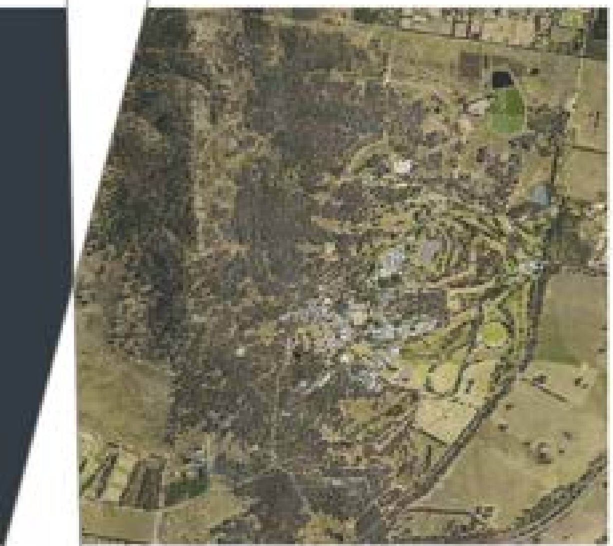
PFAS OMP Ongoing Monitoring Report

October 2021 & April 2022

Blamey Barracks Kapooka OMP

DEF19008



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Executive Summary

Background

Cardno (now Stantec) were engaged by the Australian Department of Defence (Defence) to carry out the per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Plan (OMP) (Department of Defence, 2021a) at Blamey Barracks Kapooka, New South Wales ("the Base").

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 Site. The monitoring program consists of biannual monitoring events.

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment. The OMP used the monitoring network developed as part of the PFAS Management Area Plan (PMAP) (Department of Defence, 2021b) to monitor the extent of PFAS leaving the Base through groundwater, surface water or sediment. The PMAP was designed to target areas where there is a potential risk to a receptor (for example, people or an ecological environment) associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

The OMP includes sampling and analysis of the Management Area (MA), comprised of both On-Base and Off-Base areas. The On-Base MA incorporates a portion of the Base including the eastern built-up (or developed) area from the Former Quarry in the south to the Wastewater Treatment Plant (WTP) in the north. It extends as far west as the natural ridgeline that runs north to south through the middle of the Base and to the east to include the Kapooka Creek flow pathway. The Off-Base MA consists of the public land where Kapooka Creek flows, as well as the private properties that the creek flows through.

Monitoring Program

The scope of work comprised monitoring of nine groundwater wells, 16 surface water locations and 11 sediment locations, as specified in the OMP. Works were conducted in general accordance with the Sampling and Analysis Quality Plan (SAQP) (Cardno, 2021).

The annual monitoring period for the OMP was completed between July 2021 and June 2022 and included biannual monitoring events in October 2021 (end of winter), and April 2022 (end of summer). Sampling under these different climatic conditions provides a better understanding of the movement and concentrations of PFAS in the environment.

Interpretive Assessment

Groundwater Flow Direction

Groundwater consistently flows west to northwest toward the Murrumbidgee River, which is important to understand as movement of PFAS contamination in groundwater generally correlates with the direction of groundwater flow. No significant changes in the groundwater flow regime have occurred over time.

Groundwater elevations typically varied across the monitoring period by less than half a metre (0.5 m), with lower levels observed during October 2021 (E1) when compared to April 2022 (E2). Higher elevations may be from above mean monthly rainfall recorded between November 2021 and January 2022. Groundwater elevations and associated trends will continue to be confirmed during subsequent biannual monitoring events.

Groundwater PFAS Concentrations

During the April 2022 sampling event, a first-time detection of perfluorooctanoic acid (PFOA) occurred at MW107. This is an On-Site monitoring well located within the WTP sampling area and screened within the perched water layer. Other PFAS analytes have been reported at this location historically. This detection is not considered to be associated with a new source or an impact to any receptors, as MW107 is downgradient of the WTP which is known to contain PFAS.

> PFAS results around the Former Commandants House sampling area support results reported within

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 one 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.

the PSI (Golder, 2017), and DSI (Jacobs, 2019), that the extent of any PFAS contamination and migration in groundwater within this area is currently limited.

> Results within the Kapooka Creek sampling area are consistent with pre-OMP monitoring, indicating PFAS migration from the perched water layer into the regional aquifer is currently limited.

Surface Water PFAS Concentrations

A first-time detection of both Perfluorooctane sulfonic acid + Perfluorohexane sulfonic acid (PFOS+PFHxS), and Perfluorooctane sulfonic acid (PFOS) occurred at SW149, an On-Site monitoring location within the Sewer sampling area during the April 2022 event.

One Off-Site monitoring location in the Kapooka Creek flow pathway (SW614) reported a new exceedance of adopted drinking water human health guideline values for PFOS+PFHxS, and an increase of an order of magnitude in concentration from the preceding monitoring event. Further monitoring is required to determine if this is indicative of an increasing trend or is anomalous. It is noted that an additional surface water sampling location within a nearby farm dam has been added to the OMP after the April 2022 monitoring event and will be monitored in future events to provide additional data for surface water within the Kapooka Creek flow pathway. No exceedances of the adopted assessment criteria for PFOA were reported along Kapooka Creek.

Sediment PFAS Concentrations

> A first-time detection of PFOA occurred at SD106, an On-Site monitoring location in the Overland Drainage Pathways On-Base sampling area, during the April 2022 event.

> All sediment samples collected from the On-Site drainage channels reported PFOS+PFHxS and PFOS concentrations above the LOR.

An order of magnitude increase was reported at an On-Site monitoring location in the Overland Drainage Pathways On-Base sampling area (SD136), during the April 2022 event.

Upstream sediment locations (On-Site) within the Kapooka Creek flow pathway reported increases in PFAS concentrations during E1 compared to pre-OMP levels. Concentrations decreased in the following event (E2).

CSM and Risk Profile

The October 2021 and April 2022 monitoring events did not identify any changes to the risk profile as described in the 2021 PMAP (available online at defence.gov.au/environment/pfas/Kapooka) for the MA.

The Conceptual Site Model (CSM) was reviewed for any changes in potential exposure pathways for human health and ecological receptors compared to those identified during the DSI (Jacobs 2019). Although some concentration changes were observed over the monitoring period, no new PFAS sources, new pathways, or new receptors were identified, and therefore no changes to the current CSM were required. The reported increases in concentration at select locations were mostly reported at locations near known source areas or within proximity to drainage channels and are not considered to change the overall risk profile based on the available data.

Conclusions

The October 2021 and April 2022 monitoring events met the objective of the OMP and were carried out in general accordance with the SAQP. As only two monitoring events have been completed, trends are difficult to identify given the limited dataset. Overall, there is insufficient evidence to suggest any changes in the current risk profile. Further monitoring as part of the OMP is required to reliably determine any potential long-term trends.

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Table of Abbreviations and Units

Chemical Names

DO	Dissolved Oxygen
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonic acid
PFOA	Per-fluorooctanoic acid
PFOS	Per-fluorooctane sulfonate
TDS	Total Dissolved Solids (salinity of water)

Technical Terms

AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
AS	Australian Standard
BGL	Below Ground Level
COC	Chain of Custody
CSM	Conceptual Site Model
DSI	Detailed Site Investigation
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
Esdat	Environmental Data Management Software
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
OMP	Ongoing Monitoring Plan
PMAP	PFAS Management Area Plan
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan
WTP	Wastewater Treatment Plant

Units

ha	Hectares
km	Kilometres
m	Metres
mBGL	Metres Below Ground Level
mbTOC	Metres Below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
mm	Millimetres
ppm	Parts per Million
µg/L	Micrograms per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity – Water)

1 Introduction

Cardno, now Stantec (Cardno) was engaged by the Australian Department of Defence ("Defence") to carry out the per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Plan (OMP; Department of Defence, 2021a) at Blamey Barracks, Kapooka ("the Base")The Site is located in Kapooka (Wagga Wagga), New South Wales, as shown in Figure 1, Appendix A.

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

> Cardno, (2022), *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Blamey Barracks Kapooka (Rev 3),* Reference: DEF19008, October 2022.

For the purposes of this report:

> The "On-Base Management Area" is defined as a portion of the Base including the eastern built-up (developed) portion of the Base from the Former Quarry in the south to the Wastewater Treatment Plant (WTP) in the north. It extends as far west as the natural ridgeline that runs north to south through the middle of the Base and to the east to include the Kapooka Creek flow pathway (Figure 1, Appendix A);

> The "Off-Base Management Area" includes the Kapooka Creek flow pathway on public land and all private properties which have some portion of the flow pathway passing through them. This area stretches from the Base, north all the way to the Murrumbidgee River (Figure 1, Appendix A);

> The "Management Area" (MA) is comprised of the "On-Base Management Area" and the "Off-Base Management Area" (Figure 1, Appendix A).

> The "Monitoring Area" is defined as the Base and the surrounding Off-Base areas that collectively encompasses the network of OMP monitoring locations (Figure 3, Appendix A).

1.1 Purpose and Objective

The objective of the OMP is to assess the changes in the nature and extent of PFAS in groundwater, surface water and sediment within the Monitoring Area, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor, associated with Defence's historical use of Aqueous Film Forming Foam (AFFF). The OMP will also provide confirmation of our current understanding of risk, which has been formed by previous investigations including the PSI (Golder, 2017), DSI (Jacobs, 2019) and HHERA (Jacobs, 2021).

The purpose of this PFAS OMP Ongoing Monitoring Report (OMR) is to present and evaluate OMP data from the monitoring period (July 2021 to June 2022) within the context of the PFAS Management Area Plan (PMAP), historical monitoring data (PSI, DSI and HERRA), and other ancillary information, to achieve the following objectives:

> Assess changes in the distribution, concentration, and transport of PFAS;

> Confirm or update the current understanding of risk for the purpose of protecting human health and environmental receptors; and

> Provide supporting data for the PMAP delivery and evaluation of management actions, where relevant.

1.2 Scope

Cardno carried out the following tasks to satisfy the purpose and objectives of this assessment:

> Reviewed monitoring data from the October 2021 (E1) and April/May 2022 (E2) OMP sampling events, and available data from the Preliminary Site Investigation (PSI), Detailed Site Investigation (DSI) and Human Health and Ecological Risk Assessment (HHERA);

> Undertook qualitative analysis of PFAS concentration trends; and

> Prepared this report to provide findings relevant to the objectives of the assessment.

Note that the OMR does not:

> Provide recommendations for changes to state or territory precautionary advice.

> Recommend changes or amendments to remediation measures or activities.

> Provide health advice, such as recommendations to limit PFAS exposure through food consumption.

1.3 Relevant Guidelines

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

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

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

> Department of Defence, (2019), *Contamination Management Manual* (DCMM)*,* August 2019.

> Department of Defence, (2019b), *Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance – Routine Water Quality Monitoring*.

> EPA NSW, (2002), *The NSW State Groundwater Dependant Ecosystems Policy*, April 2002.

> EPA NSW, (2004), *Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales*, Publication 1669.2, March 2004

> NSW EPA, (2016), Designing Sampling Programs for Sites Potentially Contaminated by PFAS.

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

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

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

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

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

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

2 Site Setting

A detailed description of the Base is provided in the OMP (Department of Defence, 2021a), which is summarised below.

The Base is located approximately 5 km to the west of Wagga Wagga and 160 km west of Canberra. The Base is bound between the Sturt Highway to the north and the Olympic Highway to the east and south. Churches Plain Road runs along the western boundary.

The Base is owned by the Commonwealth of Australia and comprises an area of approximately 1,990 ha. The Army Recruit Training Centre (ARTC) is located on the Base, providing training to 3,500 Army regular and 2,000 Army Reserve recruits annually (KBR, 2013), in addition to providing specialist training for the Army and other battalions. Recruits are housed On-Base at Blamey Barracks, which comprises a range of functions and amenities. The Base includes approximately 220 buildings and accommodation for up to 1,800 staff (Golder, 2017). A private lease has been held for stock agistment across grassed areas of the Base for the purposes of fire vegetation management for approximately 20 years. The Base comprises the following areas (as shown in Figure 1, Appendix A):

- Range Complex, which includes 3 Open Ranges, 1 Categorisation Range, 2 Marksmanship Ranges, 1 Grouping and Zeroing Range, a Range Danger Area, and campsites (Jacobs, 2019).
- Field Training Areas, primarily used for movement exercises.
- Cantonment, including accommodation and administrative facilities, the WTP and Fire Station.
- Disused features, which include the Former Quarry, former informal Fire Training Areas and Fire Training Pad, Former Commandant's House, Former Incinerator, and Buried Waste Areas.

2.1 Site Description

2.1.1 Surrounding Land Uses and Zoning

Land surrounding the Base is zoned 'Primary Production (RU1)', 'General Residential (R5)', 'Conservation (E2)' and 'Public Recreation (RE1)' in the Wagga Wagga City Council municipality (City of Wagga Wagga, 2018). The surrounding land uses are outlined in Table 2-1.

Table 2-1 Current and Previous Surrounding Land Uses

Direction	Historical Land Use	Current Land Use
North	▪ Off-Site: The earliest aerial imagery is from 1966 which shows the Sturt Highway as consistent with its present-day layout. Land is largely undeveloped. Limited residential development occurred from 1979 to present.	▪ RU1 – Primary Production, around the Base and north of the Sturt Highway, consisting of cleared grassland with intermittent houses and farm dams, with primary agricultural activities identified as cattle, sheep and grain farming. ▪ R5 – Large Lot Residential, including San Isidore which is immediately adjacent to the north-eastern boundary of the Base. In addition to large, rural residential properties, it also contains a rural fire station, sporting field and church. ▪ RE1 – Public Recreation, at Pomingalarna Reserve to the north of Sturt Highway, north-east of Base.
West	▪ Off-Site: Aerial imagery from 1966 shows that land to the west was relatively undeveloped, with only farmhouses. No substantial changes are considered to have occurred to the present day.	▪ RU1 – Primary Production, west of the Base towards Yarragundry, primarily consisting of cleared grassland with intermittent houses and farm dams, with primary agricultural activities identified as cattle, sheep and grain farming.
East	▪ On-Site: Aerial imagery shows that the layout of the Olympic Highway to be similar to the present day. Land underwent residential development between 1966 and 1986.	▪ C2 – Environmental Conservation, a strip which aligns with forested areas on the ridge to the east of the Base, between the Base and the City of Wagga Wagga. ▪ R1 – General Residential, approximately 3.6 km from the eastern boundary of the Base, where the westernmost suburbs of the City of Wagga Wagga are located.

Direction	Historical Land Use	Current Land Use
South	▪ Off-Site: Aerial imagery from 1966 shows the land as generally undeveloped, excavations occurred between 1986 and 1995, however, it is unclear as to what the purpose was.	▪ RU1 – Primary Production, south of the Base towards Uranqunity with intermittent housing, cultivated areas and irrigated pastures.

2.1.2 Environmental Setting

Key details defining the site are summarised in Table 2-2. See Figure 1, Appendix A for key features.

Table 2-2 Key Site Details

Setting	Description
Climate	Climate indicators have been recorded at nearby Wagga Wagga Aeronautical Meteorological Office (AMO) (072150) since 1941. Mean maximum temperatures range from 12.8°C in July to 31.9°C in January. Mean annual rainfall at this station in this period is 574.1 mm, with rain falling relatively evenly across the months of the year. The minimum mean monthly rainfall occurs in February with 39.7 mm, and the maximum in October with 56.8 mm. The prevailing wind direction in the morning (9 am) is from the east while in the afternoon (3 pm) the prevailing winds are from the west and, to a lesser extent, the south-west[1]. The Bureau of Meteorology (BoM) Kapooka Defence station (074272) has been operational since September 2017, representing a record of only five years. The mean maximum temperature in the last five years at this station is 14.2°C in July and 38.7°C in January. This is slightly warmer compared to mean maximum temperatures of 13.8°C in July and 33.5°C in January over the same period at Wagga Wagga AMO (September 2017 to present). Within the recorded five year period, the highest average volume of rainfall typically occurs during the month of November (97.3 mm) with lower falls in July (28.2 mm) recorded at the Defence 074272 station. In the same timeframe (2017 to present), the Wagga Wagga AMO station has recorded its lowest mean monthly rainfall in February (19.1 mm) with its highest in November (84.2 mm). Between the E1 and E2 events Kapooka experienced two of its wettest months since the Kapooka Defence Station began operating, being November 2021 (234.8 mm) and January 2022 (196.4 mm)[2].
Topography	The regional topography comprises ridges and tablelands stepping down westwards and breaking into detached hills with intervening alluvial valley floors. Locally, a ridgeline intersects the Base through the middle from north to south, comprising rocky outcrops, small hills and valleys. Elevations across the Base range from 190 m AHD at the northern extent to 370 m AHD at the peak towards the centre. To the east of the ridge, developed areas including the Barracks drop from approximately 270 m AHD to 230 m AHD from west to east (Jacobs, 2019).
Geology	Geology at the Base and surrounding areas consists of four main units including basement Ordovician aged metamorphic and sedimentary rock and Silurian aged Collingullie Granite. These basement lithologies are overlain by colluvial soils On-Base and to the south and alluvial sands and gravels interbedded with clay layers in the north associated with historical meanders of the Murrumbidgee River (Department of Defence, 2021b).
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) mapping, available on the Australian Soil Resource Information System (ASRIS)[3] online database indicates that there is no known occurrence of acid sulfate soils for the majority of the property with the exception of a small section of the eastern portion of the property which has a low probability of acid sulfate soil occurrence.
Hydrology	Watershed from rain is controlled by the central north to south trending ridgeline On-Base. To the east of the ridge, surface water drains from west to east in localised channels and feeds into Kapooka Creek. Kapooka Creek is ephemeral and begins in the south-eastern portion of Base as an unlined channel and runs in a northerly direction towards the Murrumbidgee River. Flow in the creek only occurs during heavy rain fall. Through San Isidore, Kapooka Creek transitions to a series of dams and low-lying areas. North of the Sturt Highway (near where the geology transitions from colluvial soils to alluvial deposits associated with the Murrumbidgee River), Kapooka Creek fans out and becomes discontinuous. Further to the east of Kapooka Creek is another north to south trending ridge line that forms the eastern extent of the valley in which the eastern portion of Base and San Isidore sit. Surface water from areas to the west of the central north to south trending ridge On-Base, including the Former Quarry and Former Commandants House, drain west towards Sandy Creek. Sandy Creek is also ephemeral and comprises a flow channel with intermittent farm dams. During heavy rainfall, Sandy Creek flows northwards and drains into the Murrumbidgee River approximately 7.5 km downstream (i.e. to the west) of Kapooka Creek. The Murrumbidgee

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td></td><td>River is a major river in the area flowing year-round from east to west and is approximately 80 m in width (Department of Defence, 2021b).</td></tr>
<tr><td>Hydrogeology</td><td>Hydrogeological units at the Base and surrounding areas can be grouped into the following:
▪ Perched water On-Base surrounding the WTP, hosted in clay with some silt. Findings in the DSI indicate this perched water isn't laterally continuous and is likely related to the adjacent WTP ponds (Department of Defence, 2021b).
▪ Perched water identified in MW601 along the Kapooka Creek flow path Off-Base. Water in MW601 is hosted in colluvial soils at 13.0 mBGL associated with Kapooka Creek. The Department of Defence (2021b) notes that "below this is a consistent clay layer from 25.0 to 30.0 mBGL, which is sufficiently continuous to act as an aquiclude preventing migration of PFAS impacted perched water from Kapooka Creek downwards into regional groundwater". However, it is Stantecs opinion that this clay layer is more likely to act as an aquitard rather than an aquiclude. This is primarily due to the geophysical investigation being 'carried out in a small area of Kapooka Creek' (Jacobs, 2021), with insufficient data for the clay layer to conclusively be defined as an aquiclude.
▪ Regional groundwater is hosted in fractured rock aquifers to the south of the MA and On-Base. Groundwater wells in this unit are hosted in granite, shale and siltstone (Department of Defence, 2021b).
▪ Regional groundwater is hosted in alluvial deposits in the north of the Management Area, where the geology transitions to interbedded alluvial sandy gravels and clays associated with the Murrumbidgee River (Department of Defence, 2021b).
Surface Water and Groundwater Connection – Although existing groundwater information is sparse, it is inferred that regional groundwater flows north towards the Murrumbidgee River, localised flow driven by topography is also possible. This is consistent with the inferred groundwater flow direction observed from E1 and E2.
Groundwater Use – Regional groundwater is known to be used for domestic, residential and agricultural purposes (primarily for stock watering).
As detailed within the DSI, 46 registered Off-Base bores exist within the MA. Bores are registered for the following purposes:
▪ Water supply: 11 bores
▪ Domestic, stock: 10 bores
▪ Dewatering (Abandoned): One bore
▪ Exploration: Four bores
▪ Recreational: Two bores
▪ Monitoring: 13 bores
▪ Irrigation: Seven bores
▪ Unknown: One bore
A review of Australian Groundwater Explorer indicates that no additional bores have been constructed since the DSI was published in 2019[4].</td></tr>
<tr><td>Environmental Sensitive Areas</td><td>Sensitive receptors in the area include the following threatened species and communities (but are not limited to):
▪ Mammals including the Eastern Bentwing-bat (Miniopterus schreibersii oceanensis), and the Squirrel Glider in the Wagga Wagga Local Government Area (Petaurus norfolcensis, endangered population)
▪ Birds including the Grey-crowned Babbler eastern subspecies (Pmatostomus temporalis temporalis), the Rainbow Bee-eater (Merops ornatus), the Magpie Goose (Anseranas semipalmata), and the White-bellied Sea-Eagle (Haliaeetus leucogaster)
▪ Reptiles including the Southern Bell Frog (Litoria raniformis), and Sloane's Froglet (Crinia sloanei)
▪ Semi-aquatic & aquatic biota including Murray Cod (Maccullochella peelii) & Trout Cod (Maccullochella macquariensis)
▪ Grass, trees & other vegetation including the Lower Murray River aquatic ecological community, Grey Box (Eucalyptus microcarpa), Grassy Woodlands and Derived Native Grasslands of south-eastern Australia (Department of Defence, 2021b)</td></tr>
</table>

1. Bureau of Meteorology, 072150, 1941 to 2022 (BoM, 2022) http://www.bom.gov.au, accessed (07/03/2023)
2. Bureau of Meteorology, 072150, 2017 to 2022 (BoM, 2022) http://www.bom.gov.au, accessed (07/03/2023)
3. Australian Soil Resource Information System, http://www.asris.csiro.au/mapping/viewer.htm, accessed (07/03/2023)
4. Australian Groundwater Explorer, http://www.bom.gov.au/water/groundwater/explorer/map.shtml, accessed (07/03/2023)

2.2 Management Area

The OMP includes sampling and analysis not only from the Base, but also from Off-Base locations situated on public land. The Base and these surrounding areas which collectively encompasses the network of OMP monitoring locations, is referred to as the “Monitoring Area” (Cardno, 2021), as defined in Section 1. This has been based upon the management area description provided within the PMAP (Department of Defence, 2021b).

The ‘On-Base Management Area’ is defined as a portion of the Blamey Barracks Kapooka (“the Base”)including the eastern built-up (or developed) portion of the Base from the Former Quarry in the south to the WTP in the north. It extends as far west as the natural ridgeline that runs north to south through the middle of the Base and to the east to include the Kapooka Creek flow pathway. The ‘Off-Base Management Area’ includes the Kapooka Creek flow pathway on public land and all private properties which have some portion of the flow pathway passing through them. This area stretches from the Base, north all the way to the Murrumbidgee River. The ‘Management Area’ is defined as comprising the On-Base Management Area, and the Off-Base Management Area.

The Management Area boundaries are presented in Figure 1, Appendix A.

2.3 Source Areas

The Site has been the subject of numerous PFAS investigations, as detailed in section 1.2.

Historical use of firefighting foam products occurred at the Base until approximately 2008. The majority of primary source areas relate to storage or testing of firefighting foam equipment, including the Fire Station, Fire Training Pad, Fire Training Areas, the Parade Ground and the Former Quarry. Primary source areas also include several areas related to waste disposal including the Enhanced Land Force (ELF) Stockpiles and Buried Waste Areas. Two other primary source areas relate to singular or less frequent discharges of firefighting foam products including using firefighting foam on a waterslide at annual Christmas parties from 1995 and 2003, and in response to a fire at the Former Commandant’s House in 2006.

Secondary source areas are related to waste treatment and discharge of treated effluent, including the WTP and grassy areas On-Base irrigated with treated effluent (Reused Effluent Irrigation Areas).

There are several Source Areas where PFAS has been detected in soil or groundwater at concentrations exceeding the adopted assessment levels (HEPA, 2020; outlined in Section 5). These have been detailed within the PMAP (2021b), and are shown in Figure 2, Appendix A, and include the following:

2.3.1 Primary Sources

- Fire Station (RMV0050-3)
- Former Fire Training Area #1 (RMV0050-3) and Inactive Incinerator (RMV0122)
- Former Fire Training Area #2 / Inactive Grenade Range (RMV0058)
- Buried Waste Area #3 (RMV0054)
- ELF Stockpiles
- Parade Ground
- Christmas Party Use Area
- Fire Training Pad
- Former Quarry (RMV0117)
- Former Commandants House

2.3.2 Secondary Sources

- Reused Effluent Areas
- WTP (RMV0051)

2.4 OMP Monitoring Locations

The network of On- and Off-Site groundwater locations sampled as part of the OMP (Department of Defence, 2021a) is summarised in Table 2-3 and shown in Figure 3, Appendix A.

Table 2-3 Blamey Barracks Kapooka Groundwater Monitoring Network

Sampling Area	Frequency	Location (On-Base/ Off-Base)	Monitoring Well / Bore ID	Justification (from the OMP; Department of Defence, 2021a)
Wastewater Treatment Plant (WTP)	Once every six months	On-Base	MW103, MW104, MW107	MW103 and MW104 are adjacent to the WTP. MW104 is located on the northern boundary of the WTP. MW103 and MW104 are installed within the regional aquifer, and MW107 is installed within the perched water layer.
Former Commandants House		On-Base	MW008, MW109, MW110	MW008 near the Former Commandants House has had consistent detections of PFAS above laboratory LOR. MW109 and MW110 to be monitored to confirm extent of PFAS in groundwater associated with impacts detected at MW008.
		Off-Base	MW625	MW625 is located Off-Base and will be monitored to confirm extent of PFAS in groundwater associated with impacts detected at MW008 and potential for future migration down-gradient to the north-west.
Kapooka Creek flow pathway		Off-Base	MW601, MW624	MW601 installed in perched water associated with Kapooka Creek and has reported PFAS concentrations with an apparent increasing trend that needs to be assessed further. MW624, adjacent to Kapooka Creek, is screened in shale in the regional aquifer and has not reported PFAS above the laboratory LOR. Ongoing monitoring is required to monitor for the potential migration of PFAS from the perched water into the regional aquifer.

The network of On- and Off-Site surface water and sediment locations sampled as part of the OMP (Department of Defence, 2021a) is summarised in Table 2-4 and shown in Figure 3, Appendix A.

Table 2-4 OMP Surface Water and Sediment Monitoring Locations and Frequency

Sampling Area	Frequency	Location (On-Base/Off-Base)	Monitoring locations	Justification (from the OMP; Department of Defence, 2021a)
Overland drainage pathways On-Base	Once every six months	On-Base	SW/SD136 SW/SD103 SW/SD106 SW/SD107 SW/SD118	These sample locations are in surface water pathways on the eastern side of the Base that feed into Kapooka Creek. SW/SD136 and SW/SD103 are downstream near the Fire Station. SW/SD107 is also downstream of the Fire Station and is located in a retention basin, which has been considered for use as part of potential management actions in the PMAP. SW/SD106 is in the drainage pathway from treated effluent irrigation areas just prior to Kapooka Creek. SW/SD118 is near Kapooka Creek On-Base. These sampling locations provide an overview of the concentrations in surface water feeding into Kapooka Creek as a result of source areas on the eastern portion of the Base.
Kapooka Creek		On-Base	SW/SD121	Risks identified Off-Base in the HHERA are all associated with Kapooka Creek. The three proposed sampling locations include SW/SD121 in an On-Base dam just prior to Kapooka Creek flowing Off-Base into San Isidore and two Off-Base locations on public

Sampling Area	Frequency	Location (On-Base/Off-Base)	Monitoring locations	Justification (from the OMP; Department of Defence, 2021a)
		Off-Base	SW/SD614 SW/SD677	land, approximately evenly spaced between the Base and the Murrumbidgee River. The two Off-Base locations (SW/SD614 and SW/SD677) are unlikely to have water present unless there has been recent rain. Therefore, it is proposed as a minimum that sediment samples are collected from these locations to assist with monitoring variability in PFAS levels along Kapooka Creek.
Sewer		On-Base	SW140 SW144 SW148 SW149	Sewer samples SW140 and SW148 are adjacent to former Fire Training Areas. SW144 and SW149 are included as these locations are immediately upstream and downstream of SW148. Similar sampling locations are not available for SW140. Sewer sampling locations are grab samples of the effluent, and are taken from existing access pits along the sewer network, If results in the OMP are found to be consistent with those in the DSI, these sampling locations may be reviewed and possibly removed from future OMP monitoring rounds.
Wastewater treatment plant ponds	Once every six months	On-Base	SW/SD108 SW/SD111	The results from previous sampling rounds have shown a slight decreasing trend in PFOS + PFHxS concentration. The objective of these sampling locations is to assess this trend. As with the sewer samples, the need for sampling beyond the first OMP round should be reviewed based on results.
Overland drainage pathways – Former Quarry		On-Base	SW/SD127	Surface water and sediment sampling point downstream of the Former Quarry in the south-west area of the Base. The DSI identified that PFAS from the Former Quarry is considered to be localised and not migrating towards Sandy Creek to the west. The objective of this sampling point is to monitor this over time and provide a trigger for review if concentrations of PFAS increase and/or decrease over time.

3 Sampling and Analytical Methodology

3.1 Sampling and Analysis Methodology

The sampling and analysis methodology is outlined in the SAQP, presented in Appendix E.

3.2 Deviations from OMP SAQP

Deviations from the SAQP are summarised in Table 3-1.

Table 3-1 Deviations from the SAQP

Location	Sampling Event	Deviation	Comments	Impact on Existing Dataset & Program
Groundwater				
MW107	E1	Not sampled	Well dry, groundwater could not be detected. While gauging well, the expected bottom of casing depth (16.21 mBTOC) could not be reached – refusal met at 14.045 mBTOC, no wet mud observed on end of interface probe (IP). It is possible the well has a blockage or a large silt build-up has occurred since the monitoring by Jacobs (2019) as part of the DSI.	This is considered to be a potential data gap as MW107 is immediately down-gradient of the WTP, and there are no additional wells targeting the perched aquifer further down-gradient near the local community. Jacobs 2019 results show PFHxS + PFOS was equivalent to the adopted drinking water criteria. This well was subsequently redeveloped and sampled in E2, with substantial plant root growth found to be present within the well likely causing obstruction during E1.
Surface Water				
SW106	E1	Not Sampled	Location Dry	This is considered to have negligible impact on the investigation as the downstream location SW121 was sampled.
SW118	E1	Not Sampled	Location Dry	This is considered to have negligible impact on the investigation as the downstream location SW121 was sampled.
SW677	E1	Not Sampled	Location Dry	This is considered to have some impact on the investigation as there are no OMP sampling locations downstream (towards the Murrumbidgee River). However, sediment data is available.
SW106	E2	Not Sampled	Location Dry	This is considered to have negligible impact on the investigation as the downstream location SW121 was sampled in this event. The location was not sampled in the previous event during October 2021 as it was also dry.
SW614	E2	Not Sampled	Location Dry	Minimal impact - Location last sampled in the October 2021 sampling event. Upstream location has been sampled in this event, but the downstream location (SW677) was dry and not sampled. Sediment data is available.
SW677	E2	Not Sampled	Location Dry	This is considered to have some impact on the investigation as there are no OMP sampling locations downstream (towards the Murrumbidgee River). The location was not sampled in the previous event during October 2021 as it was also dry. However, sediment data is available.

Location	Sampling Event	Deviation	Comments	Impact on Existing Dataset & Program
SW107 & SW108	E2	Water quality meter not recalibrated	During the E2 event EC results from one of the water quality meters did not pass the bump test on 02/05/2022 yet the instrument was not re-calibrated.	The impact is considered minimal as EC data from the E1 event for Kapooka has been compared against the EC values recorded at the SW locations sampled on 02/05/2022. Only two surface water locations (SW107 and SW108) were sampled on this day at Kapooka with the EC values for SW108 considered to be consistent with those recorded in the E1 event and as such are representative. Values for SW107 vary between the two events and are not considered consistent, however, other parameters recorded (which passed the bump test) indicate a change in conditions between the two events - which may be a result of seasonal variation.
Sediment				
Interlaboratory duplicate (split) samples for sediment	E1	No split samples for sediment	Split samples submitted to primary laboratory were lost during the process of forwarding onto the secondary laboratory. The primary laboratory asserts that they have forwarded the samples, whilst the secondary laboratory asserts that they have not received them.	This is considered to have negligible impact on the investigation as split samples for groundwater and surface water were analysed. The relative percent difference (RPD) results for these two media indicate that the differences between the primary and secondary laboratories are within acceptable limits and do not affect the validity of the results.

Changes to the monitoring network were reported, and have been documented in the relevant factual reports provided within Appendix C and Appendix D.

4 Quality Assurance and Quality Control

4.1 Data Validation Process

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following Data Quality Indicators (DQIs), as described in the SAQP, presented in Appendix E:

> Quality Assurance documentation.
> Bias.
> Data Representativeness.
> Data Precision & Accuracy.
> Laboratory Performance.
> Data Comparability.
> Data Set Completeness.

4.2 QA/QC Summary

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

Field quality assurance and quality control (QA/QC) was recorded on field sheets, and laboratory QA/QC were reported with sample results and reviewed in the Factual Report Data Quality Reviews. Standard sampling methods, handling, preservation and transport procedures were complied with as detailed in the SAQP. Quality control samples comprising blind replicate (duplicate or intra-laboratory sample), triplicate (inter-laboratory sample), rinsate blanks and trip blanks were collected during each field event, in accordance with the frequency outlined in the SAQP. Standard procedures and qualified personnel were used for each sampling event.

Field Chain of Custody forms are included in the Factual Reports and demonstrate sample integrity. The data collected is considered comparable for each sampling event and can be used for the assessment.

The data validation process (refer to the E1 and E2 factual reports in Appendix C and Appendix D) has concluded that there are no significant systematic errors in the data collection process or laboratory QC testing. Therefore, the data set used as the basis for this assessment is considered valid and complete.

5 Assessment Criteria

5.1 Groundwater and Surface Water

The assessment levels adopted for groundwater and surface water in this OMR are based upon the PFAS screening criteria specified in the OMP (Department of Defence, 2021a), which were adopted based on the guidance in the PFAS NEMP (HEPA, 2020). The adopted assessment criteria for groundwater and surface water are detailed in Table 5-1.

Table 5-1 PFAS Criteria for Groundwater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS[4]	PFOA[4]	
	µg/L		
Human Health - Surface Water Recreational	2[2]	10	HEPA 2020
Human Health - Drinking Water Quality Guideline[1]	0.07[2]	0.56	HEPA 2020
Ecological – Freshwater direct toxicity, slightly to moderately disturbed ecosystems (95% species protection)	0.13[3]	220	HEPA 2020

1. Drinking Water screening guidelines have been adopted for screening purposes for Industrial Water use, Stock Water use and Agriculture/Parks/Gardens Water use.
2. Combined PFOS and PFHxS.
3. PFOS only.
4. Limit of reporting (LOR) 0.01 µg/L.

5.2 Sediment

There are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment.

6 Contextual and Ancillary Information

In consultation with Base Management, events which have occurred within the MA over the monitoring period (July 2021 to June 2022) were identified. These have been assessed and are not considered to have influenced the monitoring results. Projects include:

> Project J0090: National CBRND Gas training (tear gas) facilities have been constructed on the southern side of the containment area and at the time of this report has been in progress for 18 months.

> Project EST3335: Company Head Quarters building refurbishment works (e.g. patching, painting and floor surfaces) have been undertaken as a result of white ants and mould issues, in addition to the demolition of Military Police compound buildings and other structures.

Neither project is considered likely to influence the monitoring results and as such have been excluded from the interpretation of results.

Higher than average rainfall within January 2022 was noted as having the potential to influence the monitoring results and has been captured within the interpretive analysis. As advised by Base, flood recording devices were reportedly installed in November 2022 as part of the flood planning project. Mass flux assessments are planned for the next monitoring period (July 2022 to June 2023). No remediation projects have been completed within the monitoring period or are currently planned at the time of writing this report.

7 Monitoring Data Summary

7.1 Groundwater

7.1.1 Groundwater Quality Field Parameters

The groundwater quality field parameters recorded during E1 and E2 monitoring events are summarised in Table 7-1 below.

Table 7-1 Groundwater Quality Field Parameters

Location	Event	pH	DO (mg/L)	EC (µS/cm)	TDS[1] (mg/L)	ORP (mV)
On-Site	E1 (October 2021)	6.45 (MW103) – 7.51 (MW008) *Slightly acidic to slightly basic*	0.46 (MW110) – 1.95 (MW103) *Generally anaerobic to aerobic conditions*	1,134 (MW109) – 4,520 (MW104)	737 (MW109) – 2,938 (MW104) *Fresh to mildly brackish water*	30.8 (MW008) – 130.8 (MW104) *Oxidising conditions*
	E2 (April/May 2022)	6.24 (MW103) – 7.35 (MW110) *Slightly acidic to slightly basic*	0.65 (MW107) – 3.19 (MW110) *Generally anaerobic to aerobic conditions*	1,302 (MW109) – 5,057 (MW104)	846 (MW109) – 3,287 (MW104) *Fresh to mildly brackish water*	-102.7 (MW109) - 119.2 (MW008) *Reducing to oxidising conditions*
Off-Site	E1 (October 2021)	6.43 (MW625) – 7.20 (MW601) *Slightly acidic to slightly basic*	0.39 (MW624) – 2.27 (MW601) *Generally anaerobic to aerobic conditions*	766.0 (MW601) – 4,294 (MW624)	497 (MW601) – 2,791 (MW624) *Fresh to mildly brackish water*	-158.0 (MW625) – 141.1 (MW624) *Reducing to oxidising conditions*
	E2 (April/May 2022)	6.54 (MW625) – 7.33 (MW601) *Slightly acidic to slightly basic*	1.08 (MW625) – 3.39 (MW601) *Generally aerobic conditions*	476 (MW601) – 2,598 (MW624)	309 (MW601) – 1,689 (MW624) *Fresh to mildly brackish water*	-74.0 (MW625) – 169.4 (MW601) *Reducing to oxidising conditions*

[1] EC in µS/cm converted to TDS in mg/L by multiplying by 0.65.

Groundwater quality field parameters recorded during the groundwater sampling program are presented in Table B1, Appendix B.

In summary, the field parameter results indicate the following:

> On-Site: pH and Oxidation-Reduction Potential (ORP) were higher during the October 2021 event, Dissolved Oxygen (DO), Electrical Conductivity (EC) and Total Dissolved Solids (TDS) were higher during the April/May 2022 event.

> Off-Site: EC and TDS were higher during the October 2021 event while pH, DO and ORP were higher during the April/May 2022 event.

7.1.2 Groundwater Elevation and Flow Directions

By using gauging records to create groundwater elevation contour plans, groundwater flow was interpreted to be generally in a north-westerly direction towards the Murrumbidgee River, consistent with previous investigations conducted by Jacobs (2019) and Golder (2017). Contour plans are included in Figures 4A-4B

Appendix A. Gauging records are presented in Table B1, Appendix B. A summary of the groundwater elevation range encountered during each monitoring event is presented in Table 7-2.

Table 7-2 Groundwater Elevation Range Summary

Event	Groundwater Elevation Range (mAHD)
DSI (February 2019)	195.803 (MW104) – 215.726 (MW107)
E1 (October 2021)	166.202 (MW625) – 200.707 (MW103)
E2 (April 2022)	166.942 (MW625) – 201.220 (MW103)

As discussed within Section 2.2, January is typically the month which sees the minimum mean monthly rainfall, with the maximum monthly rainfall within October, however, November 2021 and January 2022 each saw new rainfall records set at the Kapooka weather station between the E1 and E2 events. This may have led to the slightly increased groundwater levels observed during the E2 event.

As only two events have been completed at Kapooka, groundwater elevations are unable to be compared to historical data. Additional monitoring events are required for trends occurring as a result of seasonal variation to be established.

Groundwater elevations from wells which have been incorporated into the OMP were compared to the DSI elevations (which occurred within February 2019), with neither event able to be directly compared as the DSI elevations was gauged during a different month. Further, MW109, MW110 and MW625 were installed following the DSI as part of the HHERA (Jacobs, 2021a), and as such have been included within the groundwater elevation range presented within E1 and E2.

7.1.3 Laboratory Results

Groundwater sampling locations have been indicatively grouped with respect to major PFAS sampling areas across the site:

> Wastewater Treatment Plant.

> Former Commandants House.

> Kapooka Creek flow pathway.

These locations were used to identify trends in PFAS concentrations laterally along indicative groundwater flow paths and vertically from perched water into the deeper aquifer. Justification for the grouping of sampling locations into individual sampling areas is provided within the PMAP (Department of Defence, 2021b). For each sampling area, Table 7-3 through Table 7-5 present the PFOS+PFHxS, PFOS and PFOA results from the OMP monitoring period and the range of concentrations from historical results[1]. Wells are generally ordered from hydraulically up-gradient to down-gradient and PFAS concentration changes are highlighted where first-time detections, new exceedances, new maximums or new minimums are observed.

Laboratory analytical results were compared to the adopted assessment criteria, and are presented in Table B4, Appendix B. The PFOS+PFHxS concentrations in groundwater from 2017 to 2022 are mapped in Figures 5A-5F, Appendix A.

Laboratory certificates of analysis and chain of custody (COC) documentation are included in the Factual Reports, presented in Appendix C and Appendix D.

7.1.3.1 Wastewater Treatment Plant

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at groundwater monitoring locations associated with the WTP sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-3.

Table 7-3 Wastewater Treatment Plant – Groundwater PFOS+PFHxS, PFOS and PFOA Concentrations (µg/L)

Location ID	Aquifer	Analyte	Historical Concentration Range*	OMP Monitoring	
				E1 (Oct 2021)	E2 (Apr 2022)
MW103		PFOS+PFHxS	<0.01	<0.01	<0.01

[1] As this OMR covers the first year of monitoring under the OMP, the only historical results available are from the DSI (Jacobs, 2019) and HHERA (Jacobs, 2021a).

Location ID	Aquifer	Analyte	Historical Concentration Range*	OMP Monitoring	
				E1 (Oct 2021)	E2 (Apr 2022)
	Regional Aquifer	PFOS	<0.01	<0.01	<0.01
		PFOA	<0.01	<0.01	<0.01
MW104	Regional Aquifer	PFOS+PFHxS	<0.01	<0.01	<0.01
		PFOS	<0.01	<0.01	<0.01
		PFOA	<0.01	<0.01	<0.01
MW107	Perched Water Layer	PFOS+PFHxS	0.07 - 0.10	NS	0.14
		PFOS	<0.01 - 0.02	NS	0.02
		PFOA	<0.01	NS	0.02

New maximum	New minimum	New Exceedance	First-time Detection

Notes:
* Inclusive of QC Results
<0.01 Limit of Reporting
NS - Not Sampled

7.1.3.2 Former Commandants House

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at groundwater monitoring locations associated with the Former Commandants House sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-4.

Table 7-4 Former Commandants House – Groundwater PFOS+PFHxS, PFOS and PFOA Concentrations (µg/L)

Location ID	Aquifer	Analyte	Historical Concentration Range*	OMP Monitoring	
				E1 (Oct 2021)	E2 (Apr 2022)
MW008	Regional Aquifer	PFOS+PFHxS	0.111 – 0.23	0.11	0.10
		PFOS	0.0252 – 0.09	0.03	0.02
		PFOA	<0.0005 - <0.01	<0.01	<0.01
MW109		PFOS+PFHxS	<0.01	<0.01	<0.01
		PFOS	<0.01	<0.01	<0.01
		PFOA	<0.01	<0.01	<0.01
MW110		PFOS+PFHxS	<0.01	<0.01	<0.01
		PFOS	<0.01	<0.01	<0.01
		PFOA	<0.01	<0.01	<0.01
MW625 (Off-Base)		PFOS+PFHxS	<0.01	<0.01	<0.01
		PFOS	<0.01	<0.01	<0.01
		PFOA	<0.01	<0.01	<0.01

New maximum	New minimum	New Exceedance	First-time Detection

Notes:
* Inclusive of QC Results
<0.01 Limit of Reporting
NS - Not Sampled

7.1.3.3 Kapooka Creek Flow Pathway

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at groundwater monitoring locations associated with the Kapooka Creek Flow Pathway sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-5.

Table 7-5 Kapooka Creek Flow Pathway: Groundwater PFOS+PFHxS, PFOS and PFOA Concentrations (µg/L)

Location ID	Aquifer	Analyte	Historical Concentration Range*	OMP Monitoring	
				E1 (Oct 2021)	E2 (Apr 2022)
MW601 (Off-Base)	Perched Water Layer	PFOS+PFHxS	0.15 – 0.89	0.59	0.65
		PFOS	0.01 – 0.16	0.17	0.20
		PFOA	<0.01 – 0.01	<0.01	0.01
MW624 (Off-Base)	Regional Aquifer	PFOS+PFHxS	<0.01	<0.01	<0.01
		PFOS	<0.01	<0.01	<0.01
		PFOA	<0.01	<0.01	<0.01

New maximum	New minimum	New Exceedance	First-time detection

Notes:
* Inclusive of QC Results
<0.01 Limit of Reporting
NS - Not Sampled

7.2 Surface Water

7.2.1 Surface Water Quality Field Parameters

The stabilised surface water quality field parameters recorded during E1 and E2 monitoring events are summarised in Table 7-6 below. Stabilised water quality field parameters, water colour and turbidity observations recorded during the surface water sampling program are presented in Table B2, Appendix B.

Table 7-6 Summary of Surface Water Quality Field Parameters & Sum of PFAS January 2021 – November 2021

Location		pH	DO (mg/L)	EC (µS/cm)	TDS[1] (mg/L)	ORP (mV)
On-Site	E1 (October 2021)	7.41 (SW103) – 9.43 (SW108) *Near neutral to slightly alkaline conditions*	0.75 (SW144) – 11.07 (SW103) *Anaerobic to aerobic conditions*	124.3 (SW127) – 1,059.0 (SW148)	80.8 (SW127) – 688.4 (SW148) *Fresh water*	-51.3 (SW144) – 35.5 (SW136) *Slightly reducing to slightly oxidising conditions*
	E2 (April/May 2022)	6.66 (SW103) – 9.30 (SW108) *Near neutral to slightly alkaline conditions*	0.08 (SW144) – 8.78 (SW107) *Anaerobic to aerobic conditions*	7.7 (SW107) – 1,295.0 (SW148)	5.0 (SW107) – 841.8 (SW148) *Fresh water*	-107.8 (SW144) – 252.4 (SW107) *Reducing to oxidising conditions*
Off-Site	E1 (October 2021)[2]	6.77 *Near neutral conditions*	6.51 *Aerobic conditions*	233.4	151.7 *Fresh water*	32.9 *Slightly oxidising conditions*
	E2 (April/May 2022)[3]	-	-	-	-	-

In summary, the field parameter results indicate the following:

> On-Site: pH, DO, were higher during the October 2021 E1 event; and EC, TDS and ORP were higher during the April 2022 E2 event.

> Off-Site: As no Off-Site surface water locations contained water during the E2 monitoring event, seasonal trends in field parameters are unable to be ascertained.

7.2.2 Laboratory Results

Surface water sampling locations have been indicatively grouped with respect to major PFAS sampling areas across the site:

> Overland drainage pathways On-Base.

> Kapooka Creek.

> Sewer.

> Wastewater treatment plant ponds.

> Overland drainage pathways – Former Quarry.

These locations were used to identify trends in PFAS concentrations laterally along indicative surface water flow paths, with justification for the grouping of sampling locations into individual sampling areas provided within the PMAP (Department of Defence, 2021b). For each sampling area, Table 7-7 through Table 7-11 present the PFOS+PFHxS, PFOS and PFOA results from the OMP monitoring period and the range of concentrations from historical results[2]. Surface water results are generally ordered from hydraulically upstream to downstream and PFAS concentration changes are highlighted where first-time detections, new exceedances, new maximums or new minimums are observed.

Laboratory analytical results were compared to the adopted assessment criteria, and are presented in Table B5, Appendix B and summarised in Table 7-7 to Table 7-11 below. The PFOS+PFHxS concentrations in surface water from 2017 to 2022 are mapped in Figures 6A-6D, Appendix A.

Laboratory certificates of analysis and COC documentation are included in the Factual Reports, presented in Appendix C and Appendix D.

7.2.2.1 Overland Drainage Pathways On-Base

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at surface water monitoring locations associated with the Overland Drainage Paths On-Base sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-7.

Table 7-7 Overland Drainage Paths On-Base – Surface Water PFOS+PFHxS, PFOS and PFOA Concentrations (µg/L)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SW136	PFOS+PFHxS	4.15	1.93	0.08[1 #]
	PFOS	1.48	1.20	0.06[1 #]
	PFOA	0.11	0.04	<0.01
SW103	PFOS+PFHxS	1.31	1.31[1]	0.28
	PFOS	0.67	1.00[1]	0.19
	PFOA	0.05	0.03[1]	<0.01
SW106	PFOS+PFHxS	<0.01	NS	NS
	PFOS	<0.01	NS	NS
	PFOA	<0.01	NS	NS
SW107	PFOS+PFHxS	0.65	0.25	0.20
	PFOS	0.43	0.18	0.15
	PFOA	0.03	0.01	<0.01
SW118	PFOS+PFHxS	0.07 – 0.67	NS	0.24
	PFOS	0.07 – 0.52	NS	0.18
	PFOA	<0.01 – 0.02	NS	<0.01

[2] As this OMIR covers the first year of monitoring under the OMP, the only historical results available are from the DSI (Jacobs, 2019) and HHERA (Jacobs, 2021a).

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
New maximum	New minimum	New Exceedance	First-time detection	

Notes:
* Inclusive of QC Results
# Order of magnitude decrease
1 Duplicate/Triplicate value adopted
<0.01 Limit of Reporting
NS - Not Sampled

7.2.2.2 Kapooka Creek

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at surface water monitoring locations associated with the Kapooka Creek sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-8.

Table 7-8 Kapooka Creek – Surface Water PFOS+PFHxS, PFOS and PFOA Concentrations (µg/L)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SW121	PFOS+PFHxS	0.39	0.31	0.21
	PFOS	0.28	0.22	0.16
	PFOA	0.02	0.01	<0.01
SW614	PFOS+PFHxS	0.03	0.35^	NS
	PFOS	0.03	0.27	NS
	PFOA	<0.01	<0.01	NS
SW677	PFOS+PFHxS	NS	NS	NS
	PFOS	NS	NS	NS
	PFOA	NS	NS	NS
New maximum	New minimum	New Exceedance	First-time detection	

Notes:
* Inclusive of QC Results
^ Order of magnitude increase
<0.01 Limit of Reporting
NS - Not Sampled

7.2.2.3 Sewer

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at surface water monitoring locations associated with the Sewer sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-9.

Table 7-9 Sewer – Surface Water PFOS+PFHxS, PFOS and PFOA Concentrations (µg/L)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SW140	PFOS+PFHxS	0.25	0.02	0.02
	PFOS	0.03	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01
SW144	PFOS+PFHxS	0.03	<0.01	<0.01
	PFOS	0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SW148	PFOS+PFHxS	0.61	<0.01 #	<0.01
	PFOS	0.47	<0.01 #	<0.01
	PFOA	0.01	<0.01	<0.01
SW149	PFOS+PFHxS	<0.01	<0.01	0.02
	PFOS	<0.01	<0.01	0.02
	PFOA	<0.01	<0.01	<0.01
New maximum		New minimum	New Exceedance	First-time detection

Notes:
* Inclusive of QC Results
# Order of magnitude decrease
<0.01 Limit of Reporting
NS - Not Sampled

7.2.2.4 Wastewater Treatment Plant Ponds

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at surface water monitoring locations associated with the Wastewater Treatment Plant Ponds sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-10.

Table 7-10 Wastewater Treatment Plant Ponds – Surface Water PFOS+PFHxS, PFOS and PFOA Concentrations (µg/L)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SW108	PFOS+PFHxS	0.06	0.02	0.04
	PFOS	0.02	0.01	0.02
	PFOA	0.02	<0.01	0.01
SW111	PFOS+PFHxS	0.11	0.04	0.04
	PFOS	0.03	0.02	0.02
	PFOA	0.02	<0.01	<0.01
New maximum		New minimum	New Exceedance	First-time detection

Notes:
* Inclusive of QC Results
<0.01 Limit of Reporting
NS - Not Sampled

7.2.2.5 Overland Drainage Pathways – Former Quarry

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at surface water monitoring locations associated with the Overland Drainage Pathways – Former Quarry sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented Table 7-11.

Table 7-11 Overland Drainage Pathways – Former Quarry – Surface Water PFOS+PFHxS, PFOS and PFOA Concentrations (µg/L)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SW127	PFOS+PFHxS	<0.01	<0.01	<0.01
	PFOS	<0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01
New maximum		New minimum	New Exceedance	First-time detection

Notes:
* Inclusive of QC Results

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)

<0.01 Limit of Reporting
NS - Not Sampled

7.3 Sediment

7.3.1 Summary of Field Observations

Between E1 and E2 no significant changes to odour or sediment colour were identified, and observations were generally consistent across all events. Field observations are presented in Table B2, Appendix B.

7.3.2 Laboratory Results

Sediment sampling locations have been indicatively grouped with respect to major PFAS sampling areas across the site:

> Overland drainage pathways On-Base.

> Kapooka Creek.

> Wastewater Treatment Plant Ponds.

These locations were used to identify trends in PFAS concentrations laterally along indicative surface water paths, with justification for the grouping of sampling locations into individual sampling areas provided within the PMAP (Department of Defence, 2021b). For each sampling area, Table 7-12 through Table 7-15 present the PFOS+PFHxS, PFOS and PFOA results from the OMP monitoring period and the range of concentrations from historical results[3]. Sediment results are generally ordered from hydraulically up-gradient to down-gradient and PFAS concentration changes are highlighted where first-time detections, maximums or minimums are observed.

National assessment criteria were not established for PFAS in sediment. Laboratory analysis results have been compared against historical results, and are presented in Table B6, Appendix B. The PFOS+PFHxS concentrations in sediment are presented in Figures 7A-7C, Appendix A.

Laboratory certificates of analysis and chain of custody (COC) documentation are included in the Factual Reports, presented in Appendix C and Appendix D.

7.3.2.1 Overland Drainage Pathways On-Base

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at sediment monitoring locations associated with the Overland Drainage Pathways On-Base sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-12.

Table 7-12 Overland Drainage Pathways On-Base – Sediment PFOS+PFHxS, PFOS and PFOA Concentrations (mg/kg)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SD136	PFOS+PFHxS	-	0.005	0.0631[1] ^
	PFOS	-	0.0046	0.0606[1] ^
	PFOA	-	<0.0002	<0.005
SD103	PFOS+PFHxS	0.0096	0.0146	0.0175
	PFOS	0.0086	0.014	0.0163
	PFOA	<0.0002	<0.0002	<0.005
SD106	PFOS+PFHxS	0.008	0.0042	0.0042
	PFOS	0.0076	0.0042	0.0042
	PFOA	<0.0002	<0.0002	0.0002

[3] As this OMR covers the first year of monitoring under the OMP, the only historical results available are from the DSI (Jacobs, 2019) and HHERA (Jacobs, 2021a).

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SD107	PFOS+PFHxS	0.0149	0.0051	0.0042
	PFOS	0.0142	0.0051	0.0037
	PFOA	<0.0002	<0.0002	<0.0002
SD118	PFOS+PFHxS	0.0037	0.0045	0.0077
	PFOS	0.0037	0.0045	0.0077
	PFOA	<0.0002	<0.0002	<0.0002

New maximum	New minimum	New Exceedance	First-time detection

Notes:

* Inclusive of QC Results

[1] Duplicate/Triplicate value adopted

^ Order of magnitude increase

<0.01 Limit of Reporting

NS - Not Sampled

7.3.2.2 Kapooka Creek

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at sediment monitoring locations associated with the Kapooka Creek sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-13.

Table 7-13 Kapooka Creek – Sediment PFOS+PFHxS, PFOS and PFOA Concentrations (mg/kg)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SD121	PFOS+PFHxS	0.0246	0.033[1 2]	0.0009[#]
	PFOS	0.0238	0.033[1 2]	0.0009[#]
	PFOA	<0.0002	<0.005	<0.0002
SD614	PFOS+PFHxS	0.0097	0.0114	0.0077
	PFOS	0.0094	0.011	0.0075
	PFOA	<0.0002	<0.0002	<0.0002
SD677	PFOS+PFHxS	-	0.0075[2]	0.0068
	PFOS	-	0.0075[2]	0.0068
	PFOA	-	<0.0002	<0.0002

New maximum	New minimum	New Exceedance	First-time detection

Notes:

* Inclusive of QC Results

[#] Order of magnitude decrease

[1] Duplicate/Triplicate value adopted

[2] Result taken from sampling completed in December 2021 to confirm results obtained within the initial October 2021 E1 sampling event

<0.01 Limit of Reporting

NS – Not Sampled

7.3.2.3 Wastewater Treatment Plant Ponds

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at sediment monitoring locations associated with the WTP sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-14.

Table 7-14 Wastewater Treatment Plant Ponds – Sediment PFOS+PFHxS, PFOS and PFOA Concentrations (mg/kg)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SD108	PFOS+PFHxS	0.0004	<0.0002	<0.0002
	PFOS	0.0004	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002
SD111	PFOS+PFHxS	0.0045	0.0008	0.0005
	PFOS	0.0041	0.0008	0.0005
	PFOA	<0.0002	<0.0002	<0.0002

New maximum	New minimum	New Exceedance	First-time detection

Notes:
* Inclusive of QC Results
<0.01 Limit of Reporting
NS – Not Sampled

7.3.2.4 Overland Drainage Pathways – Former Quarry

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations at sediment monitoring locations associated with the Overland Drainage Pathways – Former Quarry sampling area for the monitoring period, and the concentration range across all historical monitoring events, are presented in Table 7-15.

Table 7-15 Overland Drainage Pathways – Former Quarry – Sediment PFOS+PFHxS, PFOS and PFOA Concentrations (mg/kg)

Location ID	Analyte	Historical Concentration Range*	OMP Monitoring	
			E1 (Oct 2021)	E2 (Apr 2022)
SD127	PFOS+PFHxS	0.0007	0.0005	<0.0002
	PFOS	0.0007	0.0005	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002

New maximum	New minimum	New Exceedance	First-time detection

Notes:
* Inclusive of QC Results
<0.01 Limit of Reporting
NS – Not Sampled

7.4 Summary

A summary of the maximum PFOS+PFHxS concentrations historically recorded and the maximum concentrations recorded during the monitoring period are presented in Table 7-16 for each media assessed and investigation area.

Table 7-16 Maximum detected PFOS+PFHxS concentrations

Sampling Area	Phase	PFOS+PFHxS Maximums		
		Groundwater (µg/L)	Surface Water (µg/L)	Sediment (mg/kg)
Wastewater Treatment Plant	Historical	0.10	0.11	0.0045
	2021/2022	0.14	0.04	0.0008
Former Commandants House	Historical	0.23	-	-
	2021/2022	0.11	-	-
Kapooka Creek flow pathway	Historical	0.89	-	-
	2021/2022	0.65	-	-
	Historical	-	4.15	0.0149

Sampling Area	PFOS+PFHxS Maximums			
	Phase	Groundwater (µg/L)	Surface Water (µg/L)	Sediment (mg/kg)
Overland drainage pathways On-Base	2021/2022	-	1.93	0.0631
Kapooka Creek	Historical	-	0.39	0.0246
	2021/2022	-	0.35	0.033
Sewer	Historical	-	0.61	-
	2021/2022	-	0.02	-
Overland drainage pathways – Former Quarry	Historical	-	<0.01	0.0007
	2021/2022	-	<0.01	0.0005

It is noted that concentration maximums are of the same order of magnitude as historical data with the following exceptions:

> Sewer: the maximum surface water concentration was an order of magnitude lower than the historical data.

8 Interpretive Analysis

This section discusses the results of the October 2021 and April 2022 monitoring events in the context of observed trends in concentrations or plume migration patterns.

It should be noted that there is limited temporal data available for the media/locations sampled at this stage. However, where possible, data was reviewed and observed from a qualitative perspective, based on results presented in Section 7.

8.1 Groundwater

8.1.1 Groundwater Quality Field Parameters

Measurements presented in Table 7-1 indicate that both On-Site and Off-Site groundwater samples are generally:

> Slightly acidic to slightly basic.

> Fresh to mildly brackish.

> Reducing to oxidising groundwater conditions.

Redox measurements were inconsistent with DO readings, which is not uncommon. This likely reflected the microbial ecology where complex assemblages of microbes influence the redox conditions at various microscales in the pore space of the aquifers.

8.1.2 Changes in the Groundwater Flow Regime

Groundwater levels have varied by less than 0.75 m between the two monitoring events. Despite the change in groundwater levels there have been no significant changes in the groundwater flow regime, with groundwater consistently flowing in a north-westerly direction toward the Murrumbidgee River. Laboratory results and field observations obtained and presented within the scope of this OMR are consistent with conclusions drawn within the PSI (Golder, 2017), and DSI (Jacobs, 2019), with vertical migration from perched water into the underlying regional aquifer currently limited.

8.1.3 Groundwater PFAS Concentrations Over Time

Groundwater PFAS concentrations from 2017 to April 2022 are presented in Figures 5A to 5F, Appendix A.

Overall, PFAS concentrations appeared generally consistent between each monitoring event, with observed trends discussed within the following sections.

As discussed within Section 7.1.3, PFAS results were arranged into three groups based on sampling area:

> Wastewater Treatment Plant (MW107 starting point).

> Former Commandants House (MW008 starting point).

> Kapooka Creek flow pathway (MW601 starting point).

Each sampling area and inferred down-gradient locations are discussed in the following sections.

8.1.3.1 Wastewater Treatment Plant

Upon review of Table 7-3 and the locations of wells adjacent to the WTP, the following evaluations were made:

> Within MW107 (which represents the perched water table to the east of the WTP), in April 2022 PFOS+PFHxS was detected at a new maximum of 0.14 µg/L, while a first-time detection for PFOA was reported at 0.02 µg/L. Increases observed are within the same order of magnitude as historically reported results, indicating PFAS concentrations are relatively stable.

> Due to the proximity of MW107 to the WTP, the observed slight increases in PFAS concentrations may be a result of leakage from the WTP, which is understood to be clay lined (Golder, 2017). However, any potential for vertical migration between the perched water layer and the regional aquifer is considered to be very limited due to the presence of the clay aquitard. This is supported by monitoring results which report PFAS below LOR at MW103 and MW104, as well as by differing water quality parameters (specifically DO, pH and ORP) observed between the perched water layer and the regional aquifer. The perched water layer is considered to be discontinuous and present locally only due to the presence of the WTP ponds (Jacobs, 2019). It should however be noted that, it is difficult to be certain about how

continuous any such aquitard may be around the WTP. Although drilling works throughout the DSI and HHERA were undertaken around the WTP and indicated a lack of connection between perched water and the regional aquifer, geophysical surveying was not completed around the WTP (Jacobs,2021).

> As outlined within the DSI (Jacobs, 2019), PFAS observed within perched water at MW107 may also be a result of rainwater infiltration. Further monitoring following periods of lower rainfall will allow for a greater understanding relating to how rainwater infiltration may be influencing observed PFAS concentrations.

> Wells MW103 and MW104 have continuously reported results below LOR for all PFAS analytes since 2019. As both wells are screened within the regional aquifer, this potentially indicates that migration of PFAS from the perched water table located adjacent to the WTP into the underlying aquifer is being limited, supporting conclusions drawn within the DSI (Jacobs, 2019). Future monitoring will be conducted to confirm this.

> As MW104 is the northernmost regional groundwater well On-Site, this suggests that PFAS impacts around the WTP are currently localised and confined to the perched water layer and is unlikely to extend Off-Site. However, additional data would be required to confirm presence/absence of PFAS concentrations in groundwater Off-Site, further down-gradient of MW104.

Results from sampling locations within the Wastewater Treatment Plant sampling area currently indicate that PFAS is present within the perched water layer adjacent to the WTP, however, migration into the underlying regional aquifer appears to be limited. Additionally, PFAS in groundwater from around the WTP appears to be currently localised at this time. Further monitoring is required to determine any long-term trends.

8.1.3.2 Former Commandants House

Upon review of Table 7-3 and the locations of wells adjacent to the Former Commandants House, the following evaluations were made:

> MW008 reported new minimum concentrations of PFOS and PFOS+PFHxS (0.02 µg/L and 0.10 µg/L respectively) during the E2 event, although still within the same order of magnitude as results from E1 and pre-OMP monitoring. PFOA concentrations were below the LOR, consistent with historical results.

> MW109, MW110 and MW625 reported no detections of PFAS above the LOR in either event, consistent with pre-OMP (i.e. DSI) monitoring results. As these wells were installed to monitor potential migration of PFAS sourced from MW008, the absence of PFAS in these three wells potentially indicates that the extent of any PFAS contamination and migration in groundwater within this area is currently limited, supporting results reported as part of the DSI. It is possible that the presence of PFAS at MW008 is a result of surface water migration, due to MW008 being an open concrete well one metre in diameter, which could allow for surface water infiltration through the well casing as hypothesised within the DSI (Jacobs, 2019). Alternatively, PFAS may have migrated through the sand and gravel alluvial deposits found to be prevalent within this area from the Former Commandants House and Shed, which are located uphill relative to MW008.

> Overall, PFAS concentrations for all wells were generally consistent with previous monitoring events.

Results from sampling locations within the Former Commandants House sampling area are consistent with PFAS results obtained from the HHERA (Jacobs, 2021), which showed that the extent of PFAS in groundwater associated with MW008 is currently limited. Further monitoring is required to assess PFAS migration from MW008 towards the north-west.

8.1.3.3 Kapooka Creek

Upon review of Table 7-5 and the locations of wells within the Kapooka Creek flow pathway, the following evaluations were made:

> During the E2 event, MW601 (perched water layer) reported a new maximum for PFOS which exceeds the adopted ecological criterion. Results indicate a potential increasing trend for PFOS since 2019 when monitoring commenced. An increasing trend was noted as occurring for PFOS+PFHxS based on pre-OMP results, however, results from E1 and E2 appear to be slightly lower than those reported during the HHERA (Jacobs, 2021). PFOA results were consistent with historical results across both events. Further monitoring is required to determine any long-term trends.

> MW624 (regional aquifer) reported no detections of PFAS above the LOR in either event, consistent with pre-OMP monitoring.

> Overall, PFAS concentrations were generally consistent with previous monitoring events. The potential increasing trend in MW601 will continue to be revisited and assessed during subsequent monitoring events.

Results from sampling locations within the Kapooka Creek sampling area are consistent with results reported within the HHERA (Jacobs, 2021), indicating PFAS concentrations within perched water associated with Kapooka Creek are generally stable. No PFAS detections within the regional aquifer were reported, consistent with the HHERA (Jacobs, 2021), and indicating that PFAS migration from perched water associated with Kapooka Creek into the underlying regional aquifer is currently limited. Ongoing sampling is required to monitor for potential future migration.

8.2 Surface Water

8.2.1 Surface Water Quality Field Parameters

Field parameters presented in Table 7-6 indicate that sampled surface water is generally:

> Near neutral to slightly alkaline.

> Fresh.

> Reducing to oxidising.

Water was freshest within the overland drainage pathways on-Base. Surface water encountered adjacent to the WTP and within the sewer network having the highest salinity. Redox measurements On-Site varied between events, with negative redox readings relatively consistent with DO readings. Only one Off-Site data point was collected within E1 and E2, as such any understanding of Off-Site surface water quality parameters is limited.

8.2.2 Surface Water – Groundwater Interaction

Laboratory results and field observations obtained and presented within the scope of this OMR are generally consistent with results from the PSI (Golder, 2017), and DSI (Jacobs, 2019), with vertical migration of PFAS from surface soils and perched water into the underlying regional aquifer currently limited. Kapooka Creek has been identified as a losing system, with downward migration of surface water into the underlying perched water aquifer likely occurring. It is noted that a mass flux assessment is currently being undertaken across the Site as part of the PMAP actions.

8.2.3 Surface Water PFAS Concentrations Over Time

Surface water PFAS concentrations from 2018 to April 2022 are presented in Figures 6A to 6D, Appendix A.

Overall, PFAS concentrations appeared generally consistent between each monitoring event, with observed trends discussed within the following sections.

As discussed within Section 7.2.2, PFAS results were arranged into five groups based on sampling area:

> Overland drainage pathways On-Base.

> Kapooka Creek.

> Sewer.

> Wastewater treatment plant ponds.

> Overland drainage pathways – Former Quarry.

Each sampling area and inferred down-gradient locations are discussed in the following sections.

8.2.3.1 Overland Drainage Pathways On-Base

Upon review of Table 7-7 and the locations of surface water monitoring locations within the Overland Drainage Pathways On-Base, the following evaluations were made:

> SW136, SW103 and SW107 reported results which were relatively consistent with pre-OMP monitoring during E1, with SW103 reporting a new maximum concentration for PFOS. SW136, SW103 and SW107 reported new minimum concentrations for all PFAS analytes during the E2 event, with PFAS concentrations at SW103 and SW107 both within the same order of magnitude as pre-OMP results. Reported PFOS+PFHxS concentrations at SW103 and SW107 remain in exceedance of the adopted drinking water human health criterion, and below recreational water criterion. SW136 reported PFOS+PFHxS concentrations above the drinking water criterion and below recreational water criterion in E2, despite decreasing by an order of magnitude relative to E1 and pre-OMP results. Despite new minimum concentrations reported within the E2 event, SW136 recorded the highest PFAS concentrations in surface water within the Management Area during the E1 event, also consistent with pre-OMP results. Further monitoring is required to determine any long-term trends.

- As SW106 was dry during both the E1 and E2 events it was unable to be sampled. Pre-OMP results obtained for this location were below LOR. It is noted that this location is unlikely to have water present unless there has been considerable rain in the lead up to sampling, with sediment collected from this location to assist with monitoring variability in PFAS levels along Kapooka Creek. See section 8.3.2.2 for a discussion of these results.
- SW118 reported PFAS concentrations which were generally consistent with pre-OMP concentrations. The reported concentrations for PFOS and PFOS+PFHxS in E2 have increased from the last round of sampling in December 2018, but have decreased from the concentrations reported in November 2018. This may be a result of rainfall experienced at the time of sampling, as it is noted that SW118 is the only location to have a sample from during dry weather and a heavy rainfall event. Further monitoring is required to determine any long-term trends.

Results from sampling locations within the Overland Drainage Pathways On-Base sampling area generally show lower concentrations than those reported pre-OMP. Further monitoring is required to determine any long-term trends.

8.2.3.2 Kapooka Creek

Upon review of Table 7-8 and the locations of surface water monitoring locations within the Kapooka Creek flow pathway, the following evaluations were made:

- SW121 reported new minimum concentrations for PFOS+PFHxS, PFOS and PFOA during the E2 event, although still within the same order of magnitude as results from E1 and pre-OMP monitoring. PFOS+PFHxS levels remain in exceedance of the adopted drinking water human health criterion, yet are below recreational water criterion.
- SW614 reported new maximum concentrations and new exceedances of drinking water criterion for PFOS+PFHxS (however remained below recreational criterion) and ecological criterion PFOS during the E1 event, with an order of magnitude increase from pre-OMP concentrations reported for PFOS+PFHxS. As SW614 is located within Kapooka Creek, this may indicate that PFAS is continuing to migrate downstream. Another potential factor affecting the difference in concentrations between E1 and DSI sampling, is that sampling within the DSI was noted to occur 30 minutes after a heavy rainfall event, whilst sampling during E1 was completed when SW614 was a stagnant water body, with no recorded rainfall for the previous two days (BoM, 2022). SW614 was unable to be sampled during E2 as the location was dry. Further monitoring is required to determine any long-term trends.
- As SW677 was dry during both the E1 and E2 events it was unable to be sampled. No pre-OMP results are available for this location. It is noted that this location is unlikely to have water present unless there has been significant rain in the lead up to sampling, with sediment collected from this location to assist with monitoring variability in PFAS levels along Kapooka Creek. See section 8.3.2.2 for a discussion of these results.

Results from sampling locations within the Kapooka Creek sampling area saw variable concentrations, with a new minimum concentration reported On-Base at SW121 (E2) and a new exceedance Off-Base at SW614 (E1).

8.2.3.3 Sewer

Upon review of Table 7-9 and the locations of surface water monitoring locations within the Sewer network, the following evaluations were made:

- Samples collected from the sewer network reported PFOS+PFHxS, PFOS and PFOA concentrations generally below LOR and lower than pre-OMP (sampling undertaken during the PSI, DSI and HHERA) levels.
- SW140 PFOS+PFHxS and PFOS concentrations reported a new minimum concentration, with PFOS+PFHxS concentrations being below the adopted drinking water human health criterion since the E1 event. SW148 reported PFOS+PFHxS, PFOS and PFOA concentrations below LOR during both E1 and E2, decreasing by an order of magnitude from historical pre-OMP levels, a new minimum for all three analytes. The Sewer sampling area exhibited elevated PFOS+PFHxS concentrations at SW140 and SW148 during the DSI. However, these concentrations decreased by more than an order of magnitude in the subsequent E1 and E2 events. The cause of this variation and the source of the increased PFOS+PFHxS concentrations in the DSI remain unclear. Further monitoring is necessary to evaluate the hypothesis presented in the DSI.
- SW144 reported a reduction in PFOS+PFHxS and PFOS concentrations by less than an order of magnitude to below the LOR in both E1 and E2. Although field observations during the E1 and E2 events

noted that there were medium and fast flows respectively, observations during the DSI monitoring event indicate that there was 'no inflow observed from PVC pipe'. As a result, the observed decreases in PFAS concentrations may be a result of considerably different flow conditions at the time of sampling. Further monitoring is required to determine any long-term trends.

> SW149 was the only location within the sewer sampling area to report an increase in PFAS concentrations, with first-time detections of PFOS+PFHxS and PFOS reported during the E2 event. However, results were below the adopted drinking water human health criteria. SW149 was selected as a sampling location due to it being directly downstream of SW148, which reported one of the highest PFAS concentrations within the DSI. PFAS concentrations at SW148 decreased to below the LOR during both E1 and E2. Sampling for SW149 is collected from a PVC inflow pipe which has extremely low flow observed during sampling in both events, with the E2 event noting 'minimal water dripping from pipe'. Further monitoring is required to determine any long-term trends or potential mechanisms which may be influencing concentrations, as results were not in line with those reported within the DSI.

Results from sampling locations within the Sewer On-Base sampling area generally saw decreased concentrations relative to those recorded pre-OMP, with results inconsistent with those reported in the DSI. Further monitoring is required to determine any long-term trends.

8.2.3.4 Wastewater Treatment Plant Ponds

Upon review of Table 7-10 and the locations of surface water monitoring within the Wastewater Treatment Plant ponds, the following evaluations were made:

> SW108 and SW111 reported a decrease in PFOS, PFOA and PFOS+PFHxS concentrations to a new minimum during the E1 event, although being within the same order of magnitude as pre-OMP concentrations. Concentrations at SW108 were observed to increase slightly during the E2 monitoring event. Further monitoring is required to determine any long-term trends.

Results from sampling locations within the Wastewater Treatment Plant Ponds sampling area wereconsistent with pre-OMP results. Further monitoring is required to determine any long-term trends.

8.2.3.5 Overland Drainage Pathways – Former Quarry

Upon review of Table 7-11 and the location of the surface water monitoring location within the Former Quarry Overland Drainage Pathway, the following evaluations were made:

> SW127 reported PFOS, PFOA and PFOS+PFHxS concentrations below the LOR for both E1 and E2, consistent with pre-OMP concentrations. This potentially indicates that there is limited migration of PFAS from the Former Quarry via the surface water drainage pathway, supporting results obtained from sampling during the DSI (Jacobs, 2018).

Results from the sampling location within the Overland Drainage Pathways – Former Quarry sampling area were consistent with pre-OMP results, indicating that PFAS from the Former Quarry is localised and not currently migrating via the surface water drainage pathway to Sandy Creek to the west. Ongoing sampling is required to monitor for potential future migration.

8.3 Sediment

8.3.1 Sediment Field Observations

Field observations are presented in Table B3, Appendix B. Overall, sediment samples taken were similar between the E1 and E2 event. No visible evidence of contamination was identified, consistent with observations during the DSI. No significant changes to odour or sediment colour were identified, when compared to historical pre-OMP field observations.

8.3.2 Sediment PFAS Concentrations Over Time

Sediment PFAS concentrations from 2018 to April 2022 are presented in Figures 7A to 7C, Appendix A.

Overall, PFAS concentrations appeared generally consistent between each monitoring event, with observed trends discussed within the following sections.

As discussed within Section 7.3.2, PFAS results were arranged into four groups based on sampling area:

> Overland drainage pathways On-Base.

> Kapooka Creek.

> Wastewater treatment plant ponds.

> Overland drainage pathways – Former Quarry.

Each sampling area and inferred down-gradient locations are discussed in the following sections.

8.3.2.1 Overland Drainage Pathways On-Base

Upon review of Table 7-12 and the locations of sediment monitoring locations within the Overland Drainage Pathways On-Base, the following evaluations were made:

> SD136 reported an increase in both PFOS+PFHxS and PFOS concentrations to a new maximum during the E2 event, with the increase being an order of magnitude greater than levels reported during the E1 event. SD103 and SD118 also reported new maximum concentrations of PFOS+PFHxS and PFOS during E2. However, increases were within the same order of magnitude as pre-OMP and E1 levels. As SW136 and SW103 reported two of the highest concentrations for Sum of PFHxS and PFOS in surface water during the DSI, the increase in concentrations at SD136 and SD103 is consistent with historical results. Further monitoring of these locations is required to establish potential trends.

> As SD118 is upstream of Kapooka Creek, the new maximum results reported in E2 potentially indicate that migration towards Kapooka Creek is occurring, which is consistent with the CSM as Kapooka Creek ultimately receives some of the On-Base stormwater, and is inferred to receive stormwater from various source areas. As historical sediment samples from this location have been collected post dry season only, this increase may be partially attributable to the large volume of rainfall experienced in the months prior to the E2 event, which may have caused a greater mass of PFAS to migrate downstream. Further monitoring of this location is required to establish potential trends.

> The new maximum concentrations observed at SD103, SD118 and SD136 may also be partially attributable to the inherent variability associated with sediment sampling, given that samples may be collected from a slightly different location each monitoring event and due to the inherent heterogeneous nature of the sample matrix. Further monitoring of these locations is required to establish potential trends.

> SD106 reported an increase in PFOS+PFHxS concentrations, with a first-time detection for PFOA reported during the E2 event. Conversely, PFOS concentrations decreased from pre-OMP levels. Further monitoring of this location is required to establish potential trends.

> SD107 reported decreased PFOS+PFHxS and PFOS concentrations in both events, although were within the same order of magnitude as pre-OMP concentrations.

Results from sampling locations within the Overland Drainage Pathways On-Base sampling area generally saw increased concentrations of PFOS+PFHxS. Further monitoring is required to determine any long-term trends.

8.3.2.2 Kapooka Creek

Upon review of Table 7-13 and the locations of sediment monitoring locations within the Kapooka Creek flow pathway, the following evaluations were made:

> SD121 reported PFOS+PFHxS concentrations comparable to pre-OMP concentrations during E1, while concentrations reported during E2 decreased by an order of magnitude. This is the most downstream On-Base location along the Kapooka Creek pathway. While concentrations at SD121 decreased in E2, sediment locations upstream of SD121 generally reported increases in PFAS concentrations during the monitoring period compared to pre-OMP levels. Further monitoring may provide further insight into the extent of any PFAS moving Off-Base, and is required to determine any long-term trends.

> SD614 reported PFOS and PFOS+PFHxS concentrations comparable to pre-OMP concentrations across both events, with a new minimum concentration reported in E2, however, was within the same order of magnitude.

> SD677 reported a decrease of PFOS and PFOS+PFHxS concentrations during the E2 event relative to E1, with pre-OMP levels not available. An additional round of sampling was undertaken during December 2021 to confirm results obtained during E1 sampling, with concentrations generally consistent across all events.

Results from sampling locations within the Kapooka Creek sampling area were generally consistent with historical results. Further monitoring is required to determine any long-term trends.

8.3.2.3 Wastewater Treatment Plant Ponds

Upon review of Table 7-14 and the locations of sediment monitoring locations within the Wastewater Treatment Plant Ponds, the following evaluations were made:

> SD108 and SD111 reported decreased PFOS+PFHxS and PFOS concentrations during E1 and E2, although were within the same order of magnitude as pre-OMP concentrations, with PFOA concentrations remaining below the LOR. SD108 reported all analytes as being below the LOR during the E1 and E2 sampling events. Historical results obtained pre-OMP showed a slight decreasing trend in PFOS+PFHxS concentrations, with results from this sampling round also showing a slight decrease. Further monitoring is required to determine any long-term trends.

Results from sampling locations within the Wastewater Treatment Plant Ponds sampling area showed a slight decrease in PFOS+PFHxS concentrations, consistent with historical results. Further monitoring is required to determine any long-term trends.

8.3.2.4 Overland Drainage Pathways – Former Quarry

Upon review of Table 7-15 and the location of the sediment monitoring location within the Former Quarry Overland Drainage Pathway, the following evaluations were made:

> Concentrations of PFOS+PFHxS and PFOS reported at SD127 decreased from pre-OMP levels over both E1 and E2 events, with both analytes below LOR during the E2 event. This potential trend is consistent with surface water results and supports the hypothesis outlined within the DSI that PFAS contamination from the Former Quarry is currently localised.

Results from the sampling location within the Overland Drainage Pathways – Former Quarry sampling area saw a decrease in PFOS+PFHxS and PFOS concentrations, indicating that PFAS from the Former Quarry is localised, with any migration via the surface water drainage pathway to Sandy Creek to the west currently limited. Ongoing sampling is required to monitor for potential future migration.

9 Discussion

9.1 Conceptual Site Model

Jacobs (2019) developed a CSM for the Site as part of the DSI, which has been reviewed by Cardno considering the new datasets available. The following has been considered:

> Is there evidence of new PFAS source areas?
> Is there evidence of new pathways via groundwater or surface water?
> Is there evidence of new receptors?

9.1.1 New PFAS Source Areas

A small number of first-time detections and new exceedances of assessment criteria in groundwater and surface water have been recorded since the DSI. However, none of these results indicate new PFAS sources. New maximums and new minimums were both reported during the monitoring period, as well as order of magnitude increases and decreases.

No new sources were identified from the ancillary information provided by the Base or the Lead Consultant.

9.1.2 New Pathways

Although some concentration changes have been observed, these are not considered to indicate new pathways of PFAS transport via groundwater, surface water or sediment, and therefore, no new pathways of PFAS transport were identified. New maximums and new minimums were both reported during the monitoring period, as well as order of magnitude increases and decreases.

No new pathways were identified from the ancillary information provided by the Base or the Lead Consultant.

9.1.3 New Receptors

No new receptors have been identified.

9.1.4 CSM Revisions

Based on the lack of new PFAS sources, new pathways, or new receptors, no changes to the current CSM are considered required.

9.2 Risk Profile

9.2.1 Summary of Risk Profile

A summary of “elevated” or “unable to be excluded” current and potential risks identified in the HHERA report (Jacobs, 2021a) are provided below.

Current risks:

> Consumption of fish from private dams by residents.
> Consumption of home-slaughtered lamb/sheep for meat consumption by residents.
> Cumulative exposure risk to residents through consumption of multiple produce types.
> Direct toxicity to lower order species.
> Bioaccumulation and effects on higher order species.

Potential risks:

> Consumption of home-grown duck eggs by residents.
> Consumption of home-slaughtered pigs for meat consumption by residents.
> Consumption of milk from dairy cattle raised by residents.

Potential risk sources have been identified and have been categorised as either Primary or Secondary source areas:

9.2.1.1 *Primary Source Areas*

> Areas where PFAS was detected in soil or groundwater exceeding the adopted assessment levels include areas associated with waste disposal including the ELF Stockpiles and Buried Waste Areas; areas which relate to the use or testing of firefighting foam equipment, including the Fire Station, Fire Training Pad, Former Fire Training Areas, the Parade Ground and the Former Quarry; and two other primary source areas which relate to singular or less frequent discharges of firefighting foam, including the waterslide at the site of annual Christmas parties from 1995 and 2003, and in response to a fire at the Former Commandant's House in 2006.

9.2.1.2 *Secondary Source Areas*

> Secondary source areas are related to waste treatment and the discharge of treated effluent, including the WTP and Reused Effluent Irrigation Areas.

9.2.2 Consideration of Monitoring Results on Risk Profile

Assessment of PFAS concentrations from E1 and E2 compared to the DSI indicate results are somewhat inconsistent. New maximums and new minimums were reported during the monitoring period, with this occasionally occurring at the same sampling location over subsequent events, with order of magnitude increases and decreases also reported. It is noted that sampling in the DSI was undertaken at the end of both October and January, making direct comparison with some of the OMP results difficult due to potential seasonal variation in concentrations. In particular, variability is expected at surface water and sediment locations due to either their ephemeral nature or in the case of sewer and WTP locations, affected by Base conditions. As such, sampling results, in particular surface water, can vary due to a number of factors at the time of sampling or in the lead up to sampling, such as rainfall, surface water flowrate, volume of water present, WTP operating conditions and time of the day or day of the week. Additionally, for the majority of monitoring locations, there is insufficient data to complete reliable quantitative or qualitative assessment of trends at this time. Overall, there is insufficient evidence to suggest any changes in the current risk profile.

It is generally considered that the existing monitoring network is sufficient to continue monitoring of these areas with respect to changes in risk profile. However, an order of magnitude increase was reported within surface water in Kapooka Creek, with increases reported in sediment. Further monitoring is required to assess and consider any long-term trends and potential changes to the risk profile. It is noted that a new Off-Base surface water sampling location within a farm dam has been added to the OMP and will be sampled in future monitoring rounds to provide additional data for surface water within the Kapooka Creek flow pathway.

9.3 Assessment of Current OMP

Cardno assessed the OMP (Department of Defence, 2021a) in consideration of the findings of this interpretive report to identify if a review of the OMP is required. As outlined in the Defence Annual Interpretive Report Guidance (Defence, 2022), the following are triggers which may require an OMP Review:

- Policy:
  - Internal or external policy changes.
  - Updates to guidance.
- Regulations or stakeholder considerations:
  - Changes to regulatory requirements.
  - Changes to regulator advice on exposure-minimisation behaviours e.g. precautionary advice.
  - Feedback and information received as a result of community consultation.
- Site conditions:
  - Changes or refinements to the monitoring network, frequency and parameters.
  - Interpretive analysis presented in the OMR.
  - Changes to the CSM or risk profile.
  - Significant changes of land use within the Monitoring Area or adjoining land.
  - The impacts of remediation work.
  - The requirements of a post-remediation Site Management Plan.

10 Conclusions

Cardno undertook the October 2021 and April 2022 biannual groundwater, surface water and sediment monitoring events at Blamey Barracks Kapooka as part of the PFAS OMP. Results from these events have been compared to adopted assessment criteria and historical data to address the objectives of the PFAS OMP OMR:

> To provide a succinct summary of the October 2021 and April 2022 monitoring data;

> To determine trends in the distribution, concentration, and transport of PFAS;

> To evaluate the current CSM and understanding of risk; and

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

The October 2021 and April 2022 monitoring and interpretive assessments have met the overall objective of the OMP to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of legacy AFFF. While there have been some deviations from the original OMP program as outlined within Section 3.2, monitoring has been carried out in general accordance with the SAQP to the extent possible.

Per the requirements outlined in the Defence Annual Interpretive Report Guidance (Defence, 2021), quantitative trend analysis of groundwater, surface water and sediment was not performed.

10.1.1 Groundwater

Results from this OMP monitoring period support results reported within the PSI (Golder, 2017) and DSI (Jacobs, 2019), that vertical migration of PFAS from surface soils and perched water into the underlying regional aquifer adjacent to the WTP is currently limited.

PFAS results around the Former Commandants House sampling area support conclusions drawn within the PSI (Golder, 2017) and DSI (Jacobs, 2019), that the extent of any PFAS contamination and migration in groundwater within this area is currently limited.

Results within the Kapooka Creek sampling area are consistent with pre-OMP monitoring, indicating that PFAS migration from the perched water layer into the regional aquifer is currently limited.

The groundwater results from the monitoring period do not indicate any new PFAS source areas, pathways or receptors. Therefore, there is no change to the current conceptual site model and risk profile.

10.1.2 Surface Water

Results from sampling locations within the Overland Drainage Pathways On-Base sampling area showed lower concentrations than those reported pre-OMP.

Results from sampling locations within the Kapooka Creek sampling area saw variable concentrations throughout the monitoring period. Further monitoring is required to determine any long-term trends.

PFAS concentrations within the sewer sampling area were generally below the LOR and lower than historical concentrations, with the exception of SW149.

Results from sampling locations within the Wastewater Treatment Plant Ponds sampling area were consistent with pre-OMP results.

Results from the sampling within the Overland Drainage Pathways – Former Quarry sampling area were consistent with pre-OMP results, indicating that PFAS from the Former Quarry is localised and not currently migrating via the surface water drainage pathway to Sandy Creek to the west.

Surface water results from the monitoring period do not indicate any new PFAS source areas, pathways or receptors. Therefore, there is no change to the current conceptual site model and risk profile.

10.1.3 Sediment

Concentrations in overland drainage pathways On-Base reported increased PFAS concentrations during E2.

Upstream sediment locations reported increases in PFAS concentrations during E1 compared to pre-OMP levels within the Kapooka Creek pathway. Concentrations decreased in the following event (E2).

Concentrations of PFAS within the WTP remained stable throughout the monitoring period. This is consistent with co-located surface water sampling results.

Concentrations of PFOS+PFHxS and PFOS reported within the Former Quarry Overland Drainage Pathway decreased from pre-OMP levels over both E1 and E2 events, with both analytes below LOR during the E2 event. This apparent trend is consistent with surface water results and supports the hypothesis outlined within the DSI (Jacobs, 2019), that PFAS contamination from the Former Quarry is currently localised.

While increases and decreases of PFAS concentrations have been observed in sediment results, they do not indicate any new PFAS source areas, pathways or receptors. Therefore, there is no change to the current conceptual site model and risk profile.

10.2 Conceptual Site Model & Risk Profile

The October 2021 and April 2022 monitoring events were carried out in general accordance with the OMP and SAQP. Results generally did not identify any substantial changes to the risk profile for the MA. An order of magnitude increase was reported within surface water at one location within Kapooka Creek, with increases reported in sediment. However, a new Off-Base surface water sampling location within a farm dam has been added to the OMP and will be sampled in future monitoring rounds to provide additional data for surface water within the Kapooka Creek flow pathway. The October 2021 and April 2022 monitoring results were generally within historical ranges or lower than historical data for all media tested. Several localised first-time detections/new exceedances of assessment criteria were identified, however, currently do not indicate new pathways of PFAS transport.

As only two monitoring events have been completed, trends are difficult to identify given the limited dataset. Overall, there is insufficient evidence to suggest any changes in the current risk profile. Further monitoring as part of the OMP is required to reliably determine any potential long-term trends.

11 References

General References

1. Australian and New Zealand Guidelines, (2018), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*
2. Australian Groundwater Explorer, http://www.bom.gov.au/water/groundwater/explorer/map.shtml, accessed (07/03/2023).
3. Australian Soil Resource Information System, http://www.asris.csiro.au/mapping/viewer.htm, accessed (07/03/2023).
4. Australian Standard AS 4482-2005, *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds*.
5. Bureau of Meteorology, 072150, 1941 to 2022 (BoM, 2022) http://www.bom.gov.au, accessed (07/03/2023).
6. City of Wagga Wagga (2018), *WaggaEX Intramaps*, (https://maps.wagga.nsw.gov.au/intramaps90/default.htm?project=WaggaEx).
7. Department of Defence, (2019a), *Contamination Management Manual – Annex L Guidance on Data Management*, July 2018, amended August 2019.
8. Department of Defence, (2019b), *Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance - Routine Water Quality Monitoring.*
9. Department of Defence, (2022), *PFAS OMP Annual Interpretive Report Guidance – Version 0.4. October 2022.*
10. Department of Defence, Department of Energy, (2018), *Quality System Manual Schedule B15 USEPA DQO Process.*
11. Heads of Environmental Protection Authority's Australia and New Zealand, (HEPA; 2020), *National Environmental Management Plan (NEMP),* Version 2.0, January 2020.
12. National Environment Protection Council, (NEPC; 1999), *National Environmental Protection (Assessment of Site Contamination) Measure* (as amended), registered May 2013.
13. National Health and Medical Research Council, (NHMRC; 2019), *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water,* August 2019.
14. Standards Australia/Standards New Zealand, (1998) AS5667.1:1998 *'Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'*.
15. U.S. Environmental Protection Agency, (USEPA; 2000), *Guidance for the Data Quality Objectives Process (EPA QA/G-4).*
16. USEPA, (2002), *Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8),* November 2002.

Site Specific References

17. KBR, (2013), *Kapooka Training Area Sustainability Monitoring and Reporting Plan (No. MEN208-TDEV-GEB-0005 Rev0)*, Kellogg Brown & Root Pty Ltd.
18. Golder, (2017), *Preliminary Site Investigation for PFAS Blamey Barracks Kapooka (0315) (No.1669283_001_R_Rev1)*, Golder Associates Pty Ltd.
19. Jacobs, (2019), *Blamey Barracks Comprehensive PFAS Investigation – Detailed Site Investigation (No. IS253200-040-NP-RPT-0002 Rev4)*, Jacobs Group (Australia) Pty Ltd.
20. Cardno, (2021), *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP), Blamey Barracks Kapooka*, Prepared for Department of Defence, 28 October 2021.
21. Department of Defence, (2021a), *PFAS Ongoing Monitoring Plan (OMP) - Blamey Barracks Kapooka*, June 2021.

22. Department of Defence, (2021b), *PFAS Management Area Plan (PMAP) – Blamey Barracks Kapooka*, June 2021.
23. Jacobs, (2021), *Blamey Barracks Comprehensive PFAS Investigation – Human Health and Ecological Risk Assessment (No. IS253200-040-NP-RPT-0006 Rev4,* June 2021.
24. Cardno, (2022a), *PFAS OMP Factual Report*: *Biannual Sampling Event October 2021*, 17 May 2022.
25. Cardno, (2022b), *PFAS OMP Factual Report*: *Biannual Sampling Event April/May 2022*, 9 August 2022.

APPENDIX

A

FIGURES

Cardno

now

Stantec

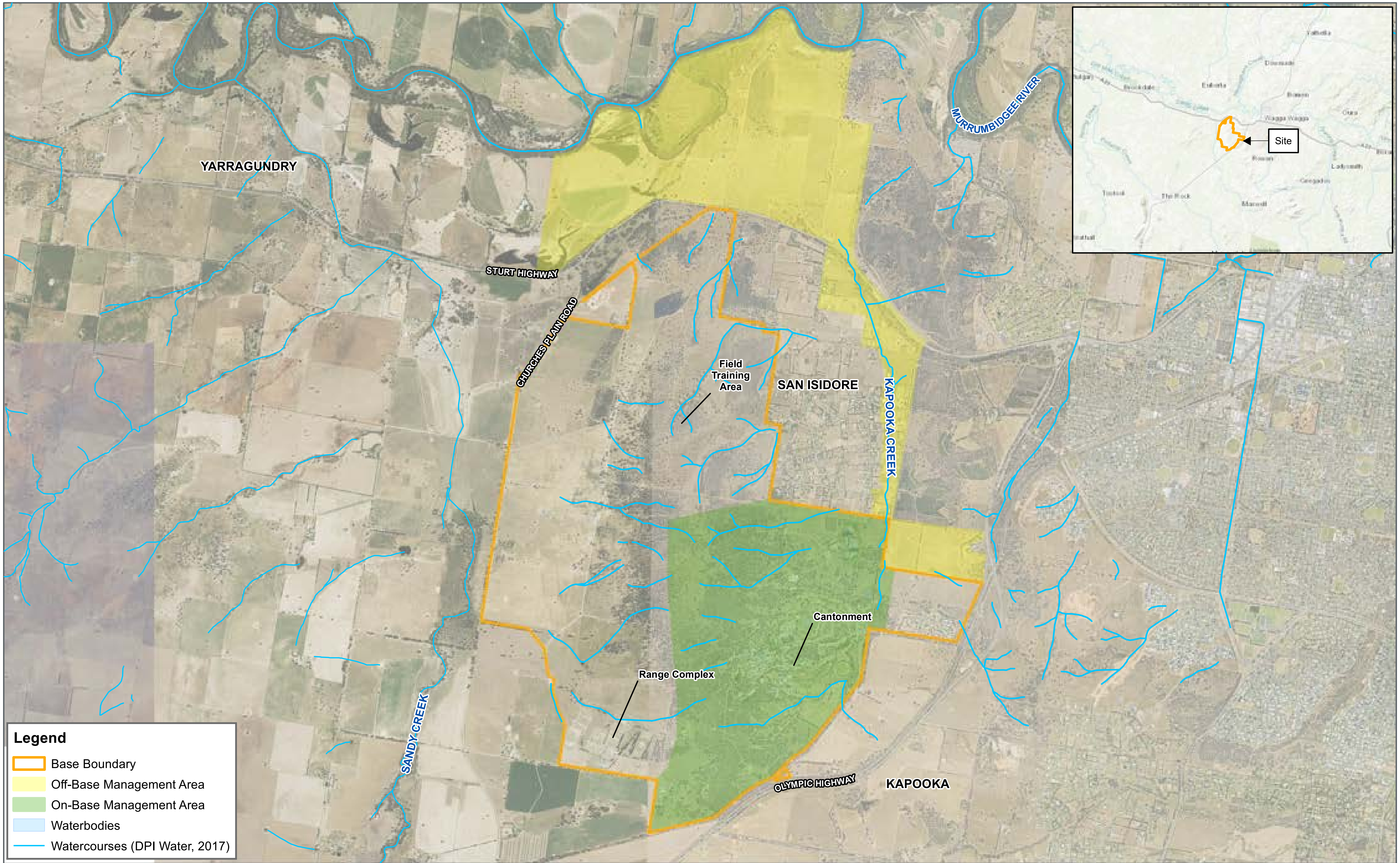

FIGURE 1

1:40,000 Scale at A3

Metres

0 1,000 2,000

Site Locality Plan & Management Areas

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-12-05 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0164-SiteLocalityPlan_K.mxd 02
Aerial Imagery Supplied by Metromap (February, 2022)

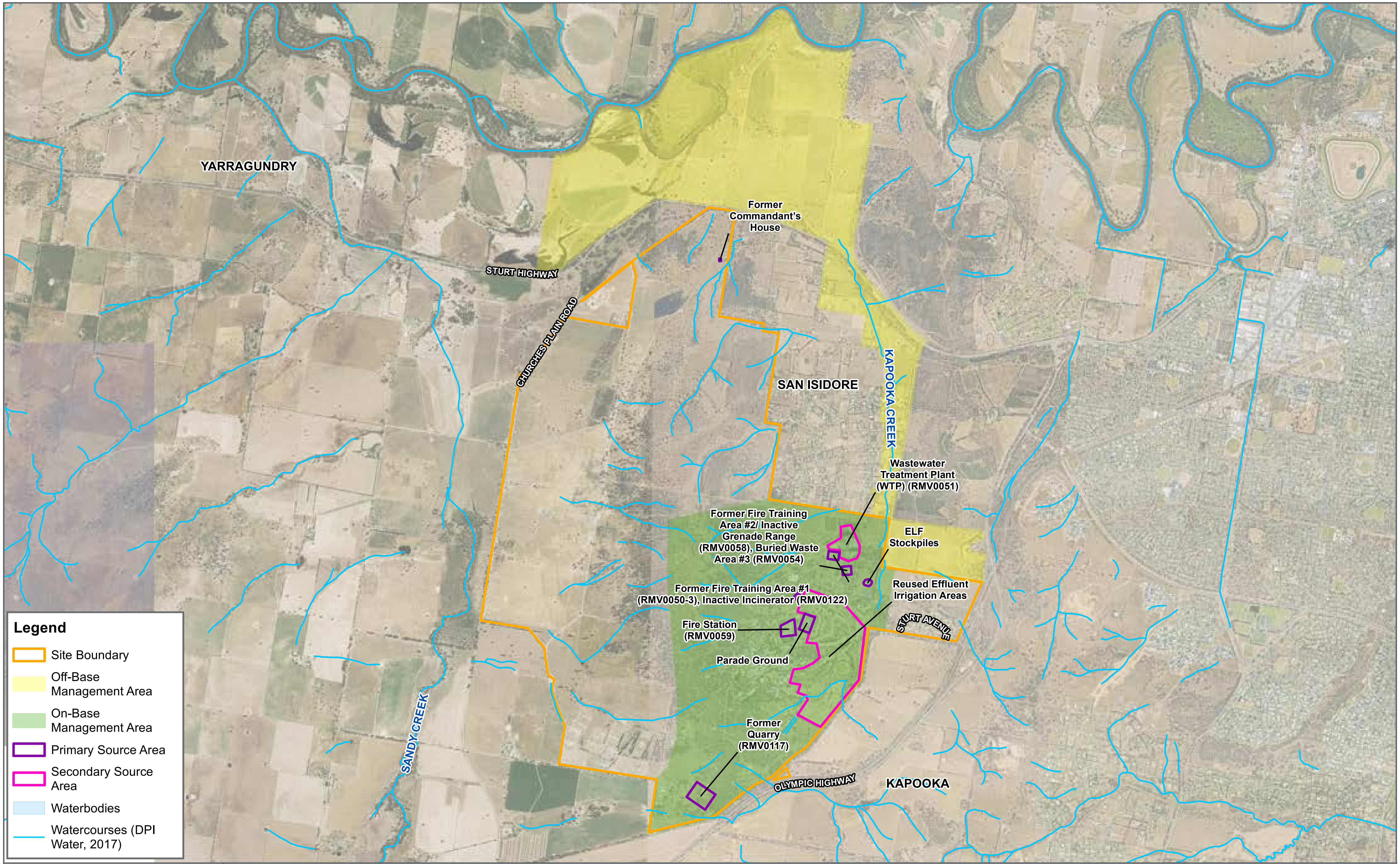

FIGURE 2

1:40,000 Scale at A3

Source Areas

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-12-05 | Project: DEF19008
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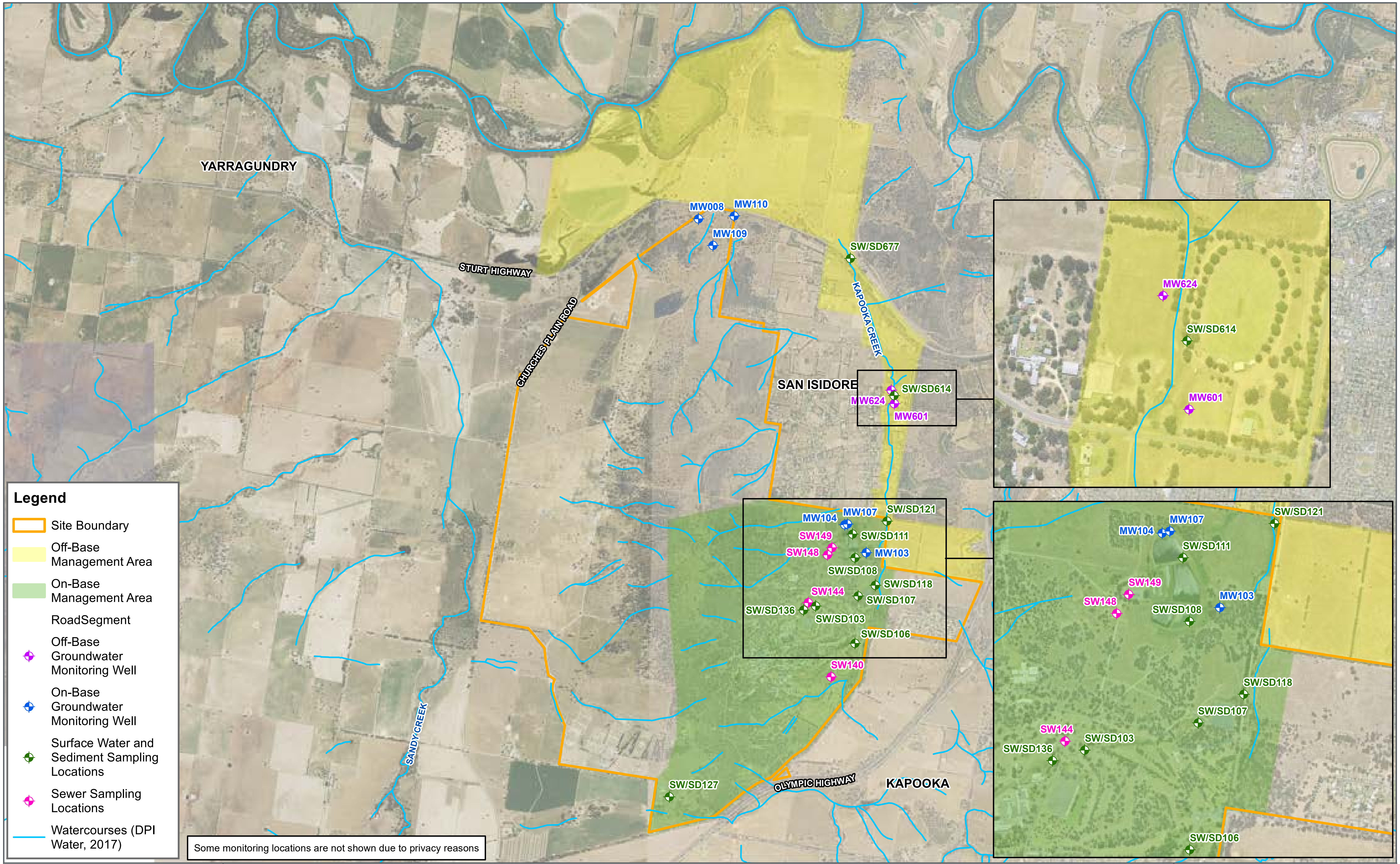

FIGURE 3

1:40,000 Scale at A3

Metres
0 1,000 2,000

Sampling Locations

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno Stantec

Map Produced by Cardno now Stantec
Date: 2023-12-05 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0166-SampleLocationsN_K.mxd 03
Aerial Imagery Supplied by Metromap

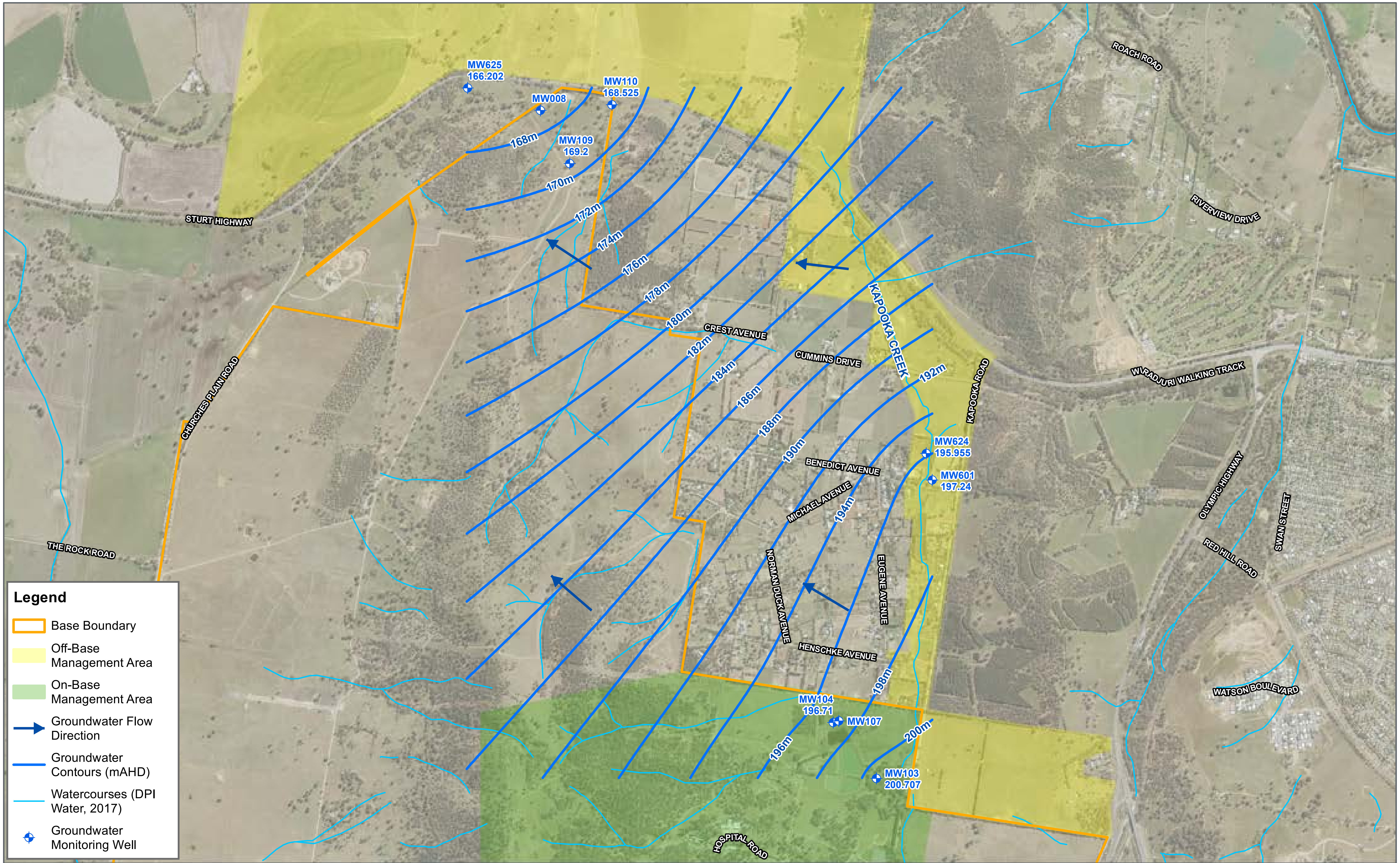

FIGURE 4A

1:20,000 Scale at A3

Metres 0 500 1,000

Groundwater Elevation Contours (October, 2021)

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno — Stantec

Map Produced by Cardno now Stantec
Date: 2022-02-21 | Project: DEF19008
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Map: DEF19008-GS-0204-GW_Contours_K.mxd 01
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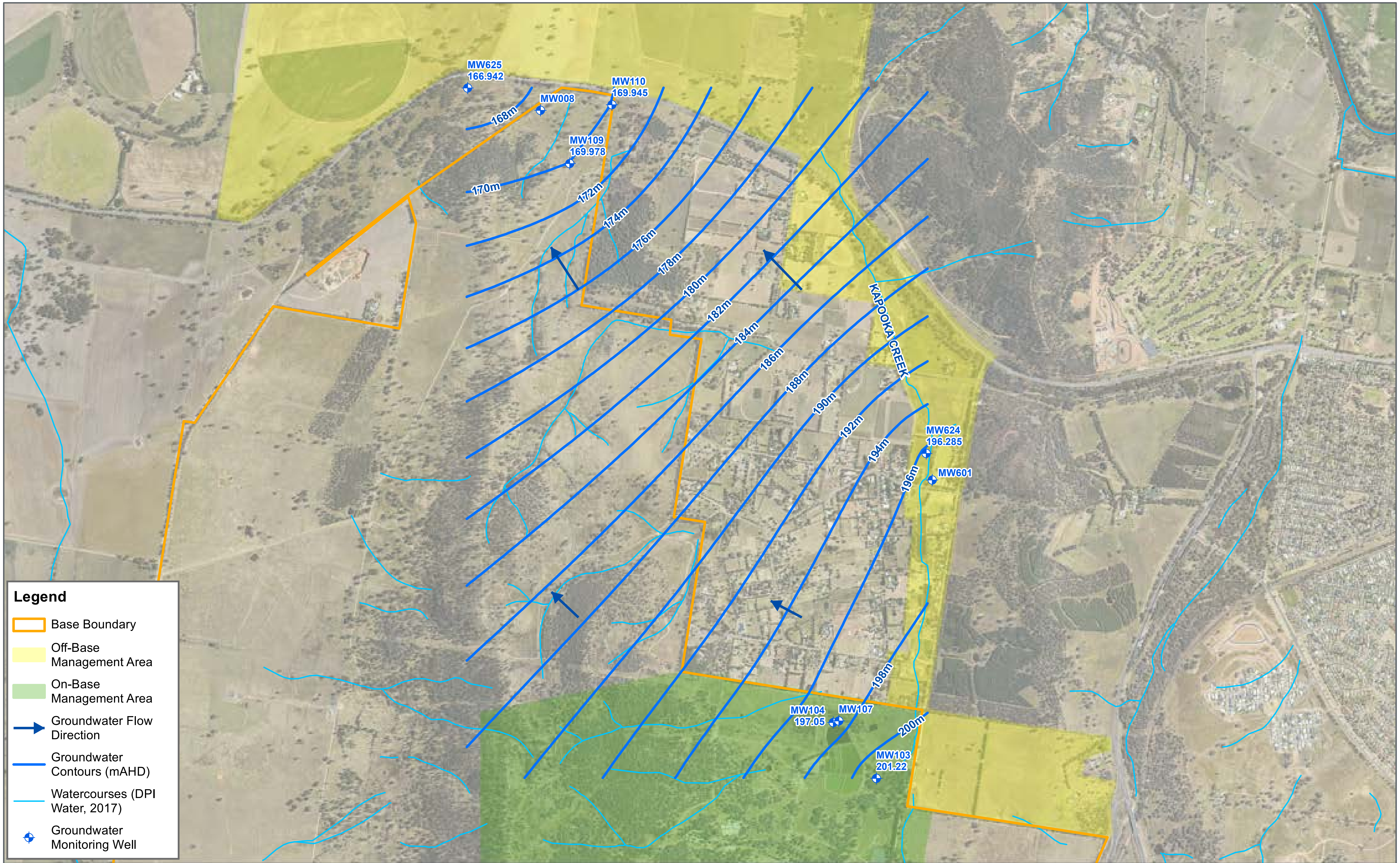

FIGURE 4B

1:20,000 Scale at A3

Metres
0 500 1,000

Groundwater Elevation Contours (April, 2022)

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

N

Cardno — Stantec

Map Produced by Cardno now Stantec
Date: 2022-07-21 | Project: DEF19008
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Map: DEF19008-GS-0231-GW_Contours_E2_K.mxd 01
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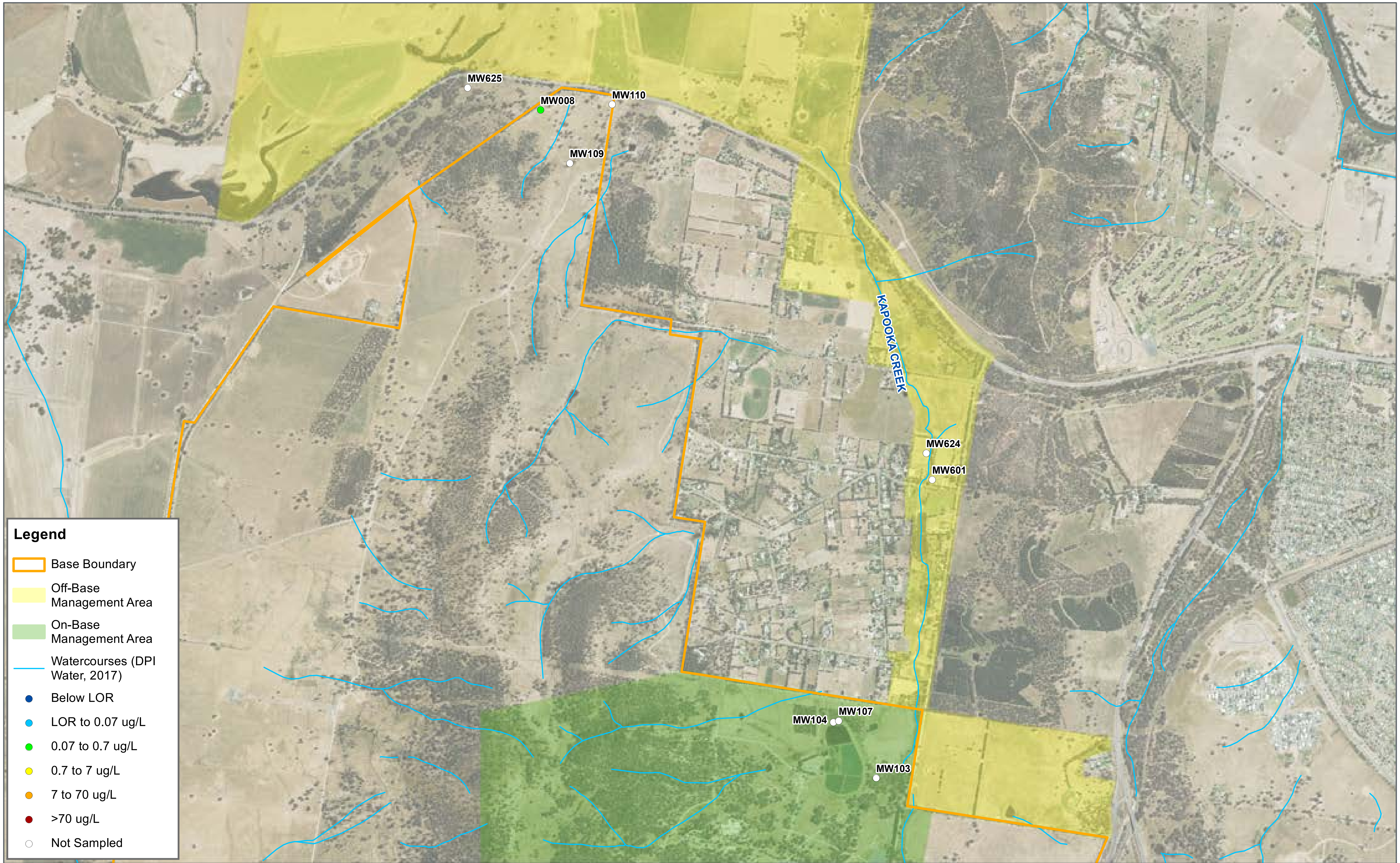

FIGURE 5A

1:20,000 Scale at A3

Metres

0 500 1,000

Groundwater PFAS Extent - 2017

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

N

Map Produced by Cardno now Stantec
Date: 2023-03-24 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0276-GW_PFAS_Extent_2017_K.mxd 01
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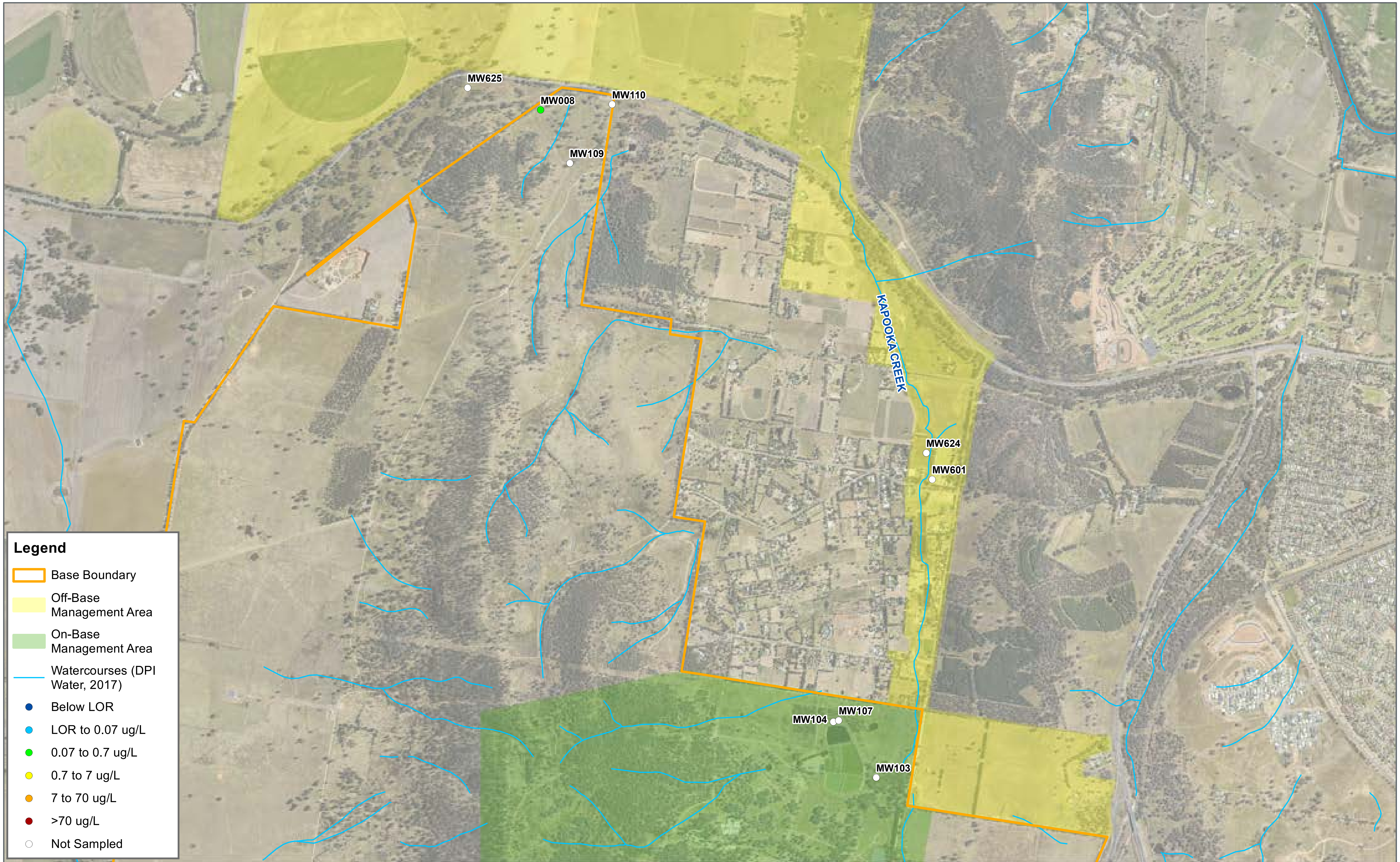

FIGURE 5B

1:20,000 Scale at A3

Metres
0 500 1,000

Groundwater PFAS Extent - 2018

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

N

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-01-30 | Project: DEF19008
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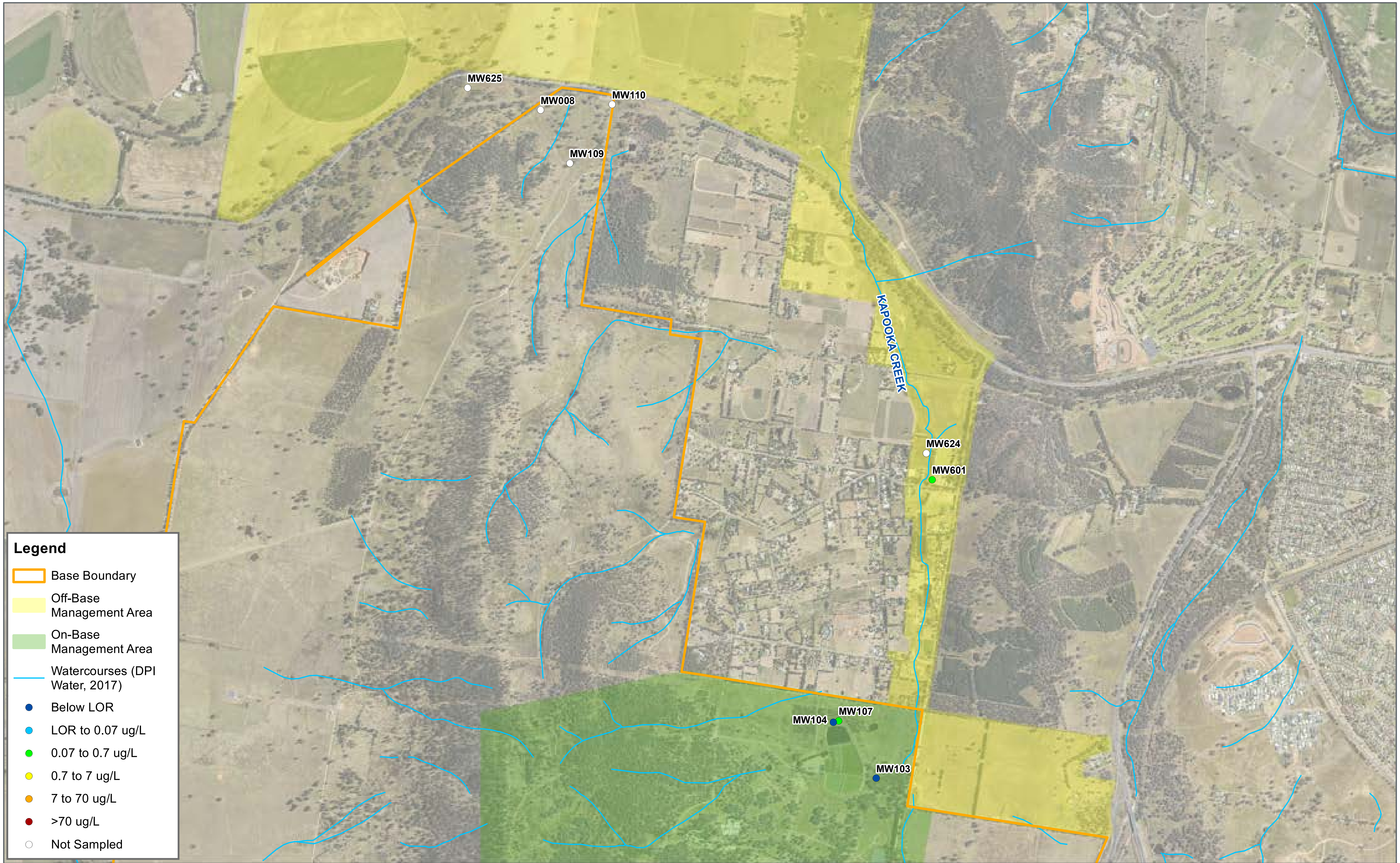

FIGURE 5C

1:20,000 Scale at A3

Metres 0 500 1,000

Groundwater PFAS Extent - 2019

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

N

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-01-30 | Project: DEF19008
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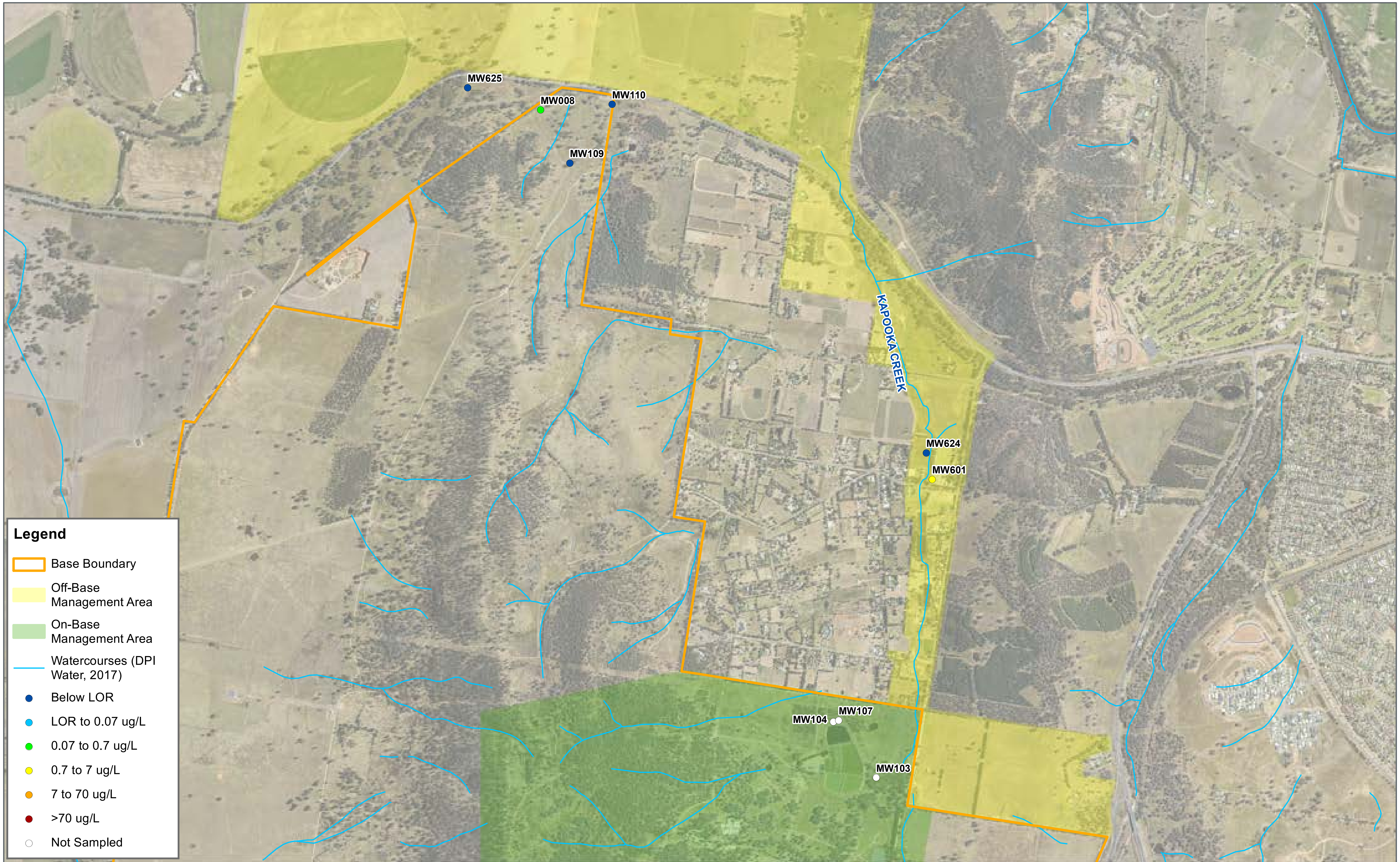

FIGURE 5D

1:20,000 Scale at A3

Groundwater PFAS Extent - 2020

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Map Produced by Cardno now Stantec
Date: 2023-02-06 | Project: DEF19008
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Map: DEF19008-GS-0279-GW_PFAS_Extent_2020_K.mxd 01
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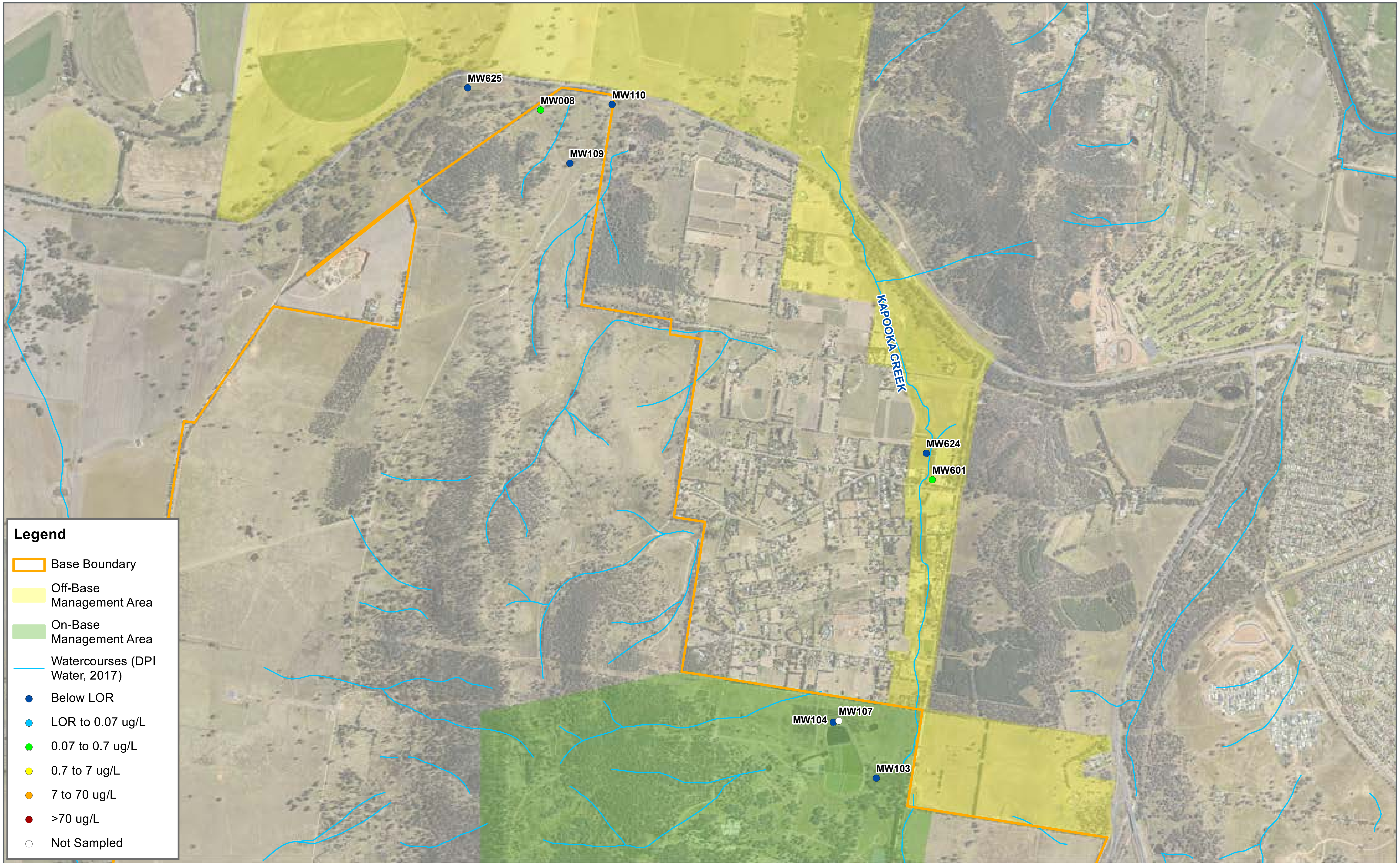

FIGURE 5E

1:20,000 Scale at A3

Metres 0 500 1,000

Groundwater PFAS Extent - 2021 (E1)

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

N

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-02-06 | Project: DEF19008
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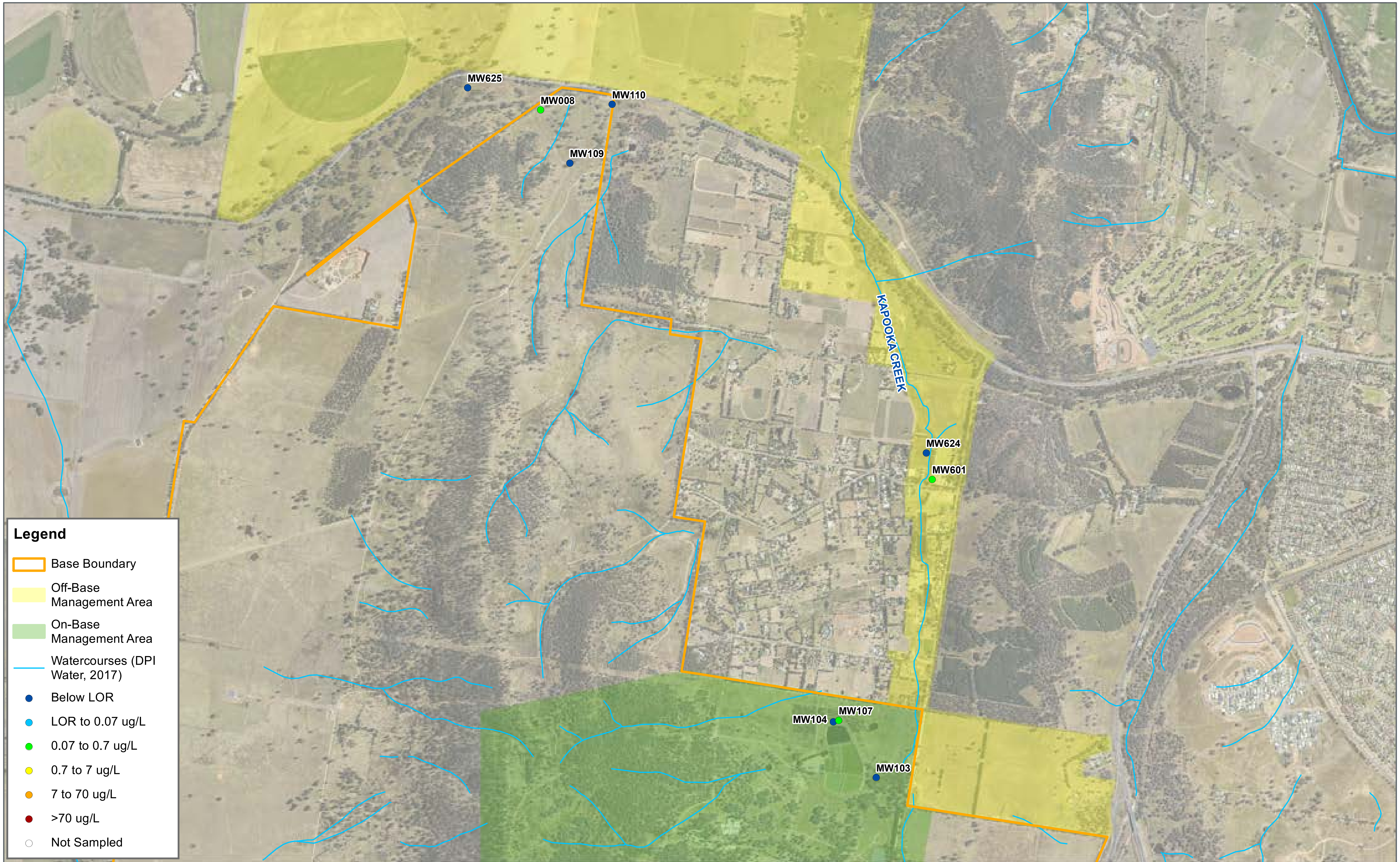

FIGURE 5F

1:20,000 Scale at A3

Groundwater PFAS Extent - 2022 (E2)

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Map Produced by Cardno now Stantec
Date: 2023-02-06 | Project: DEF19008
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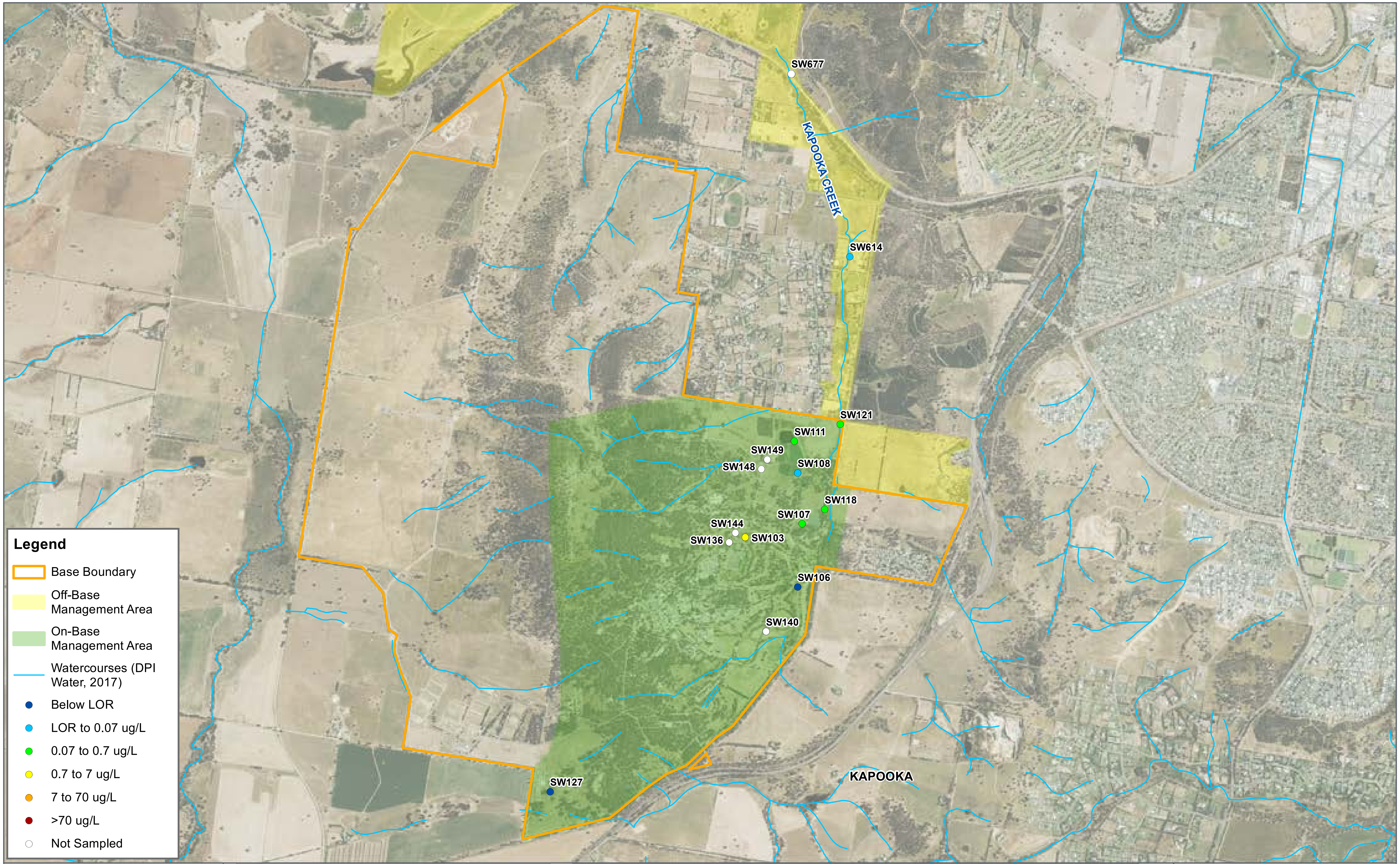

FIGURE 6A

1:30,000 Scale at A3

Metres
0 500 1,000

Surface Water PFAS Extent - 2018

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-03-17 | Project: DEF19008
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Map: DEF19008-GS-0291-SW_PFAS_Extent_2018_K.mxd 01
Aerial Imagery Supplied by Metromap (February 2022)

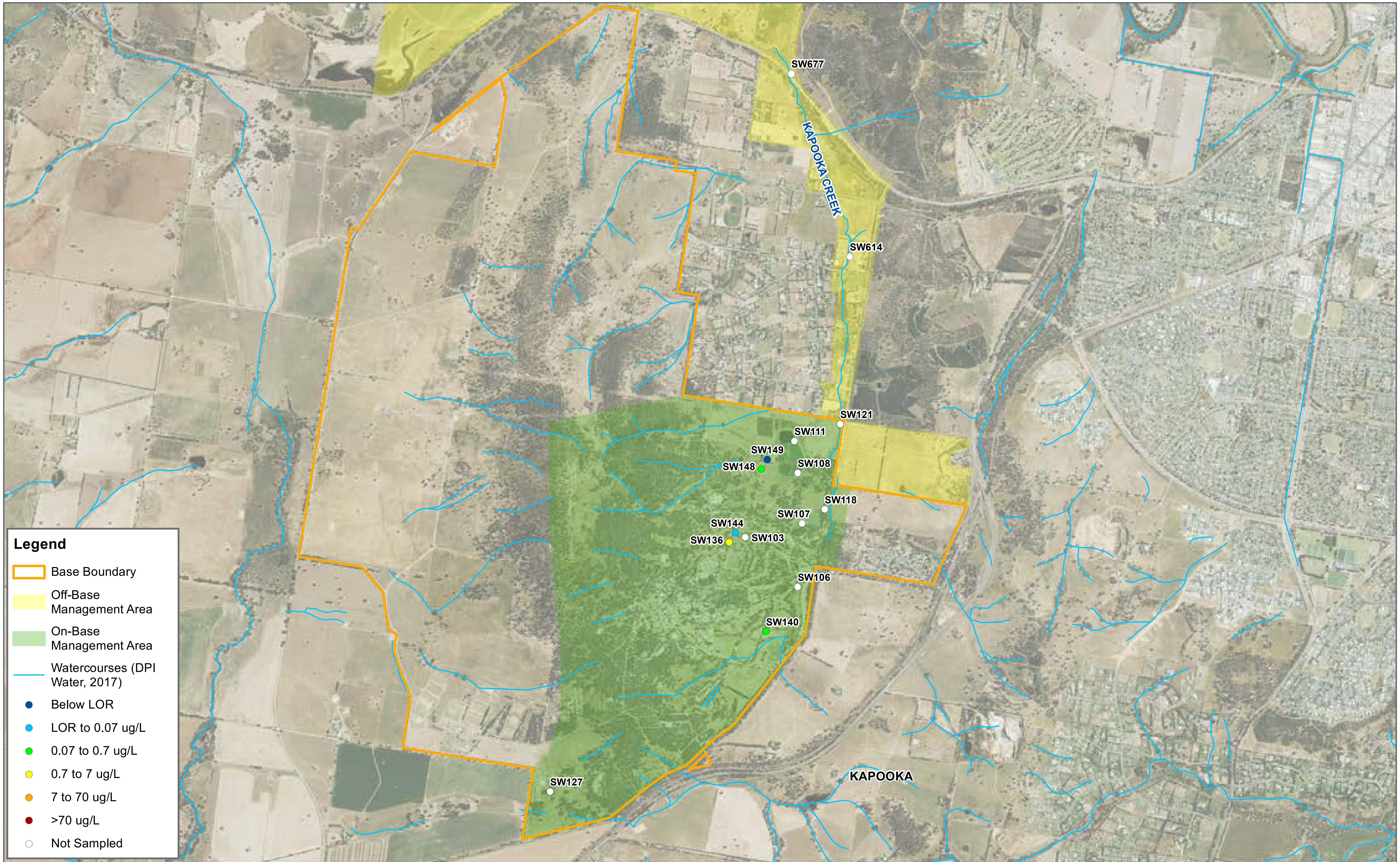

FIGURE 6B

1:30,000 Scale at A3

Metres
0 500 1,000

Surface Water PFAS Extent - 2019

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-03-17 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0292-SW_PFAS_Extent_2019_K.mxd 01
Aerial Imagery Supplied by Metromap (February 2022)

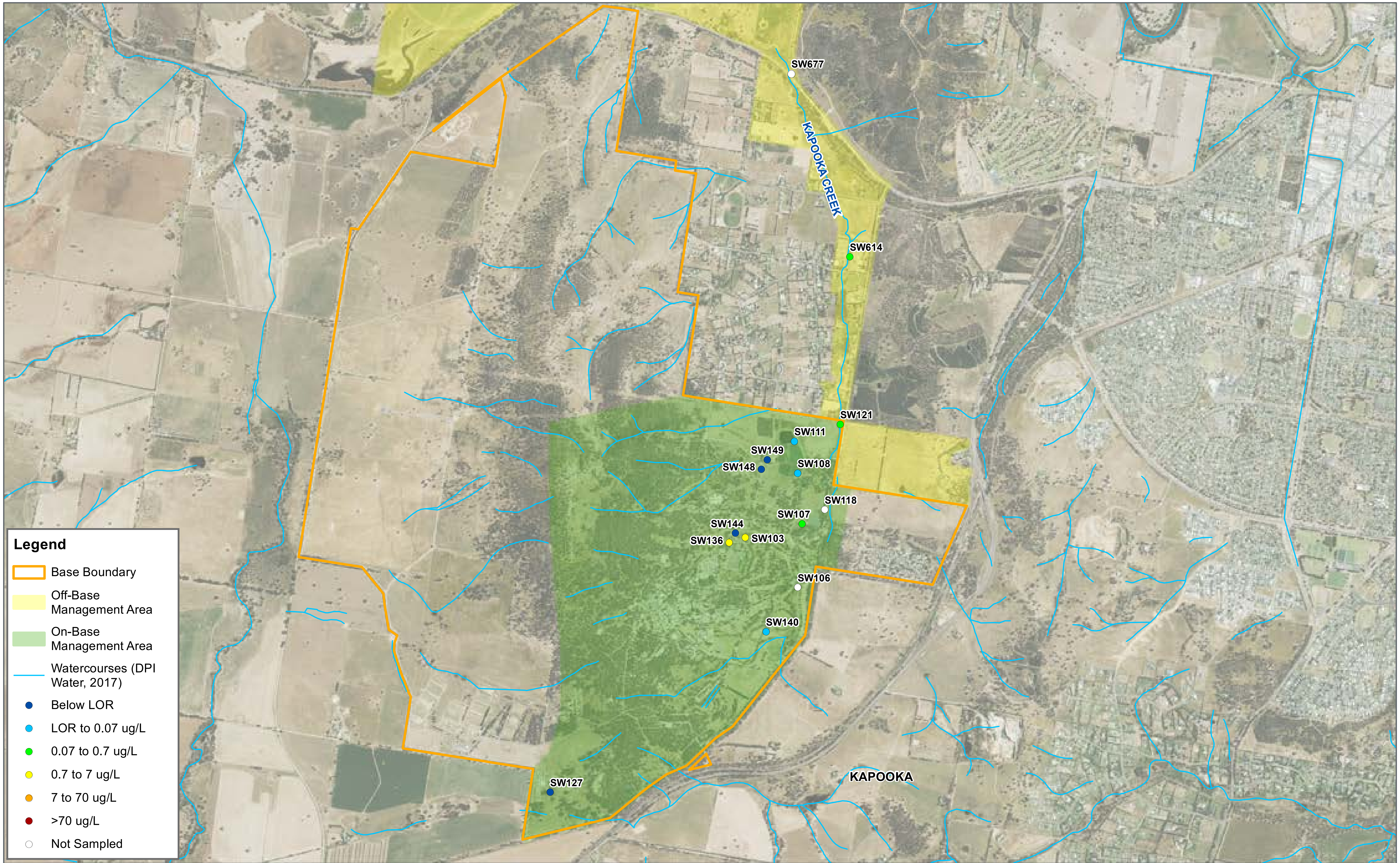

FIGURE 6C

1:30,000 Scale at A3

Metres
0 500 1,000

Surface Water PFAS Extent - 2021 (E1)

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-03-17 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0293-SW_PFAS_Extent_2021_K.mxd 01
Aerial Imagery Supplied by Metromap (February 2022)

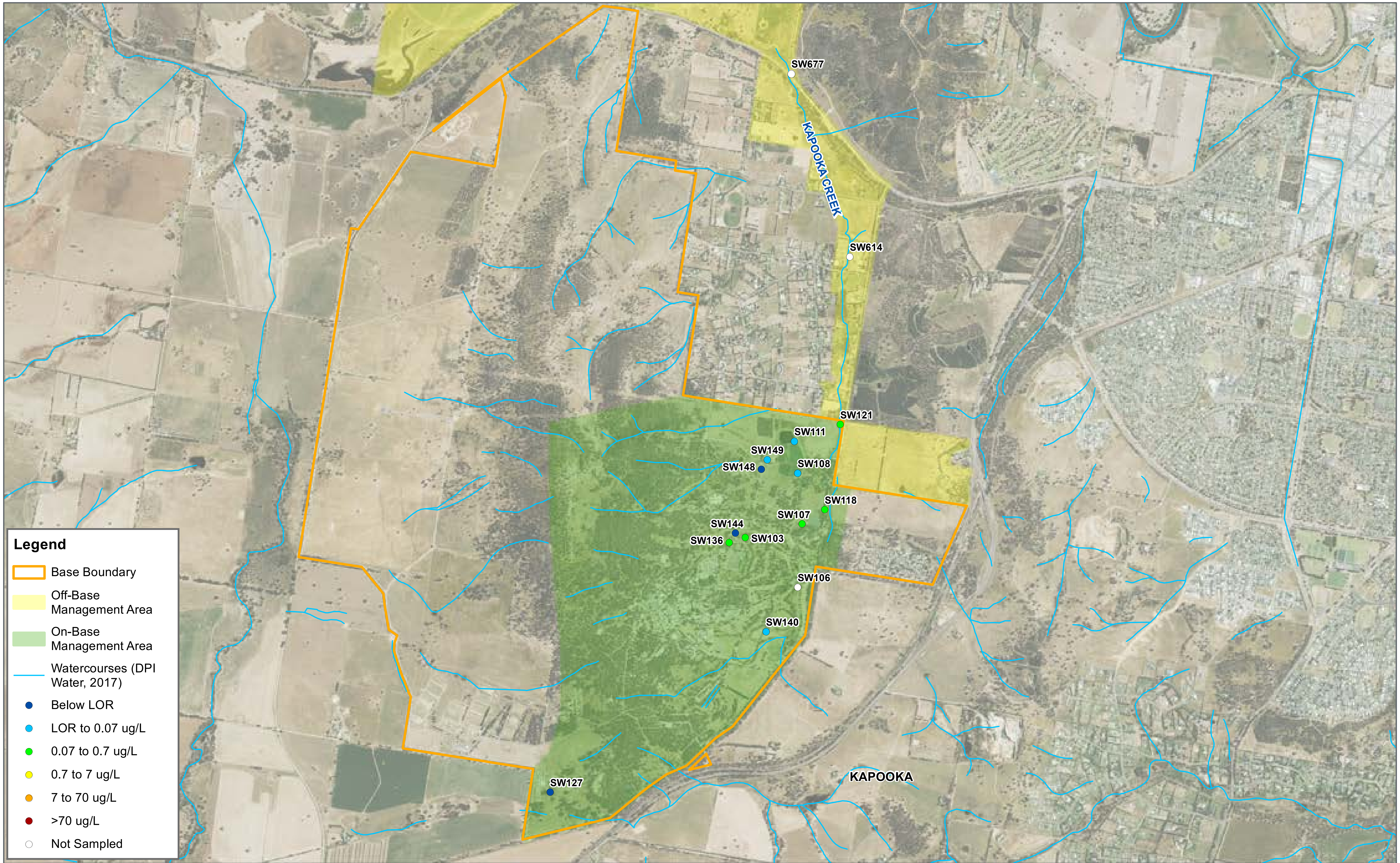

FIGURE 6D

1:30,000 Scale at A3

Metres

0 500 1,000

Surface Water PFAS Extent - 2022 (E2)

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-03-17 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0294-SW_PFAS_Extent_2022_K.mxd 01
Aerial Imagery Supplied by Metromap (February 2022)

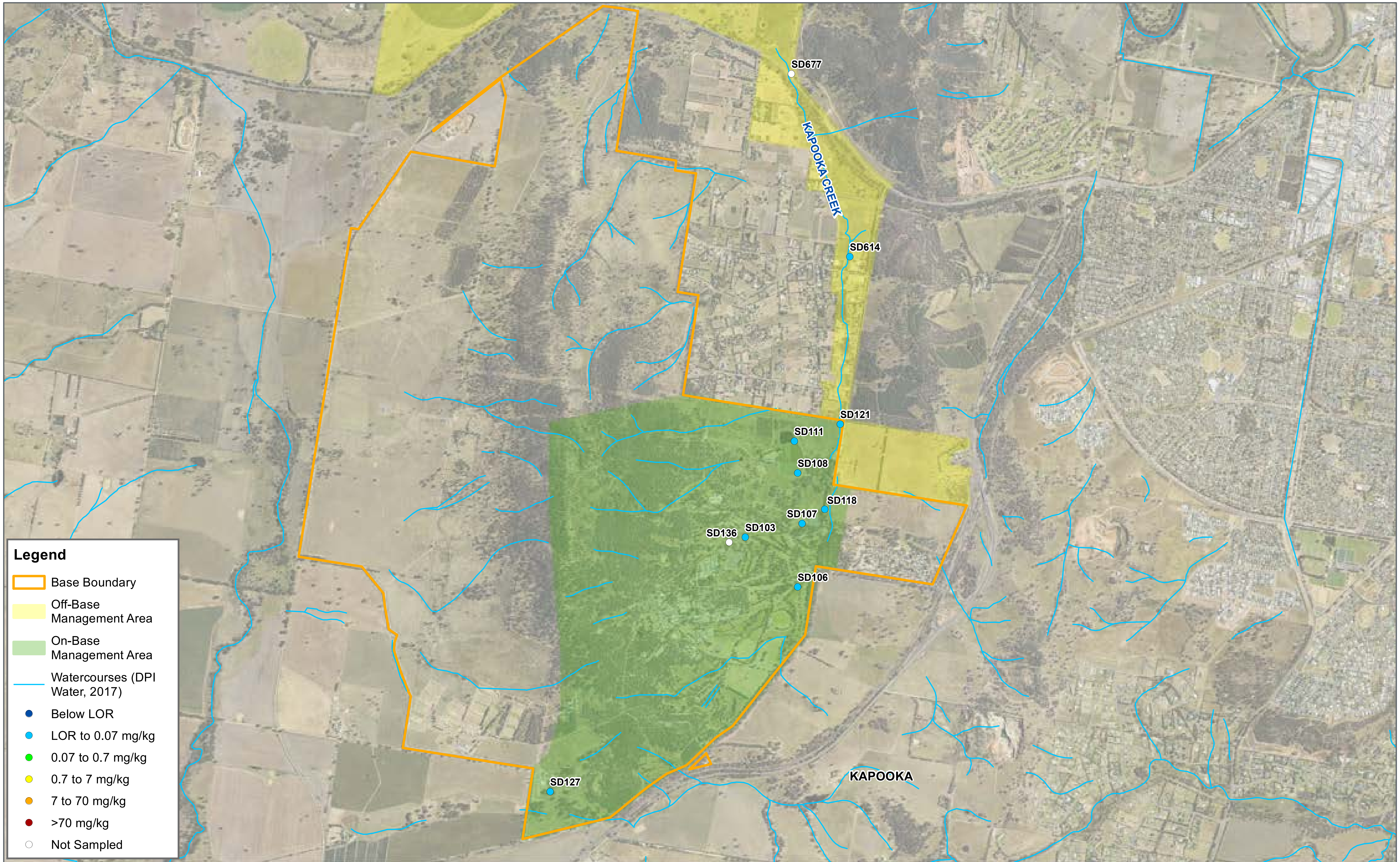

FIGURE 7A

1:30,000 Scale at A3

Metres 0 500 1,000

Sediment PFAS Extent - 2018

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

N

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-02-06 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0295-SED_PFAS_Extent_2018_K.mxd 01
Aerial Imagery Supplied by Metromap (February, 2022)

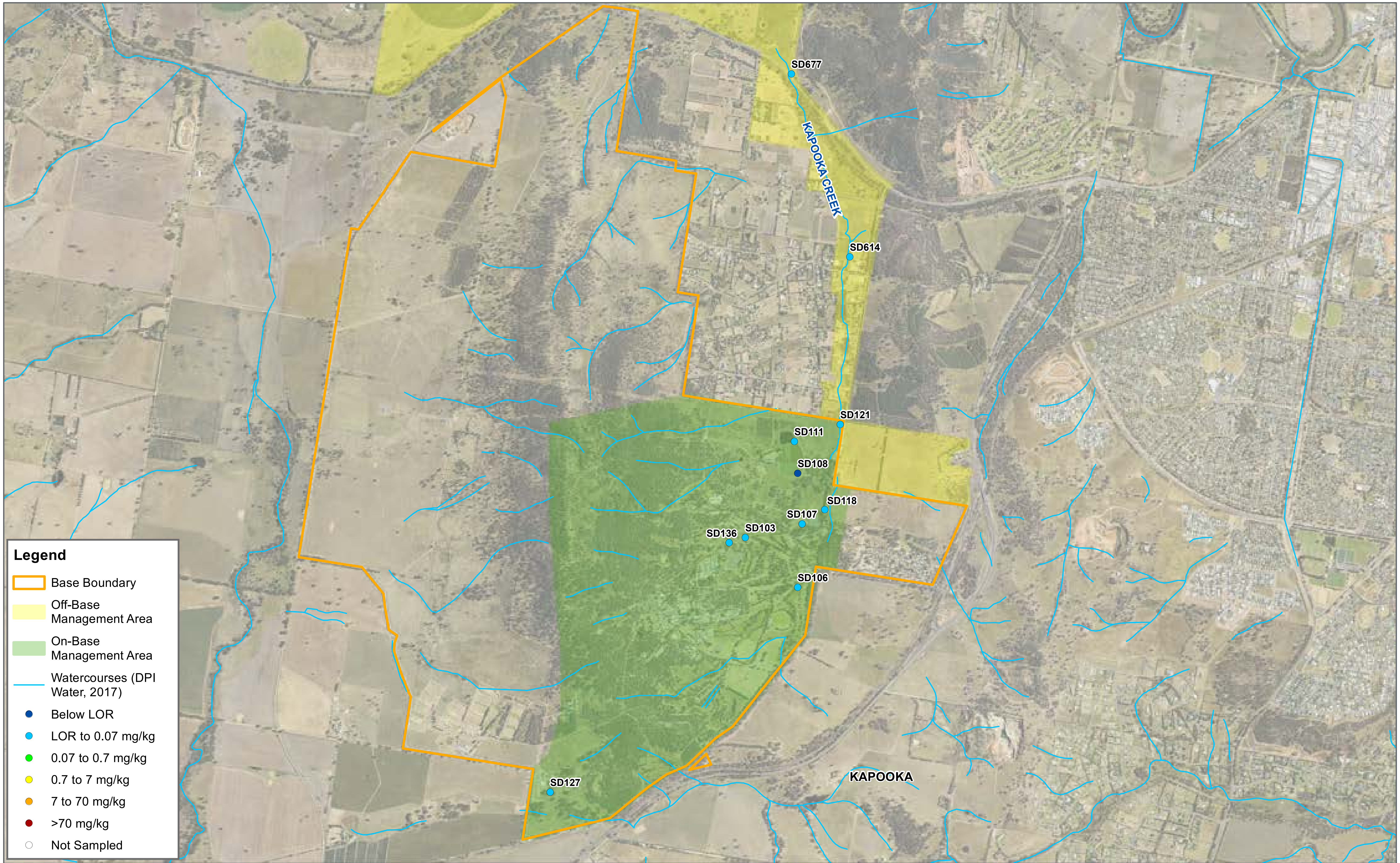

FIGURE 7B

1:30,000 Scale at A3

Metres 0 500 1,000

Sediment PFAS Extent - 2021 (E1)

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-02-06 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0296-SED_PFAS_Extent_2021_K.mxd 01
Aerial Imagery Supplied by Metromap (February, 2022)

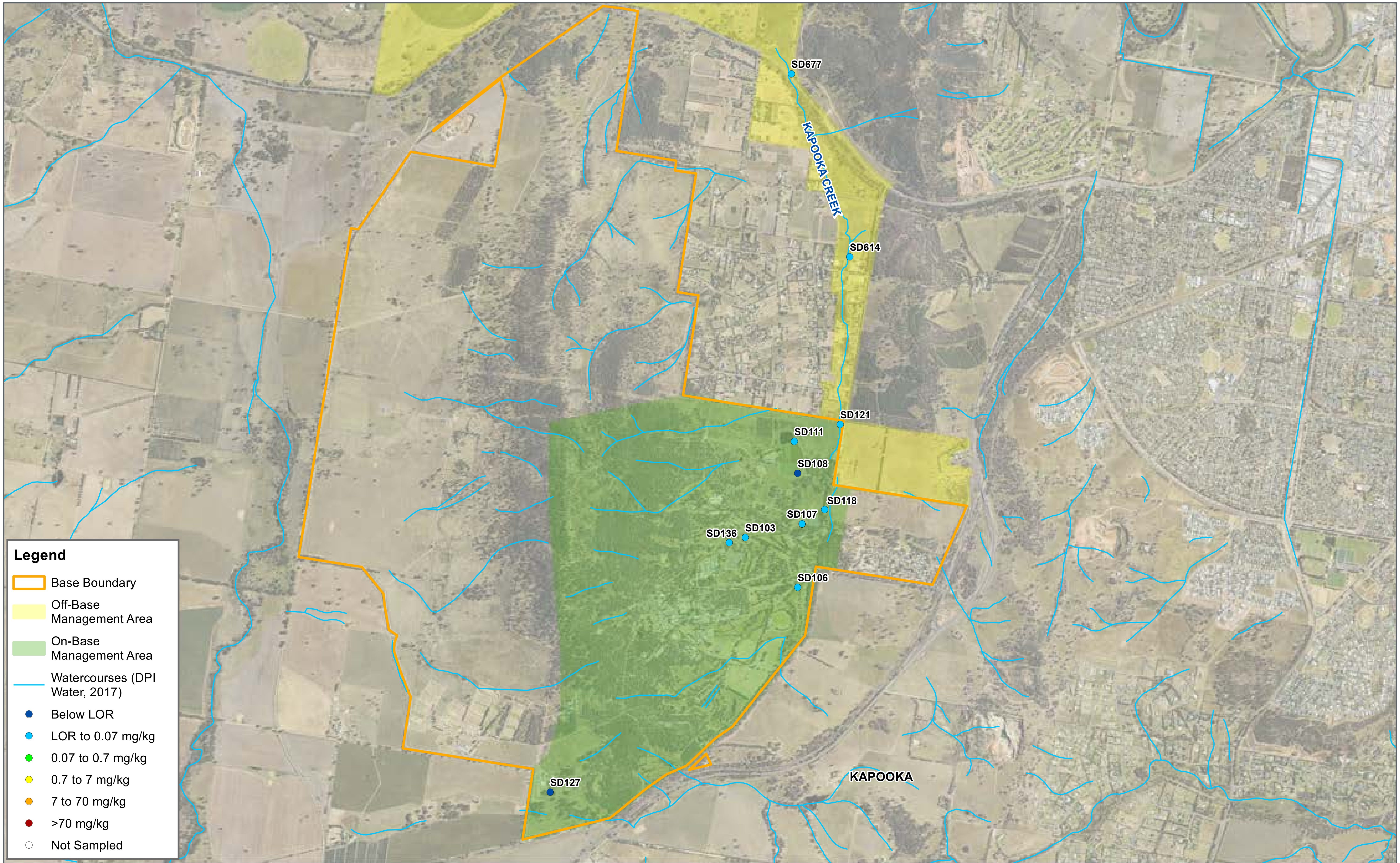

FIGURE 7C

1:30,000 Scale at A3

Metres 0 500 1,000

Sediment PFAS Extent - 2022 (E2)

ONGOING MONITORING REPORT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2023-02-06 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0297-SED_PFAS_Extent_2022_K.mxd 01
Aerial Imagery Supplied by Metromap (February, 2022)

APPENDIX

B

TABLES

Cardno

now

Stantec

Location	Event No.	Property	Easting	Northing	Monitoring Date	Bore Depth (m)	Top of casing (mAHD)	SWL (bTOC)	Water Colour	Turbidity	SWL (mAHD)	Other Observations on Bore/Site	Temp (C^o)	DO (mg/L)	EC (us/Cm)	TDS	pH	Eh (mV)
MW008	E1	On-site	524926.6	6114754.4	27-10-21	13.5	-	8.740	Clear	Low	-	Large open well underneath windmill. 1000mm diameter. Sleeve deployed.	22.9	1.05	1640	1066	7.51	30.8
MW008	E2	On-site	524926.6	6114754.4	28-04-22	60	-	7.320	Clear	-	-	Sampled using Low Flow	18.5	2.72	1756	1141	7.02	119.2
MW103	E1	On-site	526845.6	6110958.8	28-10-21	52.14	225.8	25.093	Clear	Low	200.707	Well in good condition, sleeve deployed.	20.7	1.95	2275	1479	6.45	111.9
MW103	E2	On-site	526845.6	6110958.8	29-04-22	53.5	225.800	24.580	Cloudy	Moderate, cloudy grey	201.220	-	19.7	1.17	2455	1596	6.24	41.5
MW104	E1	On-site	526597.8	6111277.7	28-10-21	53.65	231.87	35.160	Red/brown	Moderate	196.710	Well in good condition, sleeve deployed.	20.5	1.85	4520	2938	6.49	130.8
MW104	E2	On-site	526597.8	6111277.7	28-04-22	54.44	231.87	34.820	Cloudy	Medium	197.050	Orange to red fines at base of sleeve .	19.7	1.82	5057	3287	6.44	38.2
MW107	E1	On-site	526628.4	6111282.8	25-10-21	15.5	230.54	-	-	-		Well Blocked.	-	-	-	-	-	-
MW107	E2	On-site	526628.4	6111282.8	29-04-22	14.37	230.540	-	Cloudy	Low	-	Orange to grey.	18.2	0.65	2698	1754	6.99	-18.1
MW109	E1	On-site	525096.0	6114455.5	27-10-21	34.15	193.62	24.420	Clear	Low	169.200	Well in good condition, sleeve deployed. Brown-grey. sediment in sleeve.	22.4	0.72	1134	737	7.05	96.9
MW109	E2	On-site	525096.0	6114455.5	27-04-22	35.27	193.62	23.642	Cloudy	Low	169.978	Light grey.	18	1.49	1302	846	7.06	-102.7
MW110	E1	On-site	525327.6	6114785.0	27-10-21	21.81	180.29	11.765	Clear	Low	168.525	Well in good condition, sleeve deployed.	22.5	0.46	2213	1438	7.06	85.2
MW110	E2	On-site	525327.6	6114785.0	27-04-22	22.3	180.290	10.345	Clear	-	169.945	-	17.4	3.19	2527	1643	7.35	-86.3
MW601	E1	Off-site	527164.1	6112666.0	25-10-21	16.825	205.3	8.060	Clear	-	197.240	Gattic cover bolts warped and difficult to open, well in good condition, sleeve deployed. No parameter data has been recorded.	18.2	2.27	766	498	7.20	112.7
MW601	E2	Off-site	527164.1	6112666.0	28-04-22	17.23	205.3	7.670	Brown	Medium	197.630	-	18.1	3.39	475.8	309	7.33	169.4
MW624	E1	Off-site	527138.1	6112814.3	26-10-21	52.95	205.92	9.965	Clear	Low	195.955	Well in good condition, sleeve deployed.	17.1	0.39	4294	2791	6.79	141.1
MW624	E2	Off-site	527138.1	6112814.3	28-04-22	53.886	205.92	9.635	Brown	Medium	196.285	Strong organic odour.	18.3	1.19	2598	1689	6.91	95.9
MW625	E1	Off-site	524517.0	6114881.7	26-10-21	22.22	174.572	8.370	Orange/brown	Moderate	166.202	Well in good condition, string in well.	22.4	1.40	1764	1147	6.43	-158.0
MW625	E2	Off-site	524517.0	6114881.7	27-04-22	22.17	174.572	7.630	Cloudy	Low	166.942	Grey to orange .	17.6	1.08	2044	1329	6.54	-74

Location ID	Event No.	Property	Easting	Northing	Monitoring Date	Sample Depth (m)	Water Body Depth (m)	Flow Rate	Water Colour	Turbidity	Other Observations	Temp (Co)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)
SW103	E1	On-Base	526271.4	6110348.6	26-10-21	0	0.15	Low	Clear	Low	Frogs and tadpoles observed in water. No odour. Algae and reeds.	20.4	11.07	239.2	156	7.41	21.5
SW103	E2	On-Base	526271.4	6110348.6	28-04-22	0.1	0.3	Slow	Cloudy	Medium	No flow observed.	18.6	3.32	91.9	60	6.66	153
SW106	E1	On-Base	526717.6	6109926.1	26-10-21	-	-	-	-	-	Location dry.	-	-	-	-	-	-
SW106	E2	On-Base	526717.6	6109926.1	-	-	-	-	-	-	Not sampled - location dry.	-	-	-	-	-	-
SW107	E1	On-Base	526752.7	6110464.8	26-10-21	0.1	0.2	Low	Cloudy	Medium	Cloudy to brown stagnant water. Organic matter observed.	20.2	8.14	158.6	103	8.48	18.1
SW107	E2	On-Base	526752.7	6110464.8	02-05-22	0.2	0.5	Slow	Brown	High	-	11.7	8.78	7.7	5	7.82	252.4
SW108	E1	On-Base	526719.2	6110895.1	26-10-21	0	1.5	Low	Clear	Low	Aquatic vegetation observed, no odour.	19.3	6.07	768	499	9.43	15.8
SW108	E2	On-Base	526719.2	6110895.1	02-05-22	0.2	1	Slow	Green	Low	-	17.3	5.86	857	557	9.3	184.6
SW111	E1	On-Base	526686.5	6111169.2	26-10-21	0.2	1	Low	Clear	Low	Final overflow dam. Sediment sample, silty clay trace fine sands, trace gravelss, Grey-brown, L-M plasticity, organic matter observed.	18.8	3.02	674	438	7.94	21.9
SW111	E2	On-Base	526686.5	6111169.2	27-04-22	0.1	1	Slow	Clear	Low	-	17.5	3.95	779	506	7.31	-38.3
SW118	E1	On-Base	526946.5	6110587.0	-	-	-	-	-	-	-	-	-	-	-	-	-
SW118	E2	On-Base	526946.5	6110587.0	28-04-22	0.05	0.2	Slow	Brown	Medium	No flow, stagnant puddle.	18.7	5.57	92.6	60	7.31	135.7
SW121	E1	On-Base	527077.5	6111316.7	26-10-21	0.08	0.1	Low	Cloudy	Medium	Stagnant brown cloudy water. Algae and small aquatic life observed.	22.9	6.74	140.7	92	8.02	9
SW121	E2	On-Base	527077.5	6111316.7	28-04-22	0.1	0.3	Slow	Brown	High	Stagnant, dead bugs on water surface.	17.3	4.56	167.5	109	7.71	113
SW127	E1	On-Base	524610.6	6108182.2	25-10-21	0.1	0.5	Low	Clear	Low	Water colour clear to light brown. Sediment sample, brown silty clay, low plasticity, brown, organic matter, with F-M sand.	21.3	5.16	124.3	81	7.86	18.6
SW127	E2	On-Base	524610.6	6108182.2	27-04-22	0.1	0.75	-	Brown	Medium	-	16	4.5	49.7	32	7.08	137.6
SW136	E1	On-Base	526132.2	6110304.8	26-10-21	0.1	0.2	Low	Clear	Low	Yabby observed in water. Algae and reeds in water.	18.7	7.25	296.8	193	7.54	35.5
SW136	E2	On-Base	526132.2	6110304.8	27-04-22	0.1	0.4	Medium	Brown	Medium	-	16.9	5.3	76	49	7.1	169.2
SW140	E1	On-Base	526449.8	6109549.2	27-10-21	0.1	0.8	Low	Clear	Medium	Sewage pit with white metal removable lid (0.5m radius). North of other sewage pit with concrete lid. Sampled from larger pit inside. Roots and rootlets in smaller pit inside.	18	5.34	637	414	7.75	33.2
SW140	E2	On-Base	526449.8	6109549.2	28-04-22	0.1	1	Slow	Clear	Low	No odour.	19.1	1.66	628	408	7.1	21.5
SW144	E1	On-Base	526185.0	6110390.0	27-10-21	0.1	0.2	Medium	Brown	High	Sewerage odour, faeces and corn observed, brown- Grey water.	17.9	0.74	1025	666	8.45	-51.3
SW144	E2	On-Base	526185.0	6110390.0	29-04-22	0.1	0.2	Fast	Cloudy	Medium	Strong sewage odour, decaying food chunks present.	21.8	0	1156	751	8.88	-107.8
SW148	E1	On-Base	526404.5	6110931.5	27-10-21	0.05	0.1	Medium	Cloudy	Medium	Sewerage odour, faecal matter observed.	19.4	1.14	1059	688	8.46	14.4
SW148	E2	On-Base	526404.5	6110931.5	28-04-22	0.02	0.1	Medium	Cloudy	Medium	Sewage odour, toilet paper observed, brown, cloudy.	21	0.21	1295	842	8.31	-82.3
SW149	E1	On-Base	526455.0	6111012.0	27-10-21	0	0	Low	Cloudy	Medium	Sampled from inflow pipe to pit, minimal flow.	18	5.24	975	634	8.7	33.7
SW149	E2	On-Base	526455.0	6111012.0	29-04-22	0.01	0.01	Slow	Cloudy	Medium	Grey.	19.8	1.73	1257	817	8.15	17
SW614	E1	Off-Base	527151.5	6112749.5	27-10-21	0.02	0.05	Low	Cloudy	Medium	Stagnant light brown to cloudy water. High amounts of vegeta to on and sediment.	10.5	6.51	233.4	152	6.77	32.9
SW614	E2	Off-Base	527151.5	6112749.5	-	-	-	-	-	-	Not sampled - location dry.	-	-	-	-	-	-
SW677	E1	Off-Base	526647.3	6114308.7	26-10-21	0	0				No surface water observed within on or surrounding culvert.	-	-	-	-	-	-
SW677	E2	Off-Base	526647.3	6114308.7	-	-	-	-	-	-	Not sampled - location dry.	-	-	-	-	-	-

Location ID	Event No.	Property	Easting	Northing	Monitoring Date	Other Observations
SD103	E1	On-base	526271.40	6110348.60	26-10-21	Frogs and tadpoles observed in water. No odour. Algae and reeds.
SD103	E2	On-base	526271.40	6110348.60	28-04-22	Dark brown silty clay, moist, moderate plasticity, no odour, no staining.
SD106	E1	On-base	526717.60	6109926.10	26-10-21	Creek bed dry, no surface water sample taken.
SD106	E2	On-base	526717.60	6109926.10	28-04-22	Sediment sample taken from a depth of 0.1m under reed bed. Dark brown, silty clay, organic material present (plant root), low to moderate plasticity, no odour, no staining.
SD107	E1	On-base	526752.70	6110464.80	26-10-21	Cloudy to brown stagnant water. Organic matter observed.
SD107	E2	On-base	526752.70	6110464.80	02-05-22	Taken from 0.1m, dark brown silty clay, moderate plasticity, some organic material, no odour, no staining.
SD108	E1	On-base	526719.20	6110895.10	26-10-21	Aquatic vegetation observed. No odour.
SD108	E2	On-base	526719.20	6110895.10	02-05-22	Silty clay with gravels, brown to orange mottled grey, slightly wet, tree rootlets, no odour, no staining.
SD111	E1	On-base	526686.50	6111169.20	26-10-21	Final overflow dam. Sediment sample: silty clay with trace fine sands, grey brown, low to medium plasticity, organic matter observed.
SD111	E2	On-base	526686.50	6111169.20	27-04-22	Silty clay, brown mottled grey, slightly wet, moderate-high plasticity, trace rootlets, no odour, no staining, water seeping in at 0.1m depth.
SD118	E2	On-base	526946.53	6110587.04	28-04-22	Sediment sampled from 0.1m, light brown gravelly silty clay, slight organic material, moderate plasticity, moist, no odour, no staining.
SD121	E1	On-base	527077.50	6111316.70	26-10-21	Stagnant brown cloudy water. Algae and small aquatic life observed.
SD121	E2	On-base	527077.50	6111316.70	28-04-22	Sediment sampled at 0.1m. Silty clay, reddish brown, moderate plasticity, wet, no odour, no staining.
SD127	E1	On-base	524610.60	6108182.20	25-10-21	Sediment sample: brown silty clay, low plasticity, brown, organic matter, with fine to medium sand.
SD127	E2	On-base	524610.60	6108182.20	27-04-22	Silty clay, gray mottled brown, wet, moderate plasticity, no odour no staining, taken at 0.2m.
SD136	E1	On-base	526133.00	6110304.10	26-10-21	Yabby observed in water. Algae and reeds in water.
SD136	E2	On-base	526133.00	6110304.10	27-04-22	Dark brown with orange mottle, silty clay, slightly moist, moderate plasticity, no odour, no staining.
SD614	E1	Off-base	527151.50	6112749.50	27-10-21	High amounts of vegetation and sediment.
SD614	E2	Off-base	527151.50	6112749.50	28-04-22	Sediment sampled at 0.1 depth, silty clay, moderately high plasticity, brown with trace rootlets and gravels, no odour, no staining.
SD677	E2	Off-base	526647.30	6114308.65	28-04-22	Overgrown. Sediment sampled at 0.1m depth, silty clay brown, slightly moist, trace gravels and rootlets, moderate plasticity, no odour.

Location Code	Date	Field ID	Sample Type	Lab Report No.	Perfluorocarbons												
					Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorononanesulfonic acid (PFNS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoropropanesulfonic acid (PFPrS)
					µg/L	µg/L	µg/L	UG/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	UG/L
LOR					0.0003	0.0005	0.0003	0.01	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.01
PFAS NEMP 2.0 Table 1 Health Drinking Water						0.56	0.07										
PFAS NEMP 2.0 Table 1 Health Recreational Water						*10*	*2*										
PFAS NEMP 2.0 Table 5 Freshwater 95%					0.13	220											
MW008	16 Mar 2017	0315_MW008_170316	Normal	ES1706394	0.0252	<0.0005	**0.111**	-	0.0145	0.0088	0.0855	0.0034	<0.0005	0.023	<0.0005	<0.0005	-
	18 Dec 2018	0315_MW008_S_181218	Normal	ES1838696	0.04	<0.01	**0.14**	-	<0.02	<0.02	0.10	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC102_181218	Field_D	ES1838696	0.04	<0.01	**0.14**	-	<0.02	<0.02	0.10	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC104_181218	Field_D	ES1838696	0.04	<0.01	**0.15**	-	<0.02	<0.02	0.11	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC202_181218	Interlab_D	635075	0.09	<0.01	**0.23**	-	0.01	0.01	0.14	<0.01	<0.01	<0.05	<0.01	<0.01	-
	09 Mar 2020	0315_MW008_S_200309	Normal	ES2008982	0.06	<0.01	**0.23**	-	<0.02	<0.02	0.17	<0.02	- SD Descript	<0.1	<0.02	<0.02	-
		0315_QC101_200309	Field_D	ES2008982	0.06	<0.01	**0.23**	-	<0.02	<0.02	0.17	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC201_200309	Interlab_D	239048	0.05	<0.01	**0.18**	-	0.01	<0.01	0.13	<0.01	<0.02	<0.02	<0.02	<0.01	-
	28 Oct 2021	0315_MW008_20211028	Normal	ES2139229	0.03	<0.01	**0.11**	-	<0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	<0.02	-
	28 Apr 2022	0315_MW008_20220428	Normal	EM2208205	0.02	<0.01	**0.10**	-	<0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	<0.02	-
MW103	20 Feb 2019	0315_MW103_S_190220	Normal	ES1905450	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	-
	28 Oct 2021	0315_MW103_20211028	Normal	ES2139229	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
	29 Apr 2022	0315_MW103_20220429	Normal	EM2208205	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
MW104	20 Feb 2019	0315_MW104_S_190220	Normal	ES1905450	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	-
	28 Oct 2021	0315_MW104_20211028	Normal	ES2139229	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
	28 Apr 2022	0315_MW104_20220428	Normal	EM2208205	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
MW107	30 Jan 2019	0315_MW107_P_190130	Normal	ES1902996	<0.01	<0.01	**0.10**	-	<0.02	<0.02	0.10	<0.02	<0.02	<0.1	<0.02	<0.02	-
	07 Mar 2019	0315_MW107_P_190307	Normal	ES1907492	0.02	<0.01	0.07	-	<0.02	<0.02	0.05	<0.02	<0.02	<0.1	<0.02	<0.02	-
	29 Apr 2022	0315_MW107_20220429	Normal	EM2208205	0.02	0.02	**0.14**	-	0.02	0.02	0.12	<0.02	<0.02	<0.1	<0.02	<0.02	-
MW109	10 Mar 2020	0315_MW109_S_200310	Normal	ES2008982	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	-
	27 Oct 2021	0315_MW109_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC105_20211027	Field_D	ES2139230	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC205_20211027	Interlab_D	837707	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
	27 Apr 2022	0315_MW109_20220427	Normal	EM2208205	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC101_20220427	Field_D	EM2208205	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC201_20220427	Interlab_D	889626	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
MW110	10 Mar 2020	0315_MW110_S_200310	Normal	ES2008982	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	-
	28 Oct 2021	0315_MW110_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
	27 Apr 2022	0315_MW110_20220427	Normal	EM2208205	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
MW601	29 Jan 2019	0315_MW601_S_190129	Normal	ES1902996	0.01	<0.01	**0.15**	-	<0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC101_190129	Field_D	ES1902996	0.01	<0.01	**0.15**	-	<0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	<0.02	-
		0315_QC201_190129	Interlab_D	638493	0.01	<0.01	**0.1**	-	0.01	0.01	0.09	<0.01	<0.01	<0.05	<0.01	0.01	-
	18 Feb 2019	0315_MW601_S_190218	Normal	ES1905450	0.02	<0.01	**0.25**	-	<0.02	<0.02	0.23	<0.02	<0.02	<0.1	0.02	0.02	-
	12 Mar 2020	0315_MW601_P_200312	Normal	ES2008982	0.16	0.01	**0.89**	-	0.06	0.08	0.73	0.03	<0.02	<0.1	<0.02	0.04	-
	27 Oct 2021	0315_MW601_20211027	Normal	ES2139235	0.17	<0.01	**0.59**	-	0.03	0.03	0.42	<0.02	<0.02	<0.1	<0.02	0.03	-
	28 Apr 2022	0315_MW601_20220428	Normal	EM2208229	0.20	0.01	**0.65**	-	0.03	0.04	0.45	0.02	<0.02	<0.1	<0.02	0.03	-
MW624	11 Mar 2020	0315_MW624_S_200311	Normal	ES2008982	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	-
	27 Oct 2021	0315_MW624_20211027	Normal	ES2139235	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
	20 Dec 2021	MW624	Normal	EM2125953	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
	28 Apr 2022	0315_MW624_20220428	Normal	EM2208229	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
MW625	21 May 2020	0315_MW625_S_200521	Normal	ES2017986	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	-
	26 Oct 2021	0315_MW625_20211026	Normal	ES2139232	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-
	27 Apr 2022	0315_MW625_20220427	Normal	EM2208223	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	-

Table B4: Groundwater PFAS Analytical Results

					Perfluorocarbons												
					Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L
				LOR	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0005
PFAS NEMP 2.0 Table 1 Health Drinking Water																	
PFAS NEMP 2.0 Table 1 Health Recreational Water																	
PFAS NEMP 2.0 Table 5 Freshwater 95%																	
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report No.**													
MW008	16 Mar 2017	0315_MW008_170316	Normal	ES1706394	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005
	18 Dec 2018	0315_MW008_S_181218	Normal	ES1838696	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC102_181218	Field_D	ES1838696	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC104_181218	Field_D	ES1838696	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC202_181218	Interlab_D	635075	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	09 Mar 2020	0315_MW008_S_200309	Normal	ES2008982	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC101_200309	Field_D	ES2008982	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC201_200309	Interlab_D	239048	<0.01	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.1	<0.05	<0.05	<0.1	<0.5	<0.02
	28 Oct 2021	0315_MW008_20211028	Normal	ES2139229	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	28 Apr 2022	0315_MW008_20220428	Normal	EM2208205	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
MW103	20 Feb 2019	0315_MW103_S_190220	Normal	ES1905450	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	28 Oct 2021	0315_MW103_20211028	Normal	ES2139229	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	29 Apr 2022	0315_MW103_20220429	Normal	EM2208205	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
MW104	20 Feb 2019	0315_MW104_S_190220	Normal	ES1905450	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	28 Oct 2021	0315_MW104_20211028	Normal	ES2139229	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	28 Apr 2022	0315_MW104_20220428	Normal	EM2208205	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
MW107	30 Jan 2019	0315_MW107_P_190130	Normal	ES1902996	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	07 Mar 2019	0315_MW107_P_190307	Normal	ES1907492	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	29 Apr 2022	0315_MW107_20220429	Normal	EM2208205	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
MW109	10 Mar 2020	0315_MW109_S_200310	Normal	ES2008982	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	27 Oct 2021	0315_MW109_20211027	Normal	ES2139229	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC105_20211027	Field_D	ES2139230	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC205_20211027	Interlab_D	837707	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	27 Apr 2022	0315_MW109_20220427	Normal	EM2208205	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC101_20220427	Field_D	EM2208205	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC201_20220427	Interlab_D	889626	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW110	10 Mar 2020	0315_MW110_S_200310	Normal	ES2008982	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	28 Oct 2021	0315_MW110_20211027	Normal	ES2139229	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	27 Apr 2022	0315_MW110_20220427	Normal	EM2208205	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
MW601	29 Jan 2019	0315_MW601_S_190129	Normal	ES1902996	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC101_190129	Field_D	ES1902996	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
		0315_QC201_190129	Interlab_D	638493	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	18 Feb 2019	0315_MW601_S_190218	Normal	ES1905450	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	12 Mar 2020	0315_MW601_P_200312	Normal	ES2008982	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	27 Oct 2021	0315_MW601_20211027	Normal	ES2139235	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	28 Apr 2022	0315_MW601_20220428	Normal	EM2208229	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
MW624	11 Mar 2020	0315_MW624_S_200311	Normal	ES2008982	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	27 Oct 2021	0315_MW624_20211027	Normal	ES2139235	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	20 Dec 2021	MW624	Normal	EM2125953	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	28 Apr 2022	0315_MW624_20220428	Normal	EM2208229	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
MW625	21 May 2020	0315_MW625_S_200521	Normal	ES2017986	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	26 Oct 2021	0315_MW625_20211026	Normal	ES2139232	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
	27 Apr 2022	0315_MW625_20220427	Normal	EM2208223	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02

Table B4: Groundwater PFAS Analytical Results

Location Code	Date	Field ID	Sample Type	Lab Report No.	Perfluorocarbons: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of PFAS	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/kg	mg/kg	UG/L	mg/kg	ug/L
				LOR	0.0005	0.001	0.001	0.001	0.001	0.0003	0.0002	0.00001	0.01	0.005	0.01
PFAS NEMP 2.0 Table 1 Health Drinking Water															
PFAS NEMP 2.0 Table 1 Health Recreational Water															
PFAS NEMP 2.0 Table 5 Freshwater 95%															
MW008	16 Mar 2017	0315_MW008_170316	Normal	ES1706394	<0.0005	<0.001	<0.001	<0.001	<0.001	0.16	-	-	-	-	-
	18 Dec 2018	0315_MW008_S_181218	Normal	ES1838696	<0.02	<0.05	<0.05	<0.05	<0.05	0.14	-	-	-	-	-
		0315_QC102_181218	Field_D	ES1838696	<0.02	<0.05	<0.05	<0.05	<0.05	0.14	-	-	-	-	-
		0315_QC104_181218	Field_D	ES1838696	<0.02	<0.05	<0.05	<0.05	<0.05	0.15	-	-	-	-	-
		0315_QC202_181218	Interlab_D	635075	<0.05	<0.01	<0.05	<0.01	<0.01	0.25	-	-	0.09	-	0.23
	09 Mar 2020	0315_MW008_S_200309	Normal	ES2008982	<0.02	<0.05	<0.05	<0.05	<0.05	0.23	-	-	-	-	-
		0315_QC101_200309	Field_D	ES2008982	<0.02	<0.05	<0.05	<0.05	<0.05	0.23	-	-	-	-	-
		0315_QC201_200309	Interlab_D	239048	<0.02	<0.01	<0.01	<0.01	<0.01	0.19	-	0.00005	-	-	-
	28 Oct 2021	0315_MW008_20211028	Normal	ES2139229	<0.02	<0.05	<0.05	<0.05	<0.05	0.11	-	-	-	-	-
	28 Apr 2022	0315_MW008_20220428	Normal	EM2208205	<0.02	<0.05	<0.05	<0.05	<0.05	0.10	-	-	-	-	-
MW103	20 Feb 2019	0315_MW103_S_190220	Normal	ES1905450	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	28 Oct 2021	0315_MW103_20211028	Normal	ES2139229	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	29 Apr 2022	0315_MW103_20220429	Normal	EM2208205	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
MW104	20 Feb 2019	0315_MW104_S_190220	Normal	ES1905450	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	28 Oct 2021	0315_MW104_20211028	Normal	ES2139229	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	28 Apr 2022	0315_MW104_20220428	Normal	EM2208205	<0.02	<0.05	0.18	<0.05	<0.05	0.18	-	-	-	-	-
MW107	30 Jan 2019	0315_MW107_P_190130	Normal	ES1902996	<0.02	<0.05	<0.05	<0.05	<0.05	0.10	-	-	-	-	-
	07 Mar 2019	0315_MW107_P_190307	Normal	ES1907492	<0.02	<0.05	<0.05	<0.05	<0.05	0.07	-	-	-	-	-
	29 Apr 2022	0315_MW107_20220429	Normal	EM2208205	<0.02	<0.05	0.07	<0.05	<0.05	0.27	-	-	-	-	-
MW109	10 Mar 2020	0315_MW109_S_200310	Normal	ES2008982	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	27 Oct 2021	0315_MW109_20211027	Normal	ES2139229	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
		0315_QC105_20211027	Field_D	ES2139230	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
		0315_QC205_20211027	Interlab_D	837707	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	-	-	<0.01	-	<0.01
	27 Apr 2022	0315_MW109_20220427	Normal	EM2208205	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
		0315_QC101_20220427	Field_D	EM2208205	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
		0315_QC201_20220427	Interlab_D	889626	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	-	-	<0.01	-	<0.01
MW110	10 Mar 2020	0315_MW110_S_200310	Normal	ES2008982	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	28 Oct 2021	0315_MW110_20211027	Normal	ES2139229	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	27 Apr 2022	0315_MW110_20220427	Normal	EM2208205	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
MW601	29 Jan 2019	0315_MW601_S_190129	Normal	ES1902996	<0.02	<0.05	<0.05	<0.05	<0.05	0.18	-	-	-	-	-
		0315_QC101_190129	Field_D	ES1902996	<0.02	<0.05	<0.05	<0.05	<0.05	0.15	-	-	-	-	-
		0315_QC201_190129	Interlab_D	638493	<0.05	<0.01	<0.05	<0.01	<0.01	0.14	-	-	0.01	-	0.1
	18 Feb 2019	0315_MW601_S_190218	Normal	ES1905450	<0.02	<0.05	<0.05	<0.05	<0.05	0.29	-	-	-	-	-
	12 Mar 2020	0315_MW601_P_200312	Normal	ES2008982	<0.02	<0.05	<0.05	<0.05	<0.05	1.11	-	-	-	-	-
	27 Oct 2021	0315_MW601_20211027	Normal	ES2139235	<0.02	<0.05	<0.05	<0.05	<0.05	0.68	-	-	-	-	-
	28 Apr 2022	0315_MW601_20220428	Normal	EM2208229	<0.02	<0.05	<0.05	<0.05	<0.05	0.78	-	-	-	-	-
MW624	11 Mar 2020	0315_MW624_S_200311	Normal	ES2008982	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	27 Oct 2021	0315_MW624_20211027	Normal	ES2139235	<0.02	<0.05	0.05	<0.05	<0.05	0.05	-	-	-	-	-
	20 Dec 2021	MW624	Normal	EM2125953	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	28 Apr 2022	0315_MW624_20220428	Normal	EM2208229	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
MW625	21 May 2020	0315_MW625_S_200521	Normal	ES2017986	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	26 Oct 2021	0315_MW625_20211026	Normal	ES2139232	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-
	27 Apr 2022	0315_MW625_20220427	Normal	EM2208223	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-	-	-	-

						Perfluorocarbons															
						Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)
						µg/L	µg/L	µg/L	µg/L	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	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.02
PFAS NEMP 2.0 Table 1 Health Drinking Water							0.56	0.07													
PFAS NEMP 2.0 Table 1 Health Recreational Water							10	2													
PFAS NEMP 2.0 Table 5 Freshwater 95%						0.13	220														
Location Code	Monitoring Zone	Sampled Date	Field ID	Sample Type	Lab Report No.																
SW103	On-Base	10-12-18	0315_SW103_181210	Normal	ES1837611	0.67	0.05	1.31	0.1	0.06	0.64	0.02	<0.02	<0.1	0.13	0.18	0.04	<0.02	<0.02	<0.02	<0.02
	On-Base	26-10-21	0315_QC203_20211026	Interlab_D	837707	1.00	0.03	1.31	0.02	0.02	0.31	0.02	<0.01	<0.05	0.06	0.07	0.02	<0.01	<0.01	<0.01	<0.01
	On-Base	26-10-21	0315_QC103_20211026	Field_D	ES2139230	0.74	0.03	0.99	0.02	<0.02	0.25	<0.02	<0.02	<0.1	0.06	0.07	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26-10-21	0315_SW103_20211026	Normal	ES2139229	0.60	0.02	0.82	<0.02	<0.02	0.22	<0.02	<0.02	<0.1	0.06	0.06	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28-04-22	0315_SW103_20220428	Normal	EM2208205	0.19	<0.01	0.28	<0.02	<0.02	0.09	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW106	On-Base	16-12-18	0315_SW106_181216	Normal	ES1838218	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW107	On-Base	10-12-18	0315_SW107_181210	Normal	ES1837611	0.43	0.03	0.65	0.02	<0.02	0.22	<0.02	<0.02	<0.1	0.03	0.04	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26-10-21	0315_SW107_20211026	Normal	ES2139229	0.18	0.01	0.25	<0.02	<0.02	0.07	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	02-05-22	0315_SW107_20220502	Normal	EM2208205	0.15	<0.01	0.20	<0.02	<0.02	0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW108	On-Base	15-12-18	0315_SW108_181215	Normal	ES1838218	0.02	0.02	0.06	0.02	<0.02	0.04	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26-10-21	0315_SW108_20211026	Normal	ES2139229	0.01	<0.01	0.02	<0.02	<0.02	0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	02-05-22	0315_SW108_20220502	Normal	EM2208205	0.02	0.01	0.04	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW111	On-Base	15-12-18	0315_SW111_181215	Normal	ES1838218	0.03	0.02	0.11	0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26-10-21	0315_SW111_20211026	Normal	ES2139229	0.02	<0.01	0.04	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27-04-22	0315_SW111_20220427	Normal	EM2208205	0.02	<0.01	0.04	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW118	On-Base	30-11-18	0315_SW118_181130	Normal	ES1836659	0.52	0.02	0.67	<0.02	<0.02	0.15	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	13-12-18	0315_SW118_181213	Normal	ES1837950	0.07	<0.01	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28-04-22	0315_SW118_20220428	Normal	EM2208205	0.18	<0.01	0.24	<0.02	<0.02	0.06	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW121	On-Base	30-11-18	0315_SW121_181130	Normal	ES1836659	0.28	0.02	0.39	<0.02	<0.02	0.11	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26-10-21	0315_SW121_20211026	Normal	ES2139229	0.22	0.01	0.31	<0.02	<0.02	0.09	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28-04-22	0315_SW121_20220428	Normal	EM2208205	0.16	<0.01	0.21	<0.02	<0.02	0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW127	On-Base	14-12-18	0315_SW127_181214	Normal	ES1838218	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	25-10-21	0315_QC201_20211025	Interlab_D	837707	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	On-Base	25-10-21	0315_QC101_20211025	Field_D	ES2139230	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	25-10-21	0315_SW127_20211025	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27-04-22	0315_SW127_20220427	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW136	On-Base	29-01-19	0315_SW136_190129	Normal	ES1902996	1.48	0.11	4.15	0.26	0.24	2.67	0.04	<0.02	<0.1	0.17	0.44	0.16	<0.02	<0.02	<0.02	<0.02
	On-Base	26-10-21	0315_SW136_20211026	Normal	ES2139229	1.20	0.04	1.93	0.06	0.06	0.73	0.03	<0.02	<0.1	0.11	0.19	0.03	<0.02	<0.02	<0.02	<0.02
	On-Base	27-04-22	0315_QC102_20220427	Field_D	EM2208205	0.05	<0.01	0.07	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27-04-22	0315_QC202_20220427	Interlab_D	889626	0.06	<0.01	0.08	<0.01	<0.01	0.02	<0.01	<0.01	<0.05	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	On-Base	27-04-22	0315_SW136_20220427	Normal	EM2208205	0.04	<0.01	0.05	<0.02	<0.02	0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW140	On-Base	29-01-19	0315_SW140_190129	Normal	ES1902996	0.03	<0.01	0.25	0.04	0.03	0.22	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26-10-21	0315_SW140_20211026	Normal	ES2139229	<0.01	<0.01	0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28-04-22	0315_QC103_20220428	Field_D	EM2208205	<0.01	<0.01	0.01	<0.02	<0.02	0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28-04-22	0315_QC203_20220428	Interlab_D	889626	<0.01	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	On-Base	28-04-22	0315_SW140_20220428	Normal	EM2208205	<0.01	<0.01	0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW144	On-Base	29-01-19	0315_SW144_190129	Normal	ES1902996	0.01	<0.01	0.03	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27-10-21	0315_SW144_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	29-04-22	0315_SW144_20220429	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW148	On-Base	29-01-19	0315_SW148_190129	Normal	ES1902996	0.47	0.01	0.61	0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27-10-21	0315_SW148_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28-04-22	0315_SW148_20220428	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW149	On-Base	29-01-19	0315_SW149_190129	Normal	ES1902996	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27-10-21	0315_SW149_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	29-04-22	0315_SW149_20220429	Normal	EM2208205	0.02	<0.01	0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW614	Off-Base	13-12-18	0315_SW614_181213	Normal	ES1837950	0.03	<0.01	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	27-10-21	0315_SW614_20211027	Normal	ES2139235	0.27	<0.01	0.35	<0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

						Perfluorocarbons														
						Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
						µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
					LOR	0.02	0.05	0.02	0.05	0.00005	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.01	0.00001
PFAS NEMP 2.0 Table 1 Health Drinking Water																				
PFAS NEMP 2.0 Table 1 Health Recreational Water																				
PFAS NEMP 2.0 Table 5 Freshwater 95%																				
Location Code	**Monitoring Zone**	**Sampled Date**	**Field ID**	**Sample Type**	**Lab Report No.**															
SW103	On-Base	10-12-18	0315_SW103_181210	Normal	ES1837611	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	1.89	-
	On-Base	26-10-21	0315_QC203_20211026	Interlab_D	837707	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	1.55	0.00134
	On-Base	26-10-21	0315_QC103_20211026	Field_D	ES2139230	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	1.17	-
	On-Base	26-10-21	0315_SW103_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.96	-
	On-Base	28-04-22	0315_SW103_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.28	-
SW106	On-Base	16-12-18	0315_SW106_181216	Normal	ES1838218	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW107	On-Base	10-12-18	0315_SW107_181210	Normal	ES1837611	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.77	-
	On-Base	26-10-21	0315_SW107_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.26	-
	On-Base	02-05-22	0315_SW107_20220502	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.2	-
SW108	On-Base	15-12-18	0315_SW108_181215	Normal	ES1838218	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.1	-
	On-Base	26-10-21	0315_SW108_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	-
	On-Base	02-05-22	0315_SW108_20220502	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.05	-
SW111	On-Base	15-12-18	0315_SW111_181215	Normal	ES1838218	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.18	-
	On-Base	26-10-21	0315_SW111_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.04	-
	On-Base	27-04-22	0315_SW111_20220427	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.04	-
SW118	On-Base	30-11-18	0315_SW118_181130	Normal	ES1836659	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.72	-
	On-Base	13-12-18	0315_SW118_181213	Normal	ES1837950	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.07	-
	On-Base	28-04-22	0315_SW118_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	-
SW121	On-Base	30-11-18	0315_SW121_181130	Normal	ES1836659	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.44	-
	On-Base	26-10-21	0315_SW121_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.32	-
	On-Base	28-04-22	0315_SW121_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.21	-
SW127	On-Base	14-12-18	0315_SW127_181214	Normal	ES1838218	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	25-10-21	0315_QC201_20211025	Interlab_D	837707	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	<0.00001
	On-Base	25-10-21	0315_QC101_20211025	Field_D	ES2139230	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	25-10-21	0315_SW127_20211025	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	27-04-22	0315_SW127_20220427	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW136	On-Base	29-01-19	0315_SW136_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	5.57	-
	On-Base	26-10-21	0315_SW136_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	2.45	-
	On-Base	27-04-22	0315_QC102_20220427	Field_D	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.07	-
	On-Base	27-04-22	0315_QC202_20220427	Interlab_D	889626	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	0.11	0.00008
	On-Base	27-04-22	0315_SW136_20220427	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.05	-
SW140	On-Base	29-01-19	0315_SW140_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.32	-
	On-Base	26-10-21	0315_SW140_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	-
	On-Base	28-04-22	0315_QC103_20220428	Field_D	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.01	-
	On-Base	28-04-22	0315_QC203_20220428	Interlab_D	889626	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	0.00002
	On-Base	28-04-22	0315_SW140_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	-
SW144	On-Base	29-01-19	0315_SW144_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.03	-
	On-Base	27-10-21	0315_SW144_20211027	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	29-04-22	0315_SW144_20220429	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW148	On-Base	29-01-19	0315_SW148_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.66	-
	On-Base	27-10-21	0315_SW148_20211027	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	28-04-22	0315_SW148_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	0.06	<0.05	<0.05	0.06	-
SW149	On-Base	29-01-19	0315_SW149_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	27-10-21	0315_SW149_20211027	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	29-04-22	0315_SW149_20220429	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	0.07	<0.05	<0.05	0.09	-
SW614	Off-Base	13-12-18	0315_SW614_181213	Normal	ES1837950	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.03	-
	Off-Base	27-10-21	0315_SW614_20211027	Normal	ES2139235	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.35	-

						Perfluorocarbons															
						Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorononanesulfonic acid (PFNS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
					LOR	0.0002	0.0002	0.0002	0.005	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.005	0.0002	0.0002	0.0002
Location Code	**Monitoring Zone**	**Sampled Date**	**Field ID**	**Sample Type**	**Lab Report No.**																
SD103	On-Base	10-12-18	0315_SD103_181210	Normal	ES1837611	0.0086	<0.0002	0.0096	-	<0.0002	<0.0002	0.001	<0.0002	0.0003	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26-10-21	0315_QC104_20211026	Field_D	ES2139230	0.0126	<0.0002	0.0132	-	<0.0002	<0.0002	0.0006	<0.0002	0.0006	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26-10-21	0315_SD103_20211026	Normal	ES2139229	0.014	<0.0002	0.0146	-	<0.0002	<0.0002	0.0006	<0.0002	0.0004	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	28-04-22	0315_QC105_20220428	Field_D	EM2208205	0.0163	<0.0002	0.0173	-	<0.0002	<0.0002	0.001	<0.0002	0.0005	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0004
	On-Base	28-04-22	0315_QC205_20220428	Interlab_D	889626	0.013	<0.005	0.013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	On-Base	28-04-22	0315_SD103_20220428	Normal	EM2208205	0.0163	<0.0002	0.0175	-	<0.0002	<0.0002	0.0012	<0.0002	0.0007	<0.001	<0.0002	0.0002	-	<0.0002	<0.0002	0.0003
SD106	On-Base	16-12-18	0315_SD106_181216	Normal	ES1838218	0.0076	<0.0002	0.008	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26-10-21	0315_SD106_20211026	Normal	ES2139229	0.0042	<0.0002	0.0042	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	28-04-22	0315_SD106_20220428	Normal	EM2208205	0.0042	0.0002	0.0042	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0012
SD107	On-Base	10-12-18	0315_SD107_181210	Normal	ES1837611	0.0142	<0.0002	0.0149	-	<0.0002	<0.0002	0.0007	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26-10-21	0315_SD107_20211026	Normal	ES2139229	0.0051	<0.0002	0.0051	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	02-05-22	0315_SD107_20220502	Normal	EM2208205	0.0037	<0.0002	0.0042	-	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD108	On-Base	15-12-18	0315_SD108_181215	Normal	ES1838218	0.0004	<0.0002	0.0004	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26-10-21	0315_SD108_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	02-05-22	0315_SD108_20220502	Normal	EM2208205	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD111	On-Base	15-12-18	0315_SD111_181215	Normal	ES1838218	0.0041	<0.0002	0.0045	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	0.0003	<0.0002
	On-Base	26-10-21	0315_SD111_20211026	Normal	ES2139229	0.0008	<0.0002	0.0008	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	27-04-22	0315_SD111_20220427	Normal	EM2208205	0.0005	<0.0002	0.0005	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD118	On-Base	30-11-18	0315_SD118_181130	Normal	ES1836659	0.0037	<0.0002	0.0037	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26-10-21	0315_SD118_20211026	Normal	ES2139229	0.0045	<0.0002	0.0045	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	28-04-22	0315_SD118_20220428	Normal	EM2208205	0.0077	<0.0002	0.0077	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD121	On-Base	30-11-18	0315_SD121_181130	Normal	ES1836659	0.0238	<0.0002	0.0246	-	<0.0002	<0.0002	0.0008	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26-10-21	0315_SD121_20211026	Normal	ES2139229	0.0016	<0.0002	0.0016	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	21-12-21	QC101_211221	Field_D	EM2125953	0.0194	<0.0002	0.0197	-	<0.0002	-	0.0003	-	-	<0.001	<0.0002	<0.0002	-	<0.0002	-	-
	On-Base	21-12-21	QC201_211221	Interlab_D	853128	0.033	<0.005	0.033	-	-	-	<0.005	-	-	-	-	-	-	-	-	-
	On-Base	21-12-21	SD121	Normal	EM2125953	0.0184	<0.0002	0.0188	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	28-04-22	0315_SD121_20220428	Normal	EM2208205	0.0009	<0.0002	0.0009	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD127	On-Base	14-12-18	0315_SD127_181214	Normal	ES1838218	0.0007	<0.0002	0.0007	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	25-10-21	0315_QC102_20211025	Field_D	ES2139230	0.0003	<0.0002	0.0003	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	25-10-21	0315_SD127_20211026	Normal	ES2139229	0.0005	<0.0002	0.0005	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	27-04-22	0315_SD127_20220427	Normal	EM2208205	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD136	On-Base	26-10-21	0315_SD136_20211026	Normal	ES2139229	0.0046	<0.0002	0.005	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	27-04-22	0315_QC104_20220427	Field_D	EM2208205	0.0606	<0.0002	0.0631	-	<0.0002	<0.0002	0.0025	0.0002	0.0005	<0.001	<0.0002	0.0004	-	<0.0002	<0.0002	<0.0002
	On-Base	27-04-22	0315_QC204_20220427	Interlab_D	889626	0.052	<0.005	0.052	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	On-Base	27-04-22	0315_SD136_20220427	Normal	EM2208205	0.0393	<0.0002	0.0411	-	<0.0002	<0.0002	0.0018	<0.0002	0.0004	<0.001	<0.0002	0.0003	-	<0.0002	<0.0002	<0.0002
SD614	Off-Base	18-12-18	0315_SD614_181218	Normal	ES1838696	0.0094	<0.0002	0.0097	-	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	27-10-21	0315_SD614_20211027	Normal	ES2139235	0.011	<0.0002	0.0114	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	20-12-21	SD614	Normal	EM2125953	0.0093	<0.0002	0.0095	-	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	28-04-22	0315_SD614_20220428	Normal	EM2208229	0.0075	<0.0002	0.0077	-	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD677	Off-Base	26-10-21	0315_SD677_20211026	Normal	ES2139235	0.0052	<0.0002	0.0052	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	21-12-21	SD677	Normal	EM2125953	0.0075	<0.0002	0.0075	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	28-04-22	0315_SD677_20220428	Normal	EM2208229	0.0068	<0.0002	0.0068	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002

Location Code	Monitoring Zone	Sampled Date	Field ID	Sample Type	Lab Report No.	Perfluorocarbons																	
						Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
						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	0.0002	0.0002	0.0002	0.0005	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.005	0.005
SD103	On-Base	10-12-18	0315_SD103_181210	Normal	ES1837611	<0.0002	<0.0002	<0.0002	<0.0005	0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0102	-	-
	On-Base	26-10-21	0315_QC104_20211026	Field_D	ES2139230	<0.0002	<0.0002	<0.0002	<0.0005	0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0142	-	-
	On-Base	26-10-21	0315_SD103_20211026	Normal	ES2139229	<0.0002	0.0003	<0.0002	<0.0005	0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0156	-	-
	On-Base	28-04-22	0315_QC105_20220428	Field_D	EM2208205	0.0002	0.0003	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0187	-	-
	On-Base	28-04-22	0315_QC205_20220428	Interlab_D	889626	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	0.013	0.013
	On-Base	28-04-22	0315_SD103_20220428	Normal	EM2208205	0.0002	0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0191	-	-
SD106	On-Base	16-12-18	0315_SD106_181216	Normal	ES1838218	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.008	-	-
	On-Base	26-10-21	0315_SD106_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0042	-	-
	On-Base	28-04-22	0315_SD106_20220428	Normal	EM2208205	<0.0002	0.0004	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0004	<0.0005	<0.0005	<0.0005	<0.0005	0.0064	-	-
SD107	On-Base	10-12-18	0315_SD107_181210	Normal	ES1837611	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0149	-	-
	On-Base	26-10-21	0315_SD107_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0051	-	-
	On-Base	02-05-22	0315_SD107_20220502	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0042	-	-
SD108	On-Base	15-12-18	0315_SD108_181215	Normal	ES1838218	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	-	-
	On-Base	26-10-21	0315_SD108_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	-	-
	On-Base	02-05-22	0315_SD108_20220502	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	-	-
SD111	On-Base	15-12-18	0315_SD111_181215	Normal	ES1838218	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0048	-	-
	On-Base	26-10-21	0315_SD111_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	-	-
	On-Base	27-04-22	0315_SD111_20220427	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	-	-
SD118	On-Base	30-11-18	0315_SD118_181130	Normal	ES1836659	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0037	-	-
	On-Base	26-10-21	0315_SD118_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0045	-	-
	On-Base	28-04-22	0315_SD118_20220428	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0077	-	-
SD121	On-Base	30-11-18	0315_SD121_181130	Normal	ES1836659	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0246	-	-
	On-Base	26-10-21	0315_SD121_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	-	-
	On-Base	21-12-21	QC101_211221	Field_D	EM2125953	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-
	On-Base	21-12-21	QC201_211221	Interlab_D	853128	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	0.033	0.033
	On-Base	21-12-21	SD121	Normal	EM2125953	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0188	-	-
	On-Base	28-04-22	0315_SD121_20220428	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	-	-
SD127	On-Base	14-12-18	0315_SD127_181214	Normal	ES1838218	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	-	-
	On-Base	25-10-21	0315_QC102_20211025	Field_D	ES2139230	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	-	-
	On-Base	25-10-21	0315_SD127_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	-	-
	On-Base	27-04-22	0315_SD127_20220427	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	-	-
SD136	On-Base	26-10-21	0315_SD136_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.005	-	-
	On-Base	27-04-22	0315_QC104_20220427	Field_D	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0642	-	-
	On-Base	27-04-22	0315_QC204_20220427	Interlab_D	889626	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	0.052	0.052	0.052
	On-Base	27-04-22	0315_SD136_20220427	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0418	-	-
SD614	Off-Base	18-12-18	0315_SD614_181218	Normal	ES1838696	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0097	-	-
	Off-Base	27-10-21	0315_SD614_20211027	Normal	ES2139235	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0114	-	-
	Off-Base	20-12-21	SD614	Normal	EM2125953	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0095	-	-
	Off-Base	28-04-22	0315_SD614_20220428	Normal	EM2208229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0077	-	-
SD677	Off-Base	26-10-21	0315_SD677_20211026	Normal	ES2139235	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0052	-	-
	Off-Base	21-12-21	SD677	Normal	EM2125953	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0075	-	-
	Off-Base	28-04-22	0315_SD677_20220428	Normal	EM2208229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0068	-	-

APPENDIX

C

E1 FACTUAL REPORT

Cardno

now

Stantec

PFAS OMP Factual Report

Biannual Sampling Event – October 2021

Blamey Barracks Kapooka

DEF19008

Prepared for
Department of Defence

17 May 2022

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0	25/02/2022	External Draft		
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Table of Contents

Appendixes

Tables

List of Abbreviations and Units

Chemical Names

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

Technical Terms

AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
AST	Above-ground Storage Tank
BGL	Below Ground Level
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
HIL	Health Investigation Level
HSL	Health Screening Level
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan
SEPP	State Environment Protection Policy

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
ppm	Parts per Million
µg/L	Micrograms per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan

1 Introduction

1.1 Background

Cardno, now Stantec (Cardno) was engaged by the Australian Department of Defence (Defence) to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP; Jacobs, 2021c) at Blamey Barracks, Kapooka ("the Base" or "the Site"). The Site is located in Kapooka, west of Wagga Wagga, New South Wales, as shown in Figure 1, Appendix A.

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

> Cardno, 28 October 2021, Reference: DEF19008, *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Blamey Barracks Kapooka.*

For the purposes of this report:

- The "On-Base Management Area" is defined as a portion of the Base including the eastern built up portion of the Base from the Former Quarry in the south to the Wastewater Treatment Plant (WWTP) in the north. It extends as far west as the natural ridgeline that runs north-south through the middle of the Base and to the east to include the Kapooka Creek flow pathway (Figure 1, Appendix A);
- The "Off-Base Management Area" includes the Kapooka Creek flow pathway on public land and all private properties which have some portion of the flow pathway passing through them. This area stretches from the Base, north all the way to the Murrumbidgee River (Figure 1, Appendix A);
- The "Management Area" is comprised of the "On-Base Management Area" and the "Off-Base Management Area" (Figure 1, Appendix A).

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS in groundwater and surface water, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of Aqueous Film Forming Foam (AFFF). The OMP will also provide confirmation of our current understanding of risk.

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

The objectives of the report are to provide:

- A succinct summary of the October 2021 sampling event and provision of analytical results with supporting tables and figures;
- Confirmation of the current understanding of risk; and
- Supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

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

- Australian and New Zealand Guidelines, 2018, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*
- Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds*.
- Department of Defence (2019), *Contamination Management Manual* (DCMM), August 2019.
- Department of Defence (2019b), *Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance - Routine Water Quality Monitoring.*
- Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.
- EPA NSW (2002), *The NSW State Groundwater Dependant Ecosystems Policy*, April 2002.

> EPA NSW (2004), *Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales*, Publication 1669.2, March 2004

> NSW EPA (2016), *Designing Sampling Programs for Sites Potentially Contaminated by PFAS*.

> EPA NSW (2014), *Waste Classification Guidelines – Part 1: Classification of Waste*, November 2014.

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

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

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

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

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

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

2 Scope of Work

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

2.1 Groundwater Monitoring

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

Table 2-1 Groundwater Monitoring Locations

Sampling Area	Location ID
Wastewater Treatment Plant	On-Base: MW103, MW104, MW107
Former Commandants House	On-Base: MW008, MW109, MW110 Off-Base: MW625
Kapooka Creek flow pathway	Off-Base: MW601, MW624

2.2 Surface Water Monitoring

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

Table 2-2 Surface Water Monitoring Locations

Sampling Area	Location ID
Overland drainage pathways on-Base	On-Base: SW103, SW106, SW107, SW118, SW136
Kapooka Creek	On-Base: SW121 Off-Base: SW614, SW677
Sewer	On-Base: SW140, SW144, SW148, SW149
Wastewater treatment plant ponds	On-Base: SW108, SW111
Overland drainage pathways – Former Quarry	On-Base: SW127

2.3 Sediment Monitoring

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

Table 2-3 Sediment Monitoring Locations

Sampling Area	Location ID
Overland drainage pathways on-Base	SD103, SD106, SD107, SD118, SD136
Kapooka Creek	On-Base: SD121 Off-Base: SD614, SD677
Wastewater treatment plant ponds	On-Base: SD108, SD111
Overland drainage pathways – Former Quarry	On-Base: SD127

2.4 Data Management

All the data included in the report have been collected, uploaded to the ESdat database and reviewed according to the data management requirements of the Defence Contamination Management Manual (DCMM) Annex L (Department of Defence, 2019).

2.5 Deviations from the OMP SAQP

Deviations from the SAQP are presented in Table 2-4. On-site and off-site sampling and testing was undertaken at 8 groundwater monitoring wells, 12 surface water locations and 11 sediment locations. One groundwater monitoring well and three surface water locations could not be sampled as the locations were found to be dry or had insufficient water for sampling.

Table 2-4 Deviations from SAQP

Location	Deviation	Comments	Impact on Existing Dataset
		Groundwater	
MW107	Not sampled	Well dry, groundwater could not be detected. While gauging well, the expected bottom of casing depth (16.21 mBTOC) could not be reached – refusal met at 14.045 mBTOC, no wet mud observed on end of interface probe (IP). It is possible the well has a blockage or a large silt buildup has occurred since the monitoring by Jacobs (2019) as part of the Detailed Site Investigation (DSI).	This is considered to be a potential data gap as MW107 is immediately down gradient of the WWTP, and there are no additional wells targeting the perched aquifer further down gradient near the local community. Jacobs 2019 results show PFHxS + PFOS was equivalent to the adopted drinking water criteria.
SW106	Not Sampled	Location Dry	This is considered to have negligible impact on the investigation as the downstream location SW121 was sampled.
SW118	Not Sampled	Location Dry	This is considered to have negligible impact on the investigation as the downstream location SW121 was sampled
SW677	Not Sampled	Location Dry	This is considered to have some impact on the investigation as there are no OMP sampling locations downstream (towards the Murrumbidgee River).
Interlaboratory duplicate (split) samples for sediment	No split samples for sediment	Split samples submitted to primary laboratory were lost during the process of forwarding onto the secondary laboratory. The primary	This is considered to have negligible impact on the investigation as split samples for groundwater and surface water

Location	Deviation	Comments	Impact on Existing Dataset
		laboratory asserts that they have forwarded the samples, whilst the secondary laboratory asserts that they have not received them.	were analysed. The relative percent difference (RPD) results for these two media indicate that the differences between the primary and secondary laboratories are within acceptable limits and do not affect the validity of the results.

2.6 Additional Sampling

Following the preliminary assessment of the October 2021 data which reported a first-time exceedance at SW614 for Sum of PFHxS & PFOS as well as an order of magnitude increase in concentrations compared to the previous monitoring results from December 2018, additional sampling was proposed at the following locations:

> SW614 and SD614 (located along Kapooka Creek flow pathway)

> MW601 and MW624 (groundwater monitoring wells located adjacent to SW614 screened in the perched and regional aquifer, respectively)

> SW121 and SD121 (upstream of SW614/SD614)

> SW677 and SD677 (downstream of SW614/SD614)

The sampling works were undertaken on 20 December 2021 and the following locations could not be sampled:

> SW614, SW121, SW677 were all dry

> MW601 could not be accessed for sampling due to a damaged well gatic

The results of the additional sampling are discussed in Section 4.

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was undertaken using the no purge HydraSleeve® method, as detailed in Table 3-1, except for MW008 which was sampled using low-flow Micropurge, in accordance with the SAQP.

Table 3-1 Groundwater Sampling Method

Activity	Details
Dates of Field Activity	25 October 2021 to 28 October 2021
Well Gauging	Standing Water Levels (SWLs) were gauged using an interface probe. All wells were measured against a specified mark at the top of the well casing.
Water Quality Parameter Field Measurements	Water quality parameter field measurements were recorded with a water quality meter before sample collection (with the sample in a clean jar). The following field parameters were recorded using a water quality meter: ▪ pH. ▪ Electrical conductivity (EC). ▪ Oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Field measurements made by the water quality meter were recorded on field data records. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier and bump tested daily to optimise the accuracy of the measurements taken. Calibration certificates and bump test records are provided in Appendix D.

Activity	Details
Deployment of HydraSleeve®	The HydraSleeves® were deployed with attached weights in order for sample collection to begin at the lowest point of the well screen. HydraSleeves® were deployed following the gauging of all wells in the OMP on 25 October 2021.
Retrieval of HydraSleeves® (Sample Collection)	At all locations, new HydraSleeve® sampling devices were deployed, and they were left in wells for a minimum of 4 hours (if there is no top weight) or for a minimum of 24 hours (if there is a top weight) to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check valve into the sample sleeve. Samples were discharged immediately (to minimise changes in chemistry) via a discharge tube. HydraSleeves® were redeployed after sampling in preparation for the next sampling event.
Sample collection by low-flow Micropurge (MW008)	Groundwater sampling commenced once the water quality field parameters had stabilised, indicating that they represent natural groundwater in the aquifer. Samples were collected directly into appropriately preserved laboratory supplied bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody (COC) documentation. Disposable High-Density Polyethylene (HDPE) tubing will be utilised for sampling and will be taken off-site for disposal following completion of sampling.
Decontamination procedure	Dedicated HydraSleeves® were used at each groundwater bore, thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved, laboratory-supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (COC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	All groundwater samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for list of analytes). The primary laboratory was ALS Global Laboratories (Smithfield, NSW) and the secondary laboratory (quality control) was Eurofins (Lane Cove West, NSW). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.
Laboratory Testing – Quality Control	Groundwater quality control samples were collected as set out in the SAQP and analysed for the full PFAS analytical suite: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples (1 sample). ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples (1 sample). ▪ Rinsate blank samples at 1 per day [collected off re-used sampling equipment (e.g. interface probe)] (3 samples total). ▪ Trip blank samples of 1 per shipment included in the chilled sample containers upon transport to the laboratory (4 samples total).

3.2 Surface water Sampling Methodology

The surface water monitoring methods and activities are summarised in Table 3-2, except for deviations as specified in Table 2-4.

Table 3-2 Surface Water Monitoring Event Summary

Activity	Details
Dates of Field Activity	25 October 2021 to 27 October 2021.
Water Levels	Water depths were measured where relevant with an interface probe, limiting water disturbance.
Water Quality Parameter Field Measurements	Water quality parameter field measurements (pH, electrical conductivity (EC), oxidation reduction potential (ORP), dissolved oxygen (DO) and temperature) were recorded at the time of sampling using a pre-calibrated water quality meter. Field observations such as turbidity, odours or sheen presence were recorded on field sampling sheets.
Sampling Method	Where possible, the samples were collected directly into sample containers. The sample bottles were positioned below the surface water level and above the sediment bed and orientated with the opening facing downwards to avoid the collection of surface films. Where access to surface water samples was difficult, the samples were collected using a long-handled sampling device (scoop). Samples were then decanted into the laboratory-supplied sample containers. Samples were collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) *Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.*
Decontamination	All re-usable sampling equipment (e.g. water scoop) was thoroughly washed using PFAS & phosphate-free detergent (Liquinox) and then double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Sample labelling and naming was in accordance with Annex L of the DCMM. Samples were collected in appropriately preserved, laboratory-supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under COC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Surface water samples were analysed for the full PFAS analytical suite (see SAQP for full list of analytes). The primary laboratory was ALS Global Laboratories (Smithfield, NSW) and the secondary laboratory (quality control) was Eurofins (Lane Cove West, NSW). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.
Laboratory Testing – Quality Control	Surface water quality control samples were collected as set out in the SAQP and analysed for the full PFAS analytical suite: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples (2 samples). ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples (2 samples). ▪ Rinsate blank samples at 1 per day [collected off re-used sampling equipment (e.g. long-handled sampling device)] (3 samples total). ▪ Trip blank samples of 1 per shipment included in the chilled sample containers upon transport to the laboratory (4 samples total).

3.1 Sediment Sampling Methodology

Sediment monitoring was undertaken as detailed in Table 3-3, except for deviations as specified in Table 2-4.

Table 3-3 Sediment Sampling Method

Item	Details
Dates of Field Activity	25 October 2021 to 27 October 2021.
Sample Collection	Sediment samples were collected at the sediment/water interface using the required hand tools (e.g. trowel, hand auger, PVC pipe, etc.), with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation. At each sampling location, the sediment sample was visually assessed and observations (including physical description) recorded on field data sheets.
Decontamination	All re-usable sampling equipment (such as a trowel) were thoroughly washed using phosphate-free detergent (Liquinox), and subsequently double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Sample labelling and naming was in accordance with Annex L of the DCMM. Samples were contained in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (COC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	All sediment samples were analysed for the full PFAS analytical suite (see SAQP for full list of analytes). The primary laboratory was ALS Global Laboratories (Smithfield, NSW) and the secondary laboratory (quality control) was Eurofins (Lane Cove West, NSW). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.
Laboratory Testing – Quality Control	Sediment quality control samples were collected as follows and analysed for the full PFAS analytical suite: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 soil samples (2 samples). ▪ Field triplicate (inter-laboratory) samples at 1 per 10 soil samples (2 samples). ▪ Rinsate blank samples at 1 per day [collected off re-used sampling equipment (e.g. long-handled sampling device)] (3 samples total). ▪ Trip blank samples of 1 per shipment included in the chilled sample containers upon transport to the laboratory (4 samples total).

3.2 Quality Control / Quality Assurance

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

> QA documentation

> Bias

> Data Representativeness

> Data Precision & Accuracy

> Data Comparability

> Data Set Completeness

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E. A summary of the data validation from the QA/QC review is included in Section 4.6 below.

3.3 Assessment Criteria

3.3.1 Groundwater and Surface Water

The adopted assessment criteria for groundwater and surface water are detailed in Table 3-4.

Table 3-4 PFAS Criteria for Groundwater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Human Health - Drinking Water Quality Guideline[1]	0.07[2]	0.56	HEPA 2020
Human Health - Surface Water Recreational	2[2]	10	HEPA 2020
Ecological (95% species protection)	0.13[3]	220	HEPA 2020

1. Drinking Water screening guidelines have been adopted for screening purposes for Industrial Water use, Stock Water use and Agriculture/Parks/Gardens Water use.
2. Combined PFOS and PFHxS.
3. PFOS only. 95% species protection guideline values adopted for screening of results, in accordance with the OMP (Jacobs, 2021c).

3.3.2 Sediment

There are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment.

4 Field Observations and Results

4.1 Conditions Impacting the Sampling Event

In the seven days prior to the sampling event, 0.2 mm of rain was recorded at the nearest weather station (74272), located on the Kapooka base. Average rainfall in October 2021 (30.2 mm) was lower than the October monthly average between 2017 and 2021 (43.9 mm).

No on-site activities with the potential to impact sample collection or the results were noted.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Water Quality Parameter Field Measurements

Stabilised water quality parameter field measurements, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling record sheets, included in Appendix D. Groundwater varied from clear to brown with low to high turbidity and no notable changes were recorded relative to the previous monitoring event (DSI) (Jacobs, 2019).

4.2.1.2 Groundwater Elevation and Migration

Groundwater elevation during this sampling event ranged from 166.202 mAHD (MW625) to 200.707 mAHD (MW103).

Regional groundwater flow was interpreted to be in a north-westerly direction, towards the Murrumbidgee River. No previous information regarding groundwater flow direction is known, but the findings are consistent with anticipated groundwater flow direction, which as noted in the DSI (Jacobs, 2019) is that groundwater flow would likely be towards the Murrumbidgee River in the north.

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

4.2.2 Groundwater Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria, and are presented in Table B1, Appendix B, and summarised in Table 4-1 below. Of the eight (8) primary samples that were tested, PFOA was reported below the limit of reporting (LOR) in all samples, and Sum of PFHxS and PFOS was reported above the LOR in two (2) samples.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results >LOR[1]	No. Results Above Criteria	Significant Concentration Changes[4]
PFOS	MW601	0.13[3]	0.17	2	1	-
PFOA	-	0.56[2]	< LOR	0	0	-
Sum of PFHxS & PFOS	MW008, MW601	0.07[2]	0.59	2	2	-

Note:
1. Drinking water assessment criteria
2. Ecological assessment criteria
3. Significant concentration change defined as an order of magnitude increase or decrease
4. A “-“ means not applicable

Laboratory results have also been compared to available historical data (DSI) (Jacobs, 2019). All concentrations reported during this event were generally consistent with previous concentrations.

No groundwater sampling locations reported a first time exceedance of adopted assessment criteria or a first time detection during the October 2021 sampling event. Groundwater sampling results are presented on Figure 4, Appendix A, and the laboratory reports are provided in Appendix C.

As outlined in Section 2.6, MW601 and MW624 were scheduled for additional sampling in December 2021. MW601 (perched well adjacent to SW614) could not be accessed for sampling due to a damaged well gatic. MW624 (regional well adjacent to SW614) was sampled and the results were consistent with the October 2021 results (<LOR for Sum of PFHxS and PFOS, and PFOA).

4.3 Surface water

4.3.1 Summary of Field Observations

4.3.1.1 Water Quality Parameter Field Measurements

Stabilised water quality parameter field measurements, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling record sheets, included in Appendix D. Surface water varied from clear to brown with low to medium turbidity. In general, water was similar to the previous monitoring event (DSI) (Jacobs, 2019).

4.3.2 Surface Water Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria, presented in Table B2, Appendix B, and summarised in Table 4-2 below. Of the 12 primary samples that were tested, PFOA was reported above the LOR in four (4) samples, and Sum of PFHxS and PFOS in eight (8) samples.

Table 4-2 Summary of Surface Water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results >LOR[1]	No. Results Above Criteria	Significant Concentration Changes[4]
PFOS	SW103, SW107, SW121, SW136, SW614	0.13[3]	1.2	7	5	SW148 (decrease)
PFOA	-	0.56[2]	0.04	4	0	-
Sum of PFHxS & PFOS	SW103, SW107, SW121, SW136, SW614	0.07[2]	1.93	8	5	SW614 (increase) SW140, SW148, (decrease)

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results >LOR[1]	No. Results Above Criteria	Significant Concentration Changes[4]

Note:
1. Drinking water assessment criteria
2. Ecological assessment criteria
3. Significant concentration change defined as an order of magnitude increase or decrease
4. A "-" means not applicable

Results have also been compared to available historical data (DSI) (Jacobs, 2019). The following locations have reported a significant change in concentration for this monitoring event:

> SW614: Sum of PFHxS and PFOS has increased by one order of magnitude from 0.03 µg/L in December 2018 to 0.35 µg/L in this event.

> SW140: Sum of PFHxS and PFOS has decreased by one order of magnitude from 0.25 µg/L in January 2019 to 0.02 µg/L in this event.

> SW148: Sum of PFHxS and PFOS has decreased by one order of magnitude from 0.61 µg/L in January 2019 to below LOR in this event.

All other concentrations reported during this event were generally consistent with the historical results.

A summary of locations where a first-time detection, or a new exceedance of guideline values, of PFOS, Sum of PFHxS and PFOS, or PFOA, were reported is provided in Table 4-3 below. The laboratory reports are provided in Appendix C.

Table 4-3 Summary of Surface Water Results with First-time Detections or Exceedances

Deviation Type	Monitoring Well	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		October 2021	Previous Maximum	October 2021	Previous Maximum	October 2021	Previous Maximum
First-time exceedance of the NEMP (HEPA, 2020) drinking water guidelines	SW614	**0.35**	0.03	<0.01	<0.01	**0.27**	0.03

Note:
Location with first-time detection of PFOS + PFHxS or PFOA or PFOS in latest monitoring round
Location with a new exceedance of lowest adopted guideline values in latest monitoring round
Bold: Exceedance of lowest adopted guideline values

Findings are summarised as follows:

> One sampling location (SW614) reported a first-time exceedance of Sum of PFHxS and PFOS.

As outlined in Section 2.6, following the first-time exceedance reported at SW614 for Sum of PFHxS and PFOS (and 10x increase in concentrations compared to 2018), resampling was attempted at SW614, SW121 and SW677. However, the locations were all dry when visited on 20 December 2021.

4.4 Sediment

4.4.1 Summary of Field Observations

Odour, colour and other observations recorded during the sediment sampling program are presented in field sampling record sheets, included in Appendix D.

4.4.2 Laboratory Results

National assessment criteria have not been established for PFAS in sediment. The results of laboratory analysis have been compared against historical results, presented in Table B3, Appendix B and summarised below.

Of the 11 primary samples analysed, no samples reported PFOA concentrations above the LOR, and 10 samples reported Sum of PFHxS and PFOS concentrations above the LOR.

Results have also been compared to available historical data from the DSI (Jacobs, 2019). The following locations have reported a significant change in concentration for this monitoring event:

> SD121: Sum of PFHxS and PFOS has decreased by one order of magnitude from 0.0246 mg/kg in November 2018 to 0.0016 mg/kg in this event.

All other concentrations reported during this event were generally consistent with the historical results.

A summary of locations where a first-time detection, of PFOS, Sum of PFHxS and PFOS, or PFOA, were reported is provided in Table 4-4 below. The laboratory reports are provided in Appendix C.

Table 4-4 Summary of Sediment Results with First-time Detections or Exceedances

Deviation Type	Monitoring Well	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		October 2021	Previous Maximum	October 2021	Previous Maximum	October 2021	Previous Maximum
First-time detections	SD136	0.005	-	<0.0002	-	0.0046	-
	SD677	0.0052	-	<0.0002	-	0.0052	-

Note:
Location with first-time detection of PFOS + PFHxS or PFOA or PFOS in latest monitoring round
A "-" denotes no data.

Findings are summarised as follows:

> Two sampling locations (SD136 and SD677) reported first-time detections of Sum of PFHxS and PFOS. We note no historical data are available for either locations.

As outlined in Section 2.6, following the first-time exceedance reported at SW614 for Sum of PFHxS and PFOS (and 10x increase in concentrations compared to 2018), resampling was completed at SD614, SD121 and SD677. The Sum of PFHxS and PFOS results at SD614 and SD677 are consistent between the two sampling events, whilst SD121 reported an order of magnitude increase from 0.0016 mg/kg in October 2021 to 0.0188 mg/kg in December 2021. However, December 2021 results were still lower than December 2018 results. PFOA results at all three locations were consistent between the two sampling events.

4.5 Changes to the Monitoring Network Condition

No changes to the monitoring network condition were noted during this sampling event.

4.6 Data Validation

The data validation process has concluded that there are no significant systematic errors in the data collection process. Therefore, the data set used as the basis for the surface water and groundwater assessment is considered valid and complete. A detailed Data Quality Review is included in Appendix E.

5 Summary and Conclusions

Cardno conducted the October 2021 biannual groundwater, surface water and sediment monitoring event at Blamey Barracks, Kapooka as part of the PFAS OMP. On-site and off-site sampling and testing was undertaken at 8 groundwater monitoring wells, 12 surface water locations and 11 sediment locations.

Groundwater levels were gauged in all wells before sampling. Groundwater was interpreted to flow in a north-westerly direction, consistent with local drainage patterns.

Table 5-1 Summary of Results

Item	Details
Deviations from OMP SAQP	> 1 groundwater well was not sampled due to the well being dry. > 3 surface water locations were not sampled due to the locations being dry. > No split samples for sediment were analysed as they were lost during transport from the primary laboratory to the secondary laboratory.
Groundwater Analytical Results	> 8 groundwater samples were collected in total. > No samples reported a first time detection of PFOS, PFOA or Sum of PFHxS & PFOS. > No samples reported a first time exceedance of the lowest adopted assessment criteria for PFOS, PFOA or Sum of PFHxS & PFOS. > All concentrations reported during this event were generally consistent with previous concentrations.
Surface Water Analytical Results	> 12 surface water samples were collected in total. > No samples reported a first time detection of PFOS, PFOA or Sum of PFHxS & PFOS. > One sample reported a first time exceedance of the lowest adopted assessment criteria for PFOS and for Sum of PFHxS & PFOS. > No samples reported a first time exceedance of the lowest adopted assessment criteria for PFOA. > Surface water results reported during this event were generally consistent with the previous sampling event during the DSI (Jacobs, 2019) with the exception of SW140 which reported an order of magnitude decrease in Sum of PFHxS & PFOS concentrations, SW148 which reported an order of magnitude decrease in PFOS and Sum of PFHxS & PFOS concentrations, and SW614 which reported an order of magnitude increase in Sum of PFHxS & PFOS concentrations.
Sediment Analytical Results	> 11 sediment samples were collected in total. > No samples reported a first time detection of PFOA. > 2 samples reported a first time detection of PFOS and of Sum of PFHxS & PFOS. > All concentrations reported during this event were generally consistent with previous concentrations, with the exception of SD121 which reported an order of magnitude decrease in Sum of PFHxS & PFOS concentrations.
Next Scheduled Monitoring Event	Cardno will investigate MW107 next event and determine if the well has a blockage or has a silt build up at the base of the well and attempt to clear the blockage or redevelop the well. Cardno will also send samples directly to the respective laboratories, rather than having the primary laboratory forward to the secondary laboratory, to reduce the potential for samples to be lost during interlaboratory transport. Considering the above and that there were no changes to the monitoring network, revision of the SAQP is not required at this time. However, any relevant changes occurring on-site prior to the next monitoring event scheduled to commence in April 2022 will be considered.

6 References

General References

1. ANZECC and ARMCANZ (2000) *Australian Water Quality Guidelines for Fresh and Marine Water Quality.*
2. Department of Defence (2019), *Contamination Management Manual* (DCMM), August 2019.
3. Department of Defence (2019b), Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance - Routine Water Quality Monitoring.
4. Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.
5. Defence (2020) *Defence OMP Factual Report Preparation Guidance*, Revised May 2021.
6. EPA NSW (2002), The NSW State Groundwater Dependant Ecosystems Policy, April 2002.
7. EPA NSW (2004), Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales, Publication 1669.2, March 2004
8. NSW EPA (2016), Designing Sampling Programs for Sites Potentially Contaminated by PFAS.
9. EPA NSW (2014), Waste Classification Guidelines – Part 1: Classification of Waste, November 2014.
10. Environmental Protection Agency (United States EPA; 2002) EPA/240/R-02/004 *Guidance on Environmental Data Verification and Data Validation,* November 2002.
11. The Heads of EPAs Australia and New Zealand (HEPA; 2020) *PFAS National Environmental Management Plan (NEMP) Version 2.0*, January 2020.
12. National Environment Protection Council (NEPC; 1999) *National Environmental Protection (Assessment of Site Contamination) Measure (as amended),* registered May 2013.
13. National Health and Medical Research Council (2011 – updated 2018) *National Water Quality Management Strategy Australian Drinking Water Guidelines*, 6 August 2018.
14. Nation Health and Medical Research Council (NHMRC; 2019) *Guidance on Per and Poly-fluoroalkyl Substances (PFAS) in Recreational Water,* August 2019.
15. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 *Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*.
16. Standards Australia (1999) AS4482.2-1999 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds.*
17. US EPA (2000) *Guidance for the Data Quality Objectives Process* (EPA QA/G-4), United States Environmental Protection Agency.
18. US EPA (2002) *Guidance on Environmental Data Verification and Data Validation,* Reference: EPA/240/R-02/004, United States Environmental Protection Agency, November 2002.

Site Specific References

19. Jacobs (2019) Blamey Barracks *Comprehensive PFAS Investigation. Detailed Site Investigation*, September 2019.
20. Jacobs (2021a) Blamey Barracks *Comprehensive PFAS Investigation. Human Health and Ecological Risk Assessment (HHERA)*, 23 June 2021.
21. Jacobs (2021b) *Blamey Barracks Kapooka; PFAS Management Area Plan (PMAP)*, June 2021.
22. Jacobs (2021c) *PFAS Ongoing Monitoring Plan*, June 2021.
23. Cardno (2021) *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP),* Blamey Barracks Kapooka. Prepared for Department of Defence, October 2021.

APPENDIX

A

FIGURES

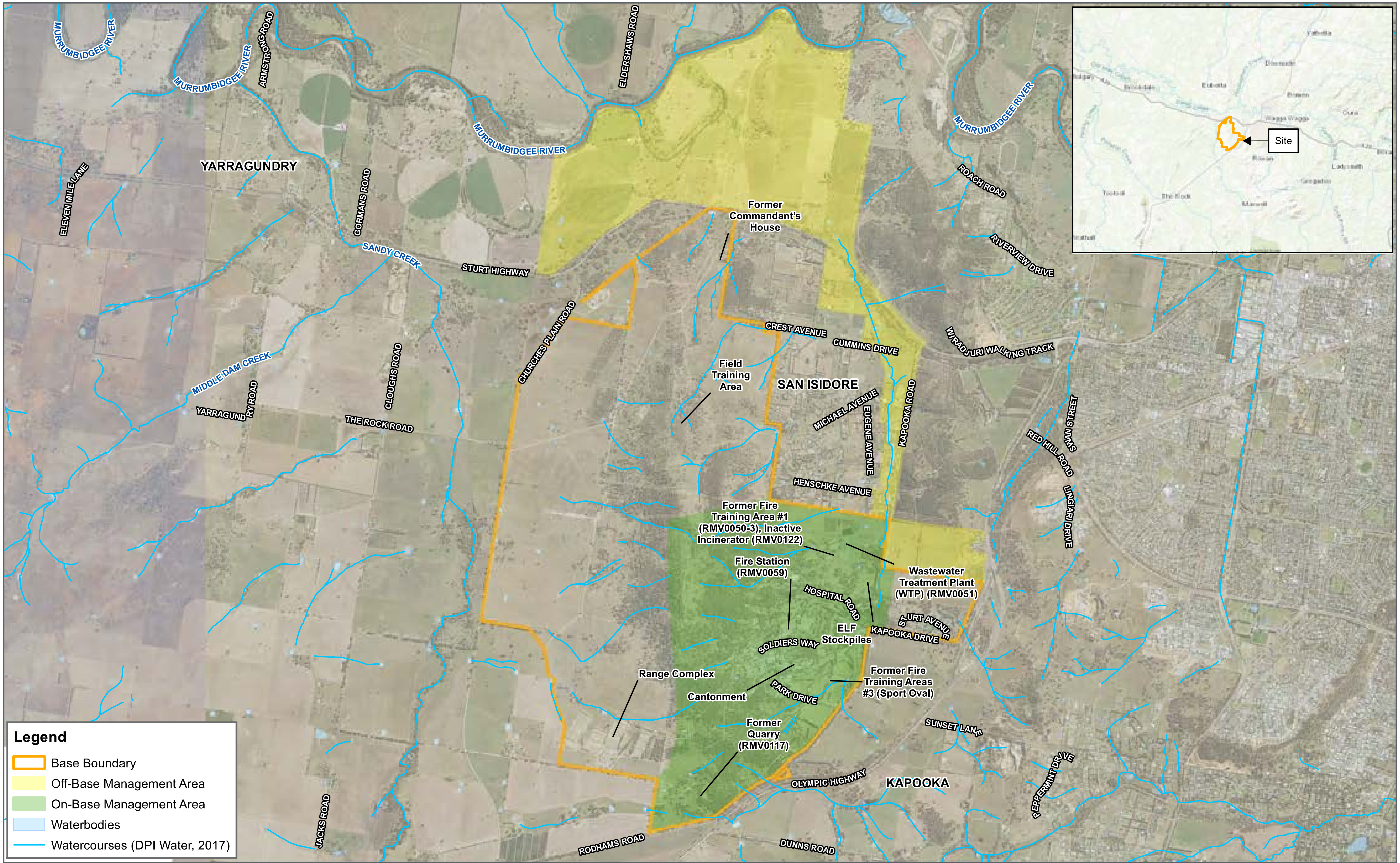

FIGURE 1

1:40,000 Scale at A3

Metres

0 1,000 2,000

Site Locality Plan & Management Areas

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno
Date: 2022-02-21 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0164-SiteLocalityPlan_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

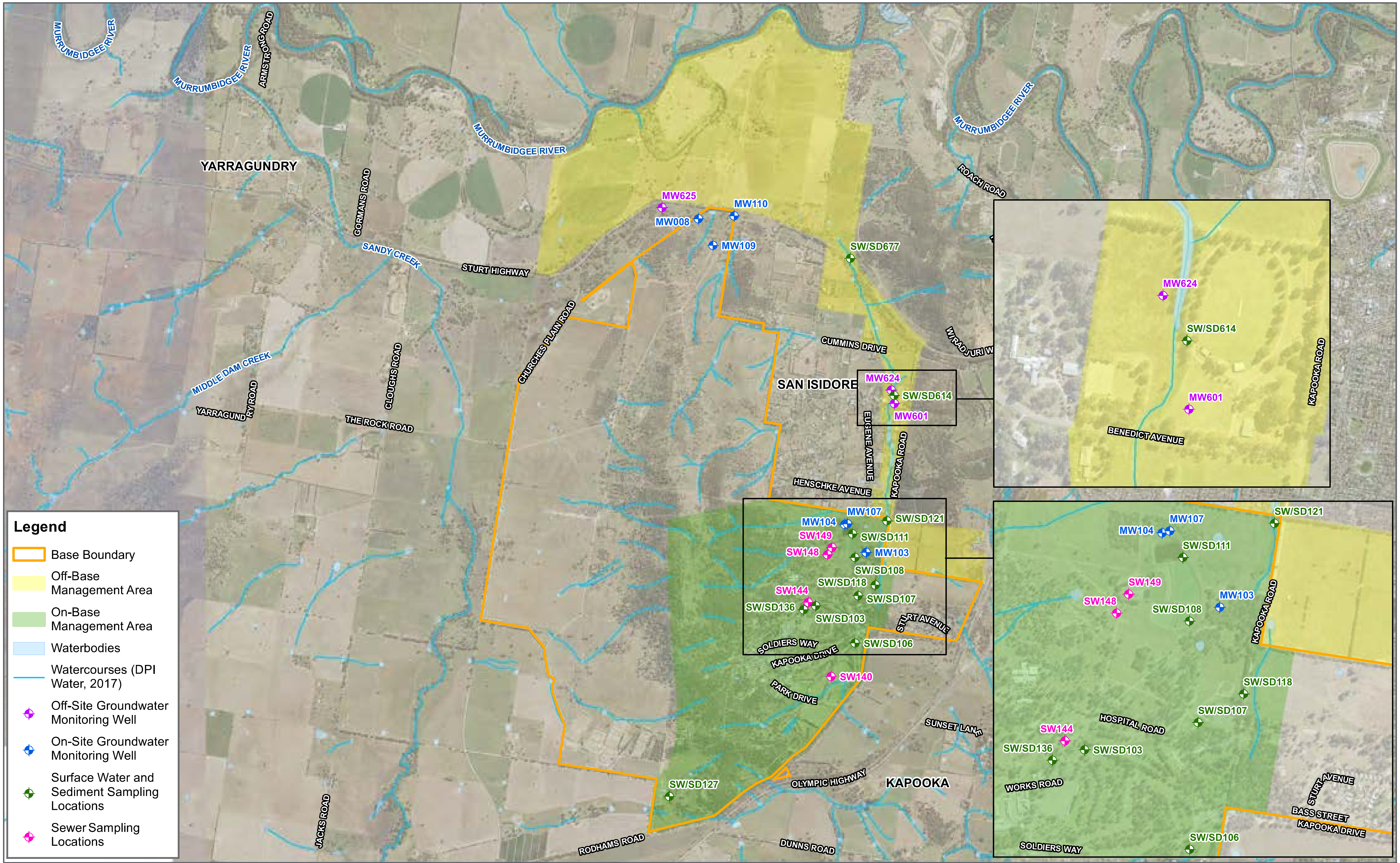

FIGURE 2

1:40,000 Scale at A3

Metres 0 1,000 2,000

Sampling Locations

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno
Date: 2021-09-27 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0166-SampleLocationsN_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

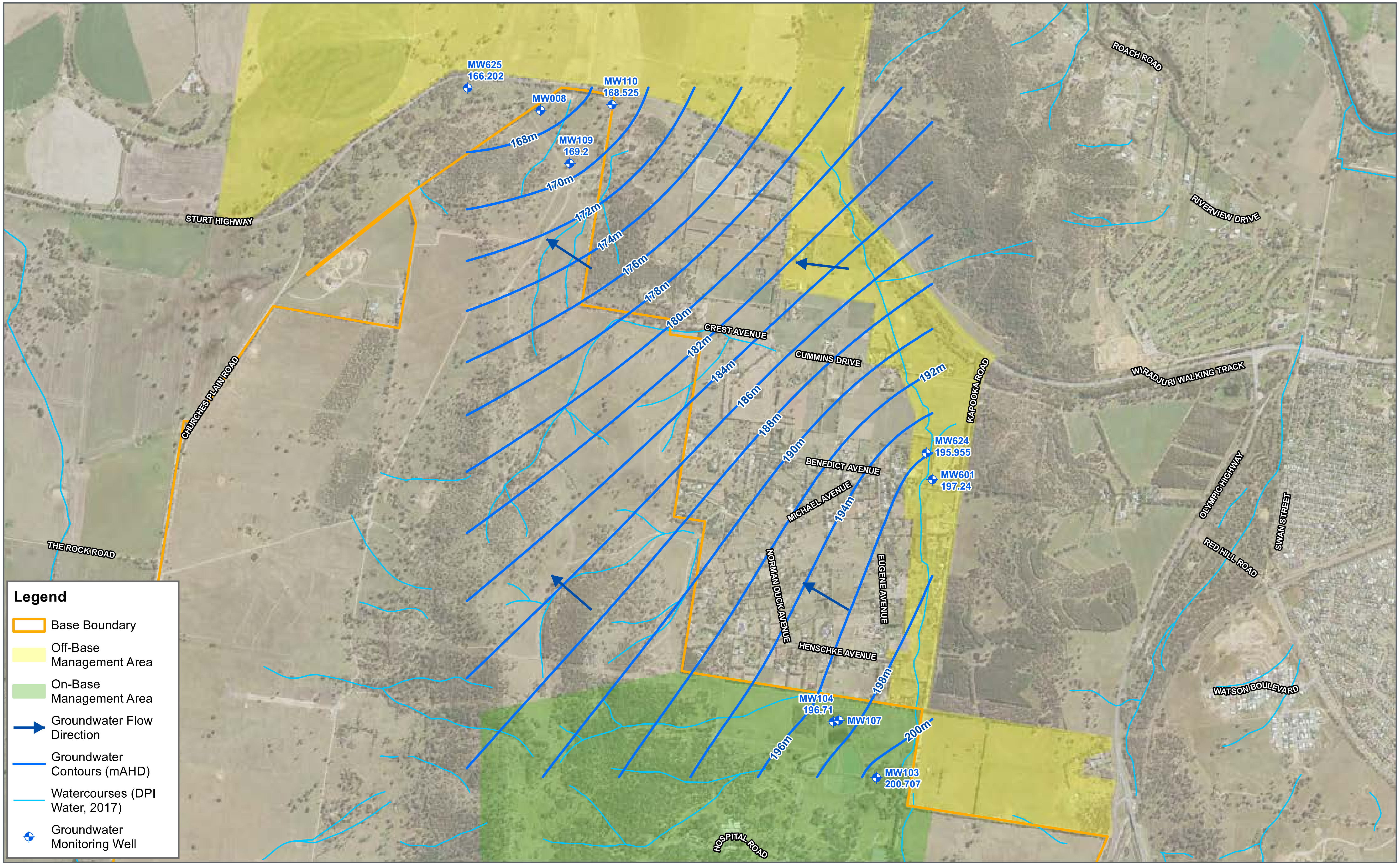

FIGURE 3

1:20,000 Scale at A3

Metres 0 500 1,000

Groundwater Elevation Contours (October, 2021)

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno
Date: 2022-02-21 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0204-GW_Contours_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

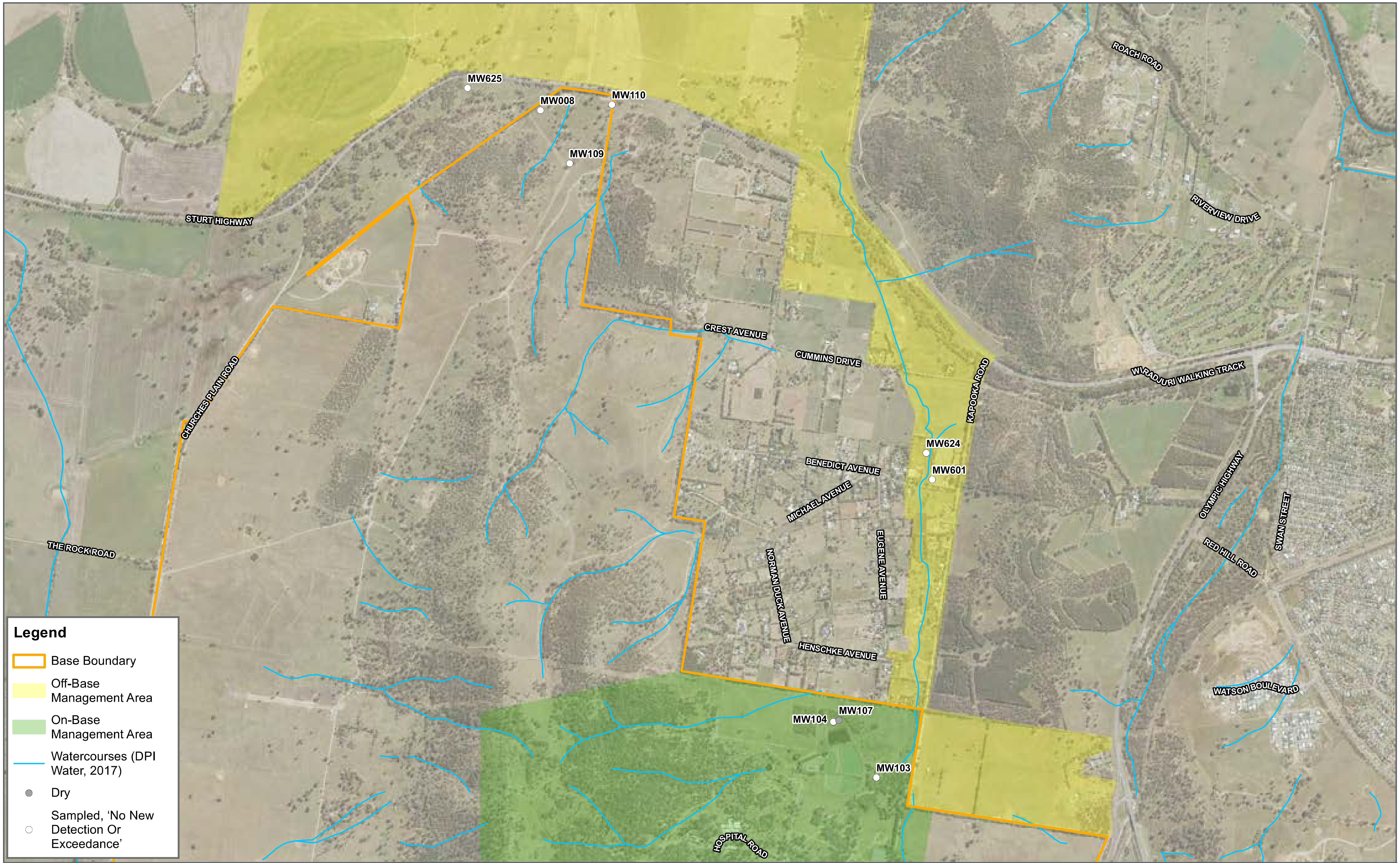

FIGURE 4

1:20,000 Scale at A3

Metres

0 500 1,000

PFAS Results Summary - Goundwater (October, 2021)

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno
Date: 2022-02-21 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0205-GW_PFAS_Summary_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

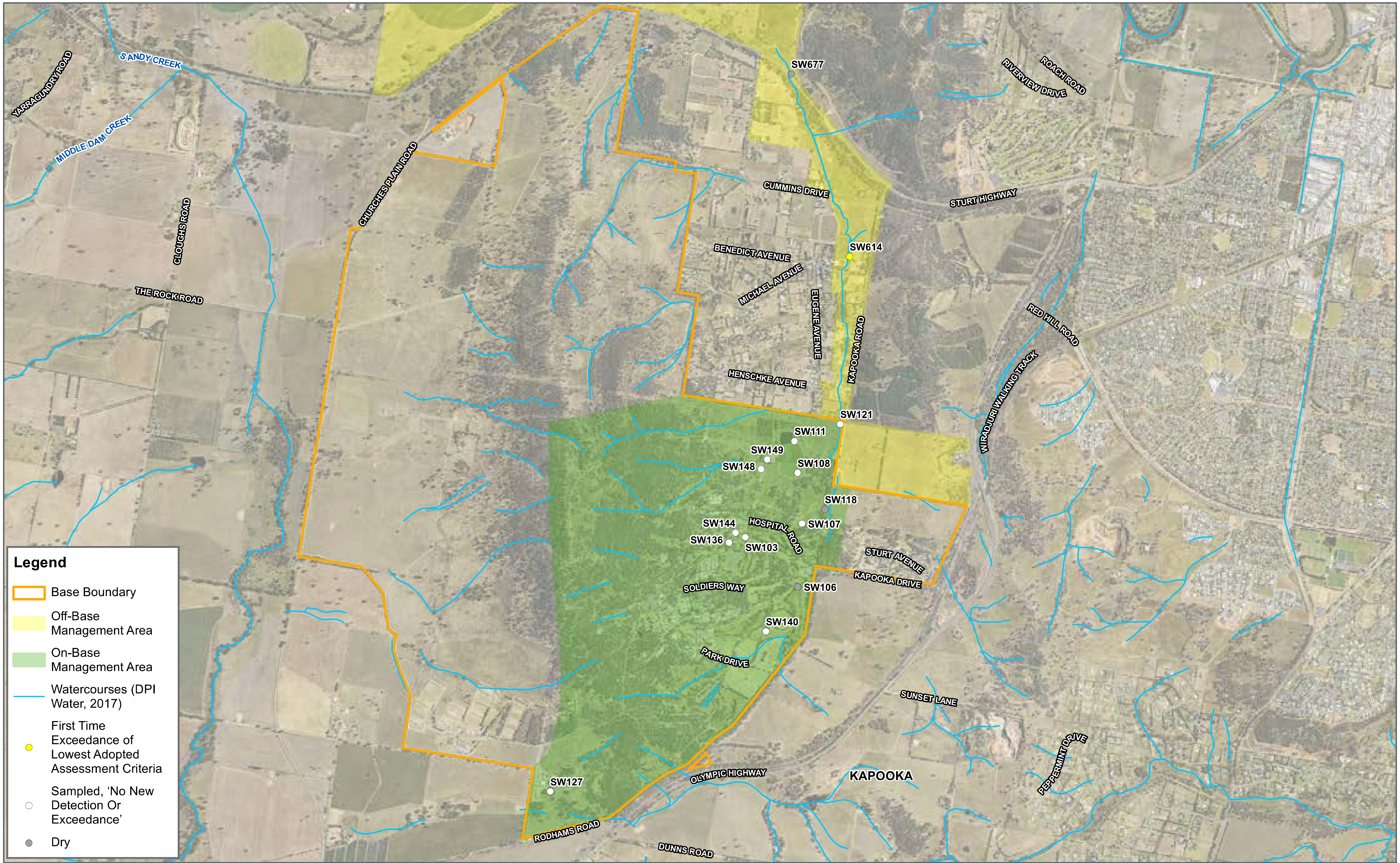

FIGURE 5

1:30,000 Scale at A3

Metres

0 500 1,000

PFAS Results Summary - Surface water (October, 2021)

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno
Date: 2022-04-27 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0206-SW_PFAS_Summary_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

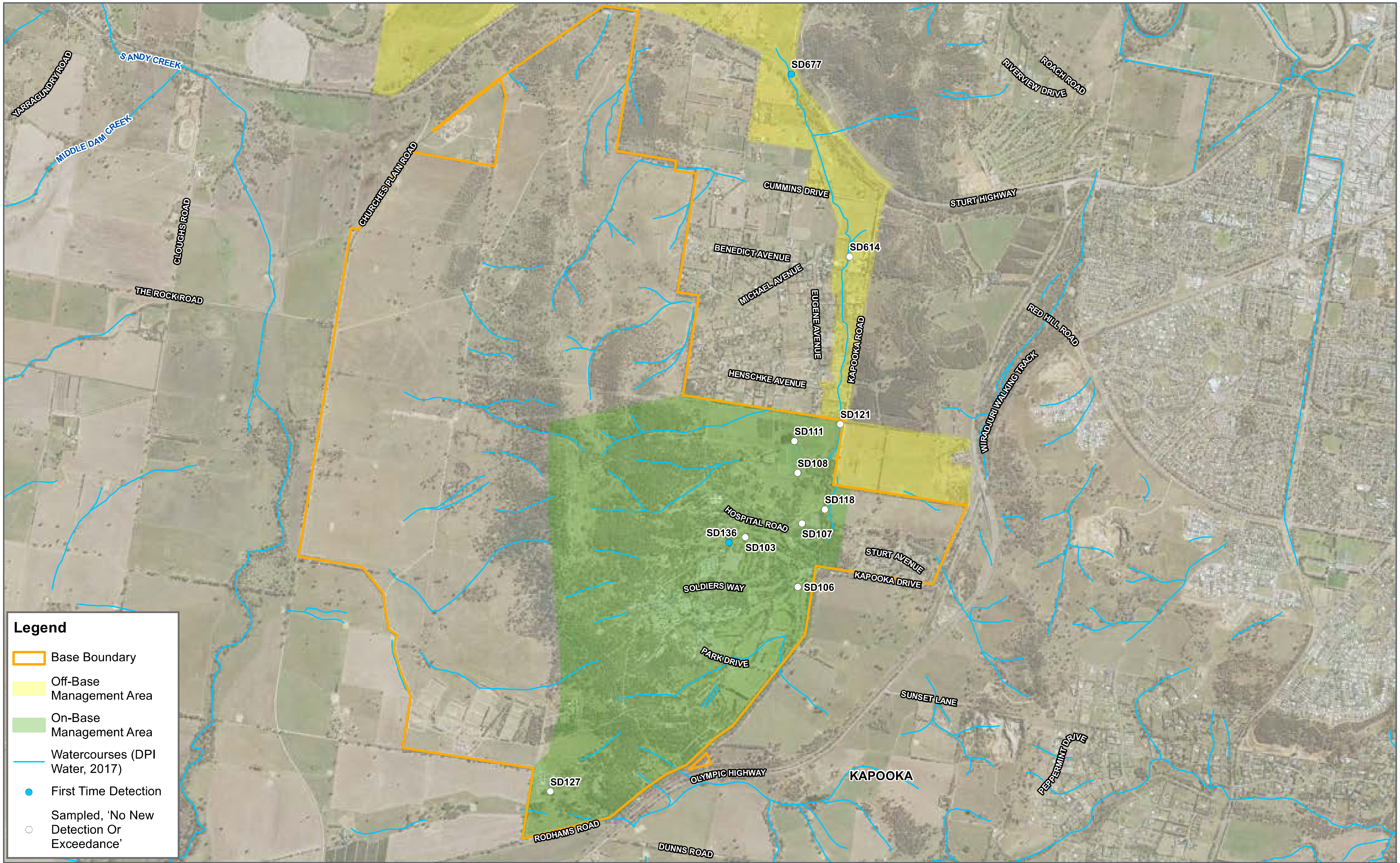

FIGURE 6

1:30,000 Scale at A3

Metres

0 500 1,000

PFAS Results Summary - Sediment (October, 2021)

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno
Date: 2022-02-21 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0207-SED_PFAS_Summary_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

APPENDIX

B

DATA ASSESSMENT TABLES

						Perfluorocarbons																															
Location Code	Monitoring Zone	Sampled Date	Field ID	Sample Type	Lab Report No.	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/kg	mg/L
LOR						0.0003	0.0005	0.0003	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.000001	0.001	0.001	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0003	0.00001	0.00001
PFAS NEMP 2.0 Table 1 Health Drinking Water							**0.56**	**0.07**																													
PFAS NEMP 2.0 Table 1 Health Recreational Water							*10*	*2*																													
PFAS NEMP 2.0 Table 5 Freshwater 95%						0.13	220																														
MW008	On-Base	16/03/2017	0315_MW008_170316	Normal	ES1706394	0.0252	<0.0005	**0.111**	0.0145	0.0088	0.0855	0.0034	<0.0005	0.023	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.000001	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	0.16	-	-
MW008	On-Base	18/12/2018	0315_QC202_181218	Split	635075	0.09	<0.01	**0.23**	0.01	0.01	0.14	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	0.25	-	0.00023
MW008	On-Base	18/12/2018	0315_MW008_S_181218	Normal	ES1838696	0.04	<0.01	**0.14**	<0.02	<0.02	0.1	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.14	-	-
MW008	On-Base	18/12/2018	0315_QC102_181218	Duplicate	ES1838696	0.04	<0.01	**0.14**	<0.02	<0.02	0.1	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.14	-	-
MW008	On-Base	18/12/2018	0315_QC104_181218	Duplicate	ES1838696	0.04	<0.01	**0.15**	<0.02	<0.02	0.11	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.15	-	-
MW008	On-Base	9/03/2020	0315_QC201_200309	Split	239048	0.05	<0.01	**0.18**	0.01	<0.01	0.13	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.1	<0.05	<0.00005	<0.1	<0.5	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	0.19	0.00005	-
MW008	On-Base	9/03/2020	0315_MW008_S_200309	Normal	ES2008982	0.06	<0.01	**0.23**	<0.02	<0.02	0.17	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.23	-	-
MW008	On-Base	9/03/2020	0315_QC101_200309	Duplicate	ES2008982	0.06	<0.01	**0.23**	<0.02	<0.02	0.17	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.23	-	-
MW008	On-Base	28/10/2021	0315_MW008_20211028	Normal	ES2139229	0.03	<0.01	**0.11**	<0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.11	-	-
MW103	On-Base	20/02/2019	0315_MW103_S_190220	Normal	ES1905450	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW103	On-Base	28/10/2021	0315_MW103_20211028	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW104	On-Base	20/02/2019	0315_MW104_S_190220	Normal	ES1905450	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW104	On-Base	28/10/2021	0315_MW104_20211028	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW107	On-Base	30/01/2019	0315_MW107_P_190130	Normal	ES1902996	<0.01	<0.01	**0.1**	<0.02	<0.02	0.1	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.1	-	-
MW107	On-Base	7/03/2019	0315_MW107_P_190307	Normal	ES1907492	0.02	<0.01	**0.07**	<0.02	<0.02	0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.07	-	-
MW109	On-Base	10/03/2020	0315_MW109_S_200310	Normal	ES2008982	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW109	On-Base	27/10/2021	0315_QC205_20211027	Split	837707	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	-	<0.00001
MW109	On-Base	27/10/2021	0315_MW109_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW109	On-Base	27/10/2021	0315_QC105_20211027	Duplicate	ES2139230	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW110	On-Base	10/03/2020	0315_MW110_S_200310	Normal	ES2008982	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW110	On-Base	28/10/2021	0315_MW110_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW601	Off-Base	29/01/2019	0315_QC201_190129	Split	638493	0.01	<0.01	**0.1**	0.01	0.01	0.09	<0.01	<0.01	<0.05	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	0.14	-	0.0001
MW601	Off-Base	29/01/2019	0315_MW601_S_190129	Normal	ES1902996	0.01	<0.01	**0.15**	<0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.18	-	-
MW601	Off-Base	29/01/2019	0315_QC101_190129	Duplicate	ES1902996	0.01	<0.01	**0.15**	<0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.15	-	-
MW601	Off-Base	18/02/2019	0315_MW601_S_190218	Normal	ES1905450	0.02	<0.01	**0.25**	<0.02	<0.02	0.23	<0.02	<0.02	<0.1	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.29	-	-
MW601	Off-Base	12/03/2020	0315_MW601_P_200312	Normal	ES2008982	0.16	0.01	**0.89**	0.06	0.08	0.73	0.03	<0.02	<0.1	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	1.11	-	-
MW601	Off-Base	27/10/2021	0315_MW601_20211027	Normal	ES2139235	0.17	<0.01	**0.59**	0.03	0.03	0.42	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.68	-	-
MW624	Off-Base	11/03/2020	0315_MW624_S_200311	Normal	ES2008982	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW624	Off-Base	27/10/2021	0315_MW624_20211027	Normal	ES2139235	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	0.05	<0.05	<0.05	0.05	-	-
MW624	Off-Base	20/12/2021	MW624	Normal	EM2125953	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW625	Off-Base	21/05/2020	0315_MW625_S_200521	Normal	ES2017986	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW625	Off-Base	26/10/2021	0315_MW625_20211026	Normal	ES2139232	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-

Notes

Denotes first time detection above LOR in latest monitoring round

Denotes new exceedance of human health screening criteria in latest monitoring round

Table B2: Suface Water Analytical Results

						Perfluorocarbons																														
						Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
					LOR	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.05	0.00005	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.01	0.00001
PFAS NEMP 2.0 Table 1 Health Drinking Water							**0.56**	**0.07**																												
PFAS NEMP 2.0 Table 1 Health Recreational Water						*2*	*10*	*2*																												
PFAS NEMP 2.0 Table 5 Freshwater 95%						0.13	220																													
Location Code	**Monitoring Zone**	**Sampled Date**	**Field ID**	**Sample Type**	**Lab Report No.**																															
SW103	On-Base	10/12/2018	0315_SW103_181210	Normal	ES1837611	0.67	0.05	**1.31**	0.1	0.06	0.64	0.02	<0.02	<0.1	0.13	0.18	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	1.89	-
SW103	On-Base	26/10/2021	0315_QC203_20211026	Split	837707	1	0.03	**1.31**	0.02	0.02	0.31	0.02	<0.01	<0.05	0.06	0.07	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	1.55	0.00134
SW103	On-Base	26/10/2021	0315_QC103_20211026	Duplicate	ES2139230	0.74	0.03	**0.99**	0.02	<0.02	0.25	<0.02	<0.02	<0.1	0.06	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	1.17	-
SW103	On-Base	26/10/2021	0315_SW103_20211026	Normal	ES2139229	0.6	0.02	**0.82**	<0.02	<0.02	0.22	<0.02	<0.02	<0.1	0.06	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.96	-
SW106	On-Base	16/12/2018	0315_SW106_181216	Normal	ES1838218	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW107	On-Base	10/12/2018	0315_SW107_181210	Normal	ES1837611	0.43	0.03	**0.65**	0.02	<0.02	0.22	<0.02	<0.02	<0.1	0.03	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.77	-
SW107	On-Base	26/10/2021	0315_SW107_20211026	Normal	ES2139229	0.18	0.01	**0.25**	<0.02	<0.02	0.07	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.26	-
SW108	On-Base	15/12/2018	0315_SW108_181215	Normal	ES1838218	0.02	0.02	0.06	0.02	<0.02	0.04	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.1	-
SW108	On-Base	26/10/2021	0315_SW108_20211026	Normal	ES2139229	0.01	<0.01	0.02	<0.02	<0.02	0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	-
SW111	On-Base	15/12/2018	0315_SW111_181215	Normal	ES1838218	0.03	0.02	**0.11**	0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.18	-
SW111	On-Base	26/10/2021	0315_SW111_20211026	Normal	ES2139229	0.02	<0.01	0.04	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.04	-
SW118	On-Base	30/11/2018	0315_SW118_181130	Normal	ES1836659	0.52	0.02	**0.67**	<0.02	<0.02	0.15	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.72	-
SW118	On-Base	13/12/2018	0315_SW118_181213	Normal	ES1837950	0.07	<0.01	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.07	-
SW121	On-Base	30/11/2018	0315_SW121_181130	Normal	ES1836659	0.28	0.02	**0.39**	<0.02	<0.02	0.11	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.44	-
SW121	On-Base	28/10/2021	0315_SW121_20211026	Normal	ES2139229	0.22	0.01	**0.31**	<0.02	<0.02	0.09	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.32	-
SW127	On-Base	14/12/2018	0315_SW127_181214	Normal	ES1838218	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW127	On-Base	25/10/2021	0315_QC201_20211025	Split	837707	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	<0.00001
SW127	On-Base	25/10/2021	0315_QC101_20211025	Duplicate	ES2139230	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW127	On-Base	25/10/2021	0315_SW127_20211025	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW136	On-Base	29/01/2019	0315_SW136_190129	Normal	ES1902996	1.48	0.11	***4.15***	0.26	0.24	2.67	0.04	<0.02	<0.1	0.17	0.44	0.16	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	5.57	-
SW136	On-Base	26/10/2021	0315_SW136_20211026	Normal	ES2139229	1.2	0.04	**1.93**	0.06	0.06	0.73	0.03	<0.02	<0.1	0.11	0.19	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	2.45	-
SW140	On-Base	29/01/2019	0315_SW140_190129	Normal	ES1902996	0.03	<0.01	**0.25**	0.04	0.03	0.22	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.32	-
SW140	On-Base	26/10/2021	0315_SW140_20211026	Normal	ES2139229	<0.01	<0.01	0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	-
SW144	On-Base	29/01/2019	0315_SW144_190129	Normal	ES1902996	0.01	<0.01	0.03	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.03	-
SW144	On-Base	27/10/2021	0315_SW144_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW148	On-Base	29/01/2019	0315_SW148_190129	Normal	ES1902996	0.47	0.01	**0.61**	0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.66	-
SW148	On-Base	27/10/2021	0315_SW148_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW149	On-Base	29/01/2019	0315_SW149_190129	Normal	ES1902996	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW149	On-Base	28/10/2021	0315_SW149_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW614	Off-Base	13/12/2018	0315_SW614_181213	Normal	ES1837950	0.03	<0.01	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.03	-
SW614	Off-Base	27/10/2021	0315_SW614_20211027	Normal	ES2139235	0.27	<0.01	**0.35**	<0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.35	-

Notes

Denotes first time detection above LOR in latest monitoring round

Denotes new exceedance of lowest adopted screening criteria in latest monitoring round

						Perfluorocarbons																															
						Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
						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	mg/kg
LOR						0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.005	0.005
Location Code	**Location Type**	**Sampled Date**	**Field ID**	**Sample Type**	**Lab Report No.**																																
SD103	On-base	10/12/2018	0315_SD103_181210	Normal	ES1837611	0.0086	<0.0002	0.0096	<0.0002	<0.0002	0.001	<0.0002	0.0003	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0102	-	-
SD103	On-base	26/10/2021	0315_QC104_20211026	Duplicate	ES2139230	0.0126	<0.0002	0.0132	<0.0002	<0.0002	0.0006	<0.0002	0.0006	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0142	-	-
SD103	On-base	26/10/2021	0315_SD103_20211026	Normal	ES2139229	0.014	<0.0002	0.0146	<0.0002	<0.0002	0.0006	<0.0002	0.0004	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005	0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0156	-	-
SD106	On-base	16/12/2018	0315_SD106_181216	Normal	ES1838218	0.0076	<0.0002	0.008	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.008	-	-
SD106	On-base	26/10/2021	0315_SD106_20211026	Normal	ES2139229	0.0042	<0.0002	0.0042	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0042	-	-
SD107	On-base	10/12/2018	0315_SD107_181210	Normal	ES1837611	0.0142	<0.0002	0.0149	<0.0002	<0.0002	0.0007	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0149	-	-
SD107	On-base	26/10/2021	0315_SD107_20211026	Normal	ES2139229	0.0051	<0.0002	0.0051	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0051	-	-
SD108	On-base	15/12/2018	0315_SD108_181215	Normal	ES1838218	0.0004	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	-	-
SD108	On-base	26/10/2021	0315_SD108_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	-	-
SD111	On-base	15/12/2018	0315_SD111_181215	Normal	ES1838218	0.0041	<0.0002	0.0045	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0048	-	-
SD111	On-base	26/10/2021	0315_SD111_20211026	Normal	ES2139229	0.0008	<0.0002	0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	-	-
SD118	On-base	30/11/2018	0315_SD118_181130	Normal	ES1836659	0.0037	<0.0002	0.0037	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0037	-	-
SD118	On-base	26/10/2021	0315_SD118_20211026	Normal	ES2139229	0.0045	<0.0002	0.0045	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0045	-	-
SD121	On-base	30/11/2018	0315_SD121_181130	Normal	ES1836659	0.0238	<0.0002	0.0246	<0.0002	<0.0002	0.0008	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0246	-	-
SD121	On-base	26/10/2021	0315_SD121_20211026	Normal	ES2139229	0.0016	<0.0002	0.0016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	-	-
SD121	On-base	21/12/2021	QC101_211221	Duplicate	EM2125953	0.0194	<0.0002	0.0197	<0.0002	-	0.0003	-	-	<0.001	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-
SD121	On-base	21/12/2021	QC201_211221	Split	853128	0.033	<0.005	0.033	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	0.033	0.033
SD121	On-base	21/12/2021	SD121	Normal	EM2125953	0.0184	<0.0002	0.0188	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0188	-	-
SD127	On-base	14/12/2018	0315_SD127_181214	Normal	ES1838218	0.0007	<0.0002	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	-	-
SD127	On-base	25/10/2021	0315_QC102_20211025	Duplicate	ES2139230	0.0003	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	-	-
SD127	On-base	25/10/2021	0315_SD127_20211026	Normal	ES2139229	0.0005	<0.0002	0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	-	-
SD136	On-base	26/10/2021	0315_SD136_20211026	Normal	ES2139229	0.0046	<0.0002	0.005	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.005	-	-
SD614	On-base	18/12/2018	0315_SD614_181218	Normal	ES1838696	0.0094	<0.0002	0.0097	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0097	-	-
SD614	On-base	27/10/2021	0315_SD614_20211027	Normal	ES2139235	0.011	<0.0002	0.0114	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0114	-	-
SD614	On-base	20/12/2021	SD614	Normal	EM2125953	0.0093	<0.0002	0.0095	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0095	-	-
SD677	Off-base	26/10/2021	0315_SD677_20211026	Normal	ES2139235	0.0052	<0.0002	0.0052	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0052	-	-
SD677	Off-base	21/12/2021	SD677	Normal	EM2125953	0.0075	<0.0002	0.0075	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0075	-	-

Notes

Denotes first time detection above LOR in latest monitoring round

Table B4: Water RPD Results

ChemName	Units	EQL	0315_SW127_20211025	0315_QC101_20211025	RPD	0315_SW103_20211026	0315_QC103_20211026	RPD	0315_MW109_20211027	0315_QC105_20211027	RPD
		Lab Report Number	ES2139229	ES2139230		ES2139229	ES2139230		ES2139229	ES2139230	
		Sampled Date	25/10/2021 15:00	25/10/2021 15:00		26/10/2021 15:00	26/10/2021 15:00		27/10/2021 15:00	27/10/2021 15:00	
Sum of WA DWER PFAS (n=10)*	ug/L	0.01 : 0.05 (Interlab)	<0.01	<0.01	0	0.96	1.17	20	<0.01	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	0.6	0.74	21	<0.01	<0.01	0
Perfluorooctanoate (PFOA)	µg/L	0.01	<0.01	<0.01	0	**0.02**	**0.03**	**40**	<0.01	<0.01	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	0.82	0.99	19	<0.01	<0.01	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	0.02	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	0.22	0.25	13	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	0.06	0.06	0	<0.02	<0.02	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	0.06	0.07	15	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	mg/l	5e-005	<0.00005	<0.00005	0	<0.00005	<0.00005	0	<0.00005	<0.00005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<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
8:2 Fluorotelomer sulfonate (8:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
Sum of PFAS	µg/L	0.01 : 0.1 (Interlab)	<0.01	<0.01	0	0.96	1.17	20	<0.01	<0.01	0

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

Table B4: Water RPD Results

ChemName	Units	EQL									
		Lab Report Number	ES2139229	837707		ES2139229	837707		ES2139229	837707	
		Field ID	0315_SW127_20211025	0315_QC201_20211025	**RPD**	0315_SW103_20211026	0315_QC203_20211026	**RPD**	0315_MW109_20211027	0315_QC205_20211027	**RPD**
		Sampled Date	25/10/2021 15:00	25/10/2021 15:00		26/10/2021 15:00	26/10/2021 15:00		27/10/2021 15:00	27/10/2021 15:00	
Sum of WA DWER PFAS (n=10)*	ug/L	0.01 : 0.05 (Interlab)	<0.01	<0.05	0	0.96	1.51	**45**	<0.01	<0.05	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	0.6	1	**50**	<0.01	<0.01	0
Perfluorooctanoate (PFOA)	µg/L	0.01	<0.01	<0.01	0	**0.02**	**0.03**	**40**	<0.01	<0.01	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	0.82	1.31	**46**	<0.01	<0.01	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	0.22	0.31	**34**	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	0.02	0	<0.02	<0.01	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.05	0	<0.1	<0.05	0	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	0.06	0.06	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	0.06	0.07	15	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	<0.05	<0.01	0	<0.05	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.05	0	<0.02	<0.05	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	mg/l	5e-005	<0.00005	<0.00005	0	<0.00005	<0.00005	0	<0.00005	<0.00005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.05	0	<0.02	<0.05	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.05	0	<0.02	<0.05	0	<0.02	<0.05	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	<0.05	<0.01	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonate (8:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	<0.05	<0.01	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	<0.05	<0.01	0	<0.05	<0.01	0
Sum of PFAS	µg/L	0.01 : 0.1 (Interlab)	<0.01	<0.1	0	0.96	1.55	**47**	<0.01	<0.1	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (1-10 x EQL); 50 (10-3(
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any

Table B5: Soil RPD Results

		Lab Report Number	ES2139229	ES2139230		ES2139229	ES2139230	
		Field ID	0315_SD127_20211026	0315_QC102_20211025	**RPD**	0315_SD103_20211026	0315_QC104_20211026	**RPD**
		Sampled Date/Time	25/10/2021 15:00	25/10/2021 15:00		26/10/2021 15:00	26/10/2021 15:00	
ChemName	**Units**	**LOR**						
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	**0.0005**	**0.0003**	**50**	0.014	0.0126	11
Perfluorooctanoate (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Sum of PFHxS and PFOS	mg/kg	0.0002	**0.0005**	**0.0003**	**50**	0.0146	0.0132	10
Perfluorobutane sulfonic acid (PFBS)	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
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	0.0006	0.0006	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorodecanesulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	**0.0004**	**0.0006**	**40**
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.001	0
Perfluoropentanoic acid (PFPeA)	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
Perfluoroheptanoic acid (PFHpA)	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
Perfluorodecanoic acid (PFDA)	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
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	**0.0003**	**<0.0002**	**40**
Perfluorotridecanoic acid (PFTrDA)	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
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	0.0003	0.0004	29
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	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 sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	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 sulfonate (8:2 FtS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0
Sum of PFAS	mg/kg	0.0002	**0.0005**	**0.0003**	**50**	0.0156	0.0142	9

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

Field Blanks (water)

		Lab Report Number	ES2139230	ES2139230	ES2139230	ES2139230	ES2139230	ES2139230	ES2139230	ES2139230
		Field ID	0315_QC302_20211025	0315_QC304_20211026	0315_QC306_20211027	0315_QC308_20211028	0315_QC501_20211025	0315_QC502_20211026	0315_QC503_20211027	0315_QC504_20211028
		Sampled_Date/Time	25/10/2021 15:00	26/10/2021 15:00	27/10/2021 15:00	28/10/2021 15:00	25/10/2021 15:00	26/10/2021 15:00	27/10/2021 15:00	28/10/2021 15:00
		Sample Type	Rinsate	Rinsate	Rinsate	Rinsate	Trip_B	Trip_B	Trip_B	Trip_B
ChemName	**Units**	**EQL**								
Sum of WA DWER PFAS (n=10)*	ug/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorocarbons										
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctanoate (PFOA)	µg/L	0.01	<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	<0.01
Perfluorononanesulfonic acid (PFNS)	mg/kg	100								
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	100								
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	mg/l	0.00005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonate (8:2 FtS)	µg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of PFAS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	mg/l	0.00001								

APPENDIX

C

LABORATORY CERTIFICATES

Cardno

CERTIFICATE OF ANALYSIS

Work Order	: **ES2139229**	Page	: 1 of 15
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] 00	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021 16:40
Order number	: ----	Date Analysis Commenced	: 01-Nov-2021
C-O-C number	: ----	Issue Date	: 04-Nov-2021 11:17
Sampler	: [redacted]		
Site	:		
Quote number	: EN/024/20		
No. of samples received	: 26		
No. of samples analysed	: 25		

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: GROUNDWATER (Matrix: WATER)			Sample ID	0315_MW008_20211028	0315_MW103_20211028	0315_MW104_20211028	0315_MW109_20211027	0315_MW110_20211027
			Sampling date / time	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	27-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139229-001	ES2139229-002	ES2139229-003	ES2139229-004	ES2139229-005
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	**0.08**	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.03**	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0315_MW008_20211028	0315_MW103_20211028	0315_MW104_20211028	0315_MW109_20211027	0315_MW110_20211027
			Sampling date / time	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	27-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139229-001	ES2139229-002	ES2139229-003	ES2139229-004	ES2139229-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.11**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.11**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.11**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**84.1**	**87.3**	**88.7**	**90.1**	**85.1**
13C8-PFOA	----	0.02	%	**86.0**	**87.2**	**89.6**	**86.0**	**86.4**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD103_20211026	0315_SD106_20211026	0315_SD107_20211026	0315_SD108_20211026	0315_SD111_20211026
			Sampling date / time	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139229-017	ES2139229-018	ES2139229-019	ES2139229-020	ES2139229-021
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**38.4**	**16.3**	**30.0**	**27.4**	**24.8**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0006**	<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	**0.0140**	**0.0042**	**0.0051**	<0.0002	**0.0008**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	**0.0004**	<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	**0.0003**	<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	**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD103_20211026	0315_SD106_20211026	0315_SD107_20211026	0315_SD108_20211026	0315_SD111_20211026
			Sampling date / time	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139229-017	ES2139229-018	ES2139229-019	ES2139229-020	ES2139229-021
				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	**0.0156**	**0.0042**	**0.0051**	<0.0002	**0.0008**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0146**	**0.0042**	**0.0051**	<0.0002	**0.0008**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0146**	**0.0042**	**0.0051**	<0.0002	**0.0008**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**98.0**	**100**	**90.5**	**88.5**	**96.0**
13C8-PFOA	----	0.0002	%	**94.0**	**95.0**	**93.5**	**91.5**	**104**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD118_20211026	0315_SD121_20211026	0315_SD127_20211026	0315_SD136_20211026	----
			Sampling date / time	26-Oct-2021 00:00	26-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	----
Compound	CAS Number	LOR	Unit	ES2139229-022	ES2139229-023	ES2139229-024	ES2139229-025	--------
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**16.4**	**23.0**	**26.8**	**30.9**	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0004**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0045**	**0.0016**	**0.0005**	**0.0046**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD118_20211026	0315_SD121_20211026	0315_SD127_20211026	0315_SD136_20211026	----
			Sampling date / time	26-Oct-2021 00:00	26-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	----
Compound	CAS Number	LOR	Unit	ES2139229-022	ES2139229-023	ES2139229-024	ES2139229-025	--------
				Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0045**	**0.0016**	**0.0005**	**0.0050**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0045**	**0.0016**	**0.0005**	**0.0050**	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0045**	**0.0016**	**0.0005**	**0.0050**	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**96.5**	**98.0**	**102**	**95.0**	----
13C8-PFOA	----	0.0002	%	**98.0**	**96.5**	**100**	**97.5**	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0315_SW103_20211026	0315_SW107_20211026	0315_SW108_20211026	0315_SW111_20211026	0315_SW121_20211026
			Sampling date / time	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139229-006	ES2139229-007	ES2139229-008	ES2139229-009	ES2139229-010
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	**0.22**	**0.07**	**0.01**	**0.02**	**0.09**
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	**0.60**	**0.18**	**0.01**	**0.02**	**0.22**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	**0.06**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**0.06**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.02**	**0.01**	<0.01	<0.01	**0.01**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0315_SW103_20211026	0315_SW107_20211026	0315_SW108_20211026	0315_SW111_20211026	0315_SW121_20211026
			Sampling date / time	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139229-006	ES2139229-007	ES2139229-008	ES2139229-009	ES2139229-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.96**	**0.26**	**0.02**	**0.04**	**0.32**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.82**	**0.25**	**0.02**	**0.04**	**0.31**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.96**	**0.26**	**0.02**	**0.04**	**0.32**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**77.2**	**86.6**	**78.1**	**80.4**	**75.4**
13C8-PFOA	----	0.02	%	**86.4**	**89.6**	**83.6**	**89.6**	**83.6**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0315_SW127_20211025	0315_SW136_20211026	0315_SW140_20211026	0315_SW144_20211027	0315_SW148_20211027
			Sampling date / time	25-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139229-011	ES2139229-012	ES2139229-013	ES2139229-014	ES2139229-015
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	**0.06**	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	**0.06**	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	**0.73**	**0.02**	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	**0.03**	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	**1.20**	<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	**0.11**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	**0.19**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	**0.03**	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	**0.04**	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0315_SW127_20211025	0315_SW136_20211026	0315_SW140_20211026	0315_SW144_20211027	0315_SW148_20211027
			Sampling date / time	25-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139229-011	ES2139229-012	ES2139229-013	ES2139229-014	ES2139229-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	**2.45**	**0.02**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	**1.93**	**0.02**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	**2.36**	**0.02**	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**102**	**103**	**104**	**101**	**108**
13C8-PFOA	----	0.02	%	**97.6**	**104**	**98.2**	**94.4**	**92.0**

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)			Sample ID	**0315_SW149_20211027**	----	----	----	----
			Sampling date / time	28-Oct-2021 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES2139229-016**	--------	--------	--------	--------
				Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0315_SW149_20211027	----	----	----	----
			Sampling date / time	28-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2139229-016	--------	--------	--------	--------
				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	%	**108**	----	----	----	----
13C8-PFOA	----	0.02	%	**89.7**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**

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

Sub-Matrix: **SEDIMENT**

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

Sub-Matrix: **SURFACE WATER**

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

QUALITY CONTROL REPORT

Work Order	: **ES2139229**		
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021
Order number	: ----	Date Analysis Commenced	: 01-Nov-2021
C-O-C number	: ----	Issue Date	: 04-Nov-2021
Sampler	: [redacted]		
Site	:		
Quote number	: EN/024/20		
No. of samples received	: 26		
No. of samples analysed	: 25		

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 moisture content, insufficient sample (reduced weight employed) or matrix interference.

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3988228)									
EP2112860-039	Anonymous	EA055: Moisture Content	----	0.1	%	16.4	17.6	7.3	0% - 20%
ES2139229-018	0315_SD106_20211026	EA055: Moisture Content	----	0.1	%	16.3	15.3	6.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3988229)									
ES2139230-004	Anonymous	EA055: Moisture Content	----	0.1	%	33.3	37.7	12.3	0% - 20%
ES2139326-009	Anonymous	EA055: Moisture Content	----	0.1	%	65.8	66.1	0.4	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3988995)									
ES2137000-015	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2139229-018	0315_SD106_20211026	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0042	0.0039	6.1	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3988995)									
ES2137000-015	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3988995) - continued									
ES2137000-015	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2139229-018	0315_SD106_20211026	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3988995)									
ES2137000-015	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2139229-018	0315_SD106_20211026	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3988995) - continued									
ES2139229-018	0315_SD106_20211026	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3988995)									
ES2137000-015	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2139229-018	0315_SD106_20211026	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989111)									
ES2139228-003	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2139229-004	0315_MW109_20211027	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989119)									
ES2139229-011	0315_SW127_20211025	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989119) - continued									
ES2139229-011	0315_SW127_20211025	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2139230-005	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989111)									
ES2139228-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
ES2139229-004	0315_MW109_20211027	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989119)									
ES2139229-011	0315_SW127_20211025	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989119) - continued									
ES2139229-011	0315_SW127_20211025	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
ES2139230-005	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989111)									
ES2139228-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139229-004	0315_MW109_20211027	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989111) - continued									
ES2139229-004	0315_MW109_20211027	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989119)									
ES2139229-011	0315_SW127_20211025	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139230-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3989111)									
ES2139228-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.06	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139229-004	0315_MW109_20211027	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory 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: 3989111) - continued									
ES2139229-004	0315_MW109_20211027	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3989119)									
ES2139229-011	0315_SW127_20211025	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139230-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3989111)									
ES2139228-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.18	0.12	40.0	0% - 50%
ES2139229-004	0315_MW109_20211027	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3989119)									
ES2139229-011	0315_SW127_20211025	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
ES2139230-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

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

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

Sub-Matrix: **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: 3988995)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3988995)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	82.4	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.8	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.8	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3988995)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.2	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.9	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.5	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3988995)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	105	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	91.6	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	99.6	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	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3988995) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.4	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	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989111)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	81.0	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	0.01	µg/L	<0.01	0.25 µg/L	83.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	96.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	90.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	97.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989119)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	76.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	77.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	87.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989111)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	92.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	80.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	79.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	85.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	81.0	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	78.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	85.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	89.7	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989119)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	78.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	83.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	85.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	80.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	77.6	71.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989119) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	86.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	73.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	83.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989111)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	75.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	74.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	77.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	83.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	80.7	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	75.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	84.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989119)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	74.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	85.4	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.3	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	77.7	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	84.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	75.2	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989111)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	80.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	76.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	75.0	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	73.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989119)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	79.8	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	84.4	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	83.2	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	90.0	71.4	144

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3988995)							
ES2137000-015	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	80.0	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	88.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	83.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	87.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	84.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	88.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3988995)							
ES2137000-015	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	86.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	93.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	90.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	92.0	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	92.8	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	100	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	98.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	96.4	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	95.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	92.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	98.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3988995)							
ES2137000-015	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	99.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	108	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	89.6	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	91.5	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	90.2	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	98.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	87.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3988995)							
ES2137000-015	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	105	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	97.6	64.0	140

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3988995) - continued							
ES2137000-015	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	101	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	96.8	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989111)							
ES2139228-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	80.6	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	89.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	74.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	82.4	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	73.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	80.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989119)							
ES2139230-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	85.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	88.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	74.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	87.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	75.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	84.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989111)							
ES2139228-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	92.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	95.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	86.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	88.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	89.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	86.4	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	82.0	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	79.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	87.4	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	88.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	93.0	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989119)							
ES2139230-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	96.5	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	87.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	90.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	87.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	91.6	69.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989119) - continued							
ES2139230-003	Anonymous	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	78.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	83.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	88.4	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	78.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	91.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989111)							
ES2139228-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	75.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	77.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	89.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	91.0	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	78.3	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	77.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	85.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989119)							
ES2139230-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	79.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	80.2	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	76.2	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	76.9	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	82.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	85.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989111)							
ES2139228-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	77.0	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	72.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	74.6	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	73.6	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989119)							
ES2139230-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	78.8	63.0	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989119) - continued							
ES2139230-003	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	82.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	92.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	75.0	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2139229**	Page	: 1 of 7
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021
Site	:	Issue Date	: 04-Nov-2021
Sampler	: [redacted]	No. of samples received	: 26
Order number	: ----	No. of samples analysed	: 25

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method		*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)			*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)								
0315_SD127_20211026		**25-Oct-2021**	**----**	----	----	**01-Nov-2021**	08-Nov-2021	✓
HDPE Soil Jar (EA055)								
0315_SD103_20211026,	0315_SD106_20211026,	**26-Oct-2021**	**----**	----	----	**01-Nov-2021**	09-Nov-2021	✓
0315_SD107_20211026,	0315_SD108_20211026,							
0315_SD111_20211026,	0315_SD118_20211026,							
0315_SD121_20211026,	0315_SD136_20211026							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0315_SD127_20211026		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X)								
0315_SD103_20211026,	0315_SD106_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
0315_SD107_20211026,	0315_SD108_20211026,							
0315_SD111_20211026,	0315_SD118_20211026,							
0315_SD121_20211026,	0315_SD136_20211026							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
0315_SD127_20211026		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X)								
0315_SD103_20211026,	0315_SD106_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
0315_SD107_20211026,	0315_SD108_20211026,							
0315_SD111_20211026,	0315_SD118_20211026,							
0315_SD121_20211026,	0315_SD136_20211026							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
0315_SD127_20211026		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X)								
0315_SD103_20211026,	0315_SD106_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
0315_SD107_20211026,	0315_SD108_20211026,							
0315_SD111_20211026,	0315_SD118_20211026,							
0315_SD121_20211026,	0315_SD136_20211026							

Matrix: **SOIL**

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

Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) 0315_SD127_20211026		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_SD103_20211026, 0315_SD107_20211026, 0315_SD111_20211026, 0315_SD121_20211026,	0315_SD106_20211026, 0315_SD108_20211026, 0315_SD118_20211026, 0315_SD136_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) 0315_SD127_20211026		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_SD103_20211026, 0315_SD107_20211026, 0315_SD111_20211026, 0315_SD121_20211026,	0315_SD106_20211026, 0315_SD108_20211026, 0315_SD118_20211026, 0315_SD136_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-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
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0315_SW127_20211025		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW103_20211026, 0315_SW108_20211026,	0315_SW107_20211026, 0315_SW111_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW136_20211026,	0315_SW140_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW109_20211027		**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW144_20211027,	0315_SW148_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW008_20211028, 0315_MW104_20211028, 0315_SW121_20211026	0315_MW103_20211028, 0315_MW110_20211027,	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**02-Nov-2021**	26-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW149_20211027		**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓

Matrix: **WATER**

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

Method / ***Container*** / *Client Sample ID(s)*		***Sample Date***	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0315_SW127_20211025		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X)								
0315_SW103_20211026,	0315_SW107_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
0315_SW108_20211026,	0315_SW111_20211026							
HDPE (no PTFE) (EP231X)								
0315_SW136_20211026,	0315_SW140_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW109_20211027		**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X)								
0315_SW144_20211027,	0315_SW148_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW008_20211028,	0315_MW103_20211028,	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**02-Nov-2021**	26-Apr-2022	✓
0315_MW104_20211028,	0315_MW110_20211027,							
0315_SW121_20211026								
HDPE (no PTFE) (EP231X)								
0315_SW149_20211027		**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0315_SW127_20211025		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X)								
0315_SW103_20211026,	0315_SW107_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
0315_SW108_20211026,	0315_SW111_20211026							
HDPE (no PTFE) (EP231X)								
0315_SW136_20211026,	0315_SW140_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW109_20211027		**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X)								
0315_SW144_20211027,	0315_SW148_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW008_20211028,	0315_MW103_20211028,	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**02-Nov-2021**	26-Apr-2022	✓
0315_MW104_20211028,	0315_MW110_20211027,							
0315_SW121_20211026								
HDPE (no PTFE) (EP231X)								
0315_SW149_20211027		**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0315_SW127_20211025		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW103_20211026, 0315_SW108_20211026,	0315_SW107_20211026, 0315_SW111_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW136_20211026,	0315_SW140_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW109_20211027		**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW144_20211027,	0315_SW148_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW008_20211028, 0315_MW104_20211028, 0315_SW121_20211026	0315_MW103_20211028, 0315_MW110_20211027,	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**02-Nov-2021**	26-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW149_20211027		**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0315_SW127_20211025		**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW103_20211026, 0315_SW108_20211026,	0315_SW107_20211026, 0315_SW111_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW136_20211026,	0315_SW140_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW109_20211027		**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW144_20211027,	0315_SW148_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW008_20211028, 0315_MW104_20211028, 0315_SW121_20211026	0315_MW103_20211028, 0315_MW110_20211027,	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**02-Nov-2021**	26-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW149_20211027		**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	34	**11.76**	**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	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2139229**

Client	: **CARDNO VICTORIA 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	: NSW_0315_PFASOMP	Page	: 1 of 3
Order number	: ----	Quote number	: EP2020LANECON0001 (EN/024/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: [redacted]		

Dates

Date Samples Received	: 29-Oct-2021 16:40	Issue Date	: 01-Nov-2021
Client Requested Due Date	: 05-Nov-2021	Scheduled Reporting Date	: **05-Nov-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 6.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 26 / 25

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please note that ALS received a water sample with ID 0315_SW136_20211026, however a sediment jar with the same ID was also received.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2139229-017	26-Oct-2021 00:00	0315_SD103_20211026		✓	✓
ES2139229-018	26-Oct-2021 00:00	0315_SD106_20211026		✓	✓
ES2139229-019	26-Oct-2021 00:00	0315_SD107_20211026		✓	✓
ES2139229-020	26-Oct-2021 00:00	0315_SD108_20211026		✓	✓
ES2139229-021	26-Oct-2021 00:00	0315_SD111_20211026		✓	✓
ES2139229-022	26-Oct-2021 00:00	0315_SD118_20211026		✓	✓
ES2139229-023	26-Oct-2021 00:00	0315_SD121_20211026		✓	✓
ES2139229-024	25-Oct-2021 00:00	0315_SD127_20211026		✓	✓
ES2139229-025	26-Oct-2021 00:00	0315_SD136_20211026		✓	✓
ES2139229-026	26-Oct-2021 00:00	0315_SW136_20211026	✓		

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)
ES2139229-001	28-Oct-2021 00:00	0315_MW008_20211028	✓
ES2139229-002	28-Oct-2021 00:00	0315_MW103_20211028	✓
ES2139229-003	28-Oct-2021 00:00	0315_MW104_20211028	✓
ES2139229-004	27-Oct-2021 00:00	0315_MW109_20211027	✓
ES2139229-005	28-Oct-2021 00:00	0315_MW110_20211027	✓
ES2139229-006	26-Oct-2021 00:00	0315_SW103_20211026	✓
ES2139229-007	26-Oct-2021 00:00	0315_SW107_20211026	✓
ES2139229-008	26-Oct-2021 00:00	0315_SW108_20211026	✓
ES2139229-009	26-Oct-2021 00:00	0315_SW111_20211026	✓
ES2139229-010	28-Oct-2021 00:00	0315_SW121_20211026	✓
ES2139229-011	25-Oct-2021 00:00	0315_SW127_20211025	✓
ES2139229-012	26-Oct-2021 00:00	0315_SW136_20211026	✓
ES2139229-013	26-Oct-2021 00:00	0315_SW140_20211026	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
ES2139229-014	27-Oct-2021 00:00	0315_SW144_20211027	✓
ES2139229-015	27-Oct-2021 00:00	0315_SW148_20211027	✓
ES2139229-016	28-Oct-2021 00:00	0315_SW149_20211027	✓

Proactive Holding Time Report

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

Requested Deliverables

ALL INVOICES

- 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 [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ESDAT LSPECS

- EDI Format - ESDAT (ESDAT) Email [redacted]
- Electronic SRN for ESdat (ESRN_ESDAT) Email [redacted]

Cardno

Chain of Custody

Sheet 1 of 1

PM Name: [redacted]
Phone: [redacted]
Address: [redacted]
PM Email: [redacted]
Project Number: NSW_0315_PFASOMP   Site:

Laboratory (name, phone, & contact person):
ALS

Sample ID		Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Sediment	Groundwater	Surface Water	QC	Sample preservation: Mel Ice Bricks	Analysis: EP231X - PFAS Standard	HOLD	Forward to Eurofins	Comments: Please amend Sample IDs as follows	Please send to Eurofins
0315_MW006_20211026	1		2 x 20 ml	26/10/2021			1			1	1				
0315_MW103_20211026	2		2 x 20 ml	26/10/2021			1			1	1				
0315_MW104_20211026	3		2 x 20 ml	26/10/2021			1			1	1				
0315_MW109_20211027	4		6 x 20 ml	27/10/2021			1			1	1				
0315_MW110_20211027	5		2 x 20 ml	27/10/2021			1			1	1				
0315_SW103_20211026	6		6 x 20 ml	26/10/2021				1		1	1				
0315_SW107_20211026	7		2 x 20 ml	26/10/2021				1		1	1				
0315_SW108_20211026	8		2 x 20 ml	26/10/2021				1		1	1				
0315_SW111_20211026	9		2 x 20 ml	26/10/2021				1		1	1				
0315_SW121_20211026	10		2 x 20 ml	26/10/2021				1		1	1				
0315_SW127_20211026	11		6 x 20 ml	26/10/2021				1		1	1				
0315_SW136_20211026	12		2 x 20 ml	26/10/2021				1		1	1				
0315_SW140_20211026	13		2 x 20 ml	26/10/2021				1		1	1				
0315_SW144_20211027	14		2 x 20 ml	27/10/2021				1		1	1				
0315_SW148_20211027	15		2 x 20 ml	27/10/2021				1		1	1				
0315_SW149_20211027	16		2 x 20 ml	27/10/2021				1		1	1				
0315_SD103_20211026	17		1 x 200 g	26/10/2021		1				1	1				
0315_SD106_20211026	18		1 x 200 g	26/10/2021		1				1	1				
0315_SD107_20211026	19		1 x 200 g	26/10/2021		1				1	1				
0315_SD108_20211026	20		1 x 200 g	26/10/2021		1				1	1				
0315_SD111_20211026	21		1 x 200 g	26/10/2021		1				1	1				
0315_SD118_20211026	22		1 x 200 g	26/10/2021		1				1	1				
0315_SD121_20211026	23		1 x 200 g	26/10/2021		1				1	1				
0315_SD127_20211026	24		1 x 200 g	26/10/2021		1				1	1				
0315_SD136_20211026	25		1 x 200 g	26/10/2021		1				1	1				

Sampler: I attest that the proper field sampling procedures were used during the collection of these samples. Sampler name: [redacted] Date: 29/10/21 10:15

Relinquished by (print and signature) Date Time Received by (print and signature) Date Time

Relinquished by (print and signature) Date Time Received by (print and signature) Date Time

Relinquished by (print and signature) Date Time Received by (print and signature) Date Time

rec: Fax 29/10/21 4:24

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/5 days) Please circle

Page of

Revision 1
Approved 23 May 2013

DEF19008_E1_GWM-SWM_SED_KapookaBarracks.xls

Environmental Division
Sydney
Work Order Reference
ES2139229

Telephone : + 61-2-8784 8555

Printed 29/10/2021

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2139230**	Page	: 1 of 11
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021 16:20
Order number	: ----	Date Analysis Commenced	: 01-Nov-2021
C-O-C number	: ----	Issue Date	: 04-Nov-2021 11:18
Sampler	: ----		
Site	:		
Quote number	: EN/024/20		
No. of samples received	: 17		
No. of samples analysed	: 13		

NATA

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[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	0315_QC102_20211025	0315_QC104_20211026	----	----	----
			Sampling date / time	25-Oct-2021 00:00	26-Oct-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2139230-002	ES2139230-004	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**27.9**	**33.3**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	**0.0006**	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0003**	**0.0126**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	**0.0006**	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	**0.0004**	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	0315_QC102_20211025	0315_QC104_20211026	----	----	----
			Sampling date / time	25-Oct-2021 00:00	26-Oct-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2139230-002	ES2139230-004	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0003**	**0.0142**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0003**	**0.0132**	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0003**	**0.0132**	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**80.0**	**76.5**	----	----	----
13C8-PFOA	----	0.0002	%	**88.0**	**84.0**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC101_20211025	0315_QC103_20211026	0315_QC105_20211027	0315_QC302_20211025	0315_QC304_20211026
			Sampling date / time	25-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139230-001	ES2139230-003	ES2139230-005	ES2139230-007	ES2139230-009
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	**0.02**	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	**0.25**	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	**0.74**	<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	**0.06**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	**0.07**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	**0.03**	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	0315_QC101_20211025	0315_QC103_20211026	0315_QC105_20211027	0315_QC302_20211025	0315_QC304_20211026
Sampling date / time				25-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00
				ES2139230-001	ES2139230-003	ES2139230-005	ES2139230-007	ES2139230-009
				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	**1.17**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	**0.99**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	**1.17**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**104**	**99.7**	**98.4**	**104**	**105**
13C8-PFOA	----	0.02	%	**98.4**	**99.7**	**98.5**	**98.9**	**103**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC306_20211027	0315_QC308_20211028	0315_QC501_20211025	0315_QC502_20211026	0315_QC503_20211027
			Sampling date / time	27-Oct-2021 00:00	28-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139230-011	ES2139230-013	ES2139230-014	ES2139230-015	ES2139230-016
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC306_20211027	0315_QC308_20211028	0315_QC501_20211025	0315_QC502_20211026	0315_QC503_20211027
			Sampling date / time	27-Oct-2021 00:00	28-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2139230-011	ES2139230-013	ES2139230-014	ES2139230-015	ES2139230-016
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**100**	**97.9**	**103**	**107**	**104**
13C8-PFOA	----	0.02	%	**102**	**103**	**101**	**102**	**102**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC504_20211028	----	----	----	----
			Sampling date / time	28-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2139230-017	--------	--------	--------	--------
				Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC504_20211028	----	----	----	----
			Sampling date / time	28-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2139230-017	--------	--------	--------	--------
				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	%	**102**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

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

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order	: **ES2139230**	Page	: 1 of 11
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021
Order number	: ----	Date Analysis Commenced	: 01-Nov-2021
C-O-C number	: ----	Issue Date	: 04-Nov-2021
Sampler	: ----		
Site	:		
Quote number	: EN/024/20		
No. of samples received	: 17		
No. of samples analysed	: 13		

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 moisture content, insufficient sample (reduced weight employed) or matrix interference.

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3988229)									
ES2139230-004	0315_QC104_20211026	EA055: Moisture Content	----	0.1	%	33.3	37.7	12.3	0% - 20%
ES2139326-009	Anonymous	EA055: Moisture Content	----	0.1	%	65.8	66.1	0.4	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989001)									
ES2139191-027	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0006	0.0006	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2139191-042	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0018	0.0021	14.3	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989001)									
ES2139191-027	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory 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: 3989001) - continued									
ES2139191-027	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2139191-042	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0003	0.0004	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989001)									
ES2139191-027	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2139191-042	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3989001)									
ES2139191-027	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2139191-042	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989119)									
ES2139229-011	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2139230-005	0315_QC105_20211027	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989119)									
ES2139229-011	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989119) - continued									
ES2139229-011	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
ES2139230-005	0315_QC105_20211027	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989119)									
ES2139229-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139230-005	0315_QC105_20211027	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3989119)									
ES2139229-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139230-005	0315_QC105_20211027	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3989119)									
ES2139229-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
ES2139230-005	0315_QC105_20211027	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

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

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

Sub-Matrix: **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: 3989001)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.6	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989001)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	77.7	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.0	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989001)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.6	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	98.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989001)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	81.6	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	82.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.4	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: 3989001) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	88.4	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: 3989119)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	76.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	77.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	87.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989119)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	78.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	83.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	85.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	80.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	77.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	86.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	73.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	83.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989119)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	74.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	85.4	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.3	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	77.7	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	84.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	75.2	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989119)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	79.8	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	84.4	64.0	140

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989119) - continued								
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	83.2	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	90.0	71.4	144

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989001)							
ES2139191-027	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	79.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	87.2	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	75.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	87.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	75.2	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	80.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989001)							
ES2139191-027	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	76.3	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	82.8	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	76.4	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	96.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	88.4	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	98.8	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	95.2	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	99.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	102	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	105	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	101	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989001)							
ES2139191-027	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	81.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	98.9	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	107	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	103	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134

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
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989001) - continued							
ES2139191-027	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	113	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: 3989001)							
ES2139191-027	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	83.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	88.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	85.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	85.2	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989119)							
ES2139230-003	0315_QC103_20211026	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	85.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	88.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	74.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	87.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	75.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	84.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989119)							
ES2139230-003	0315_QC103_20211026	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	96.5	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	87.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	90.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	87.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	91.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	78.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	83.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	88.4	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	78.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	91.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989119)							
ES2139230-003	0315_QC103_20211026	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	79.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	80.2	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	76.2	66.0	145

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989119) - continued							
ES2139230-003	0315_QC103_20211026	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	76.9	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	82.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	85.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989119)							
ES2139230-003	0315_QC103_20211026	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	78.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	82.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	92.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	75.0	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2139230**	Page	: 1 of 6
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021
Site	:	Issue Date	: 04-Nov-2021
Sampler	: ----	No. of samples received	: 17
Order number	: ----	No. of samples analysed	: 13

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) 0315_QC102_20211025	**25-Oct-2021**	**----**	----	----	**01-Nov-2021**	08-Nov-2021	✓
HDPE Soil Jar (EA055) 0315_QC104_20211026	**26-Oct-2021**	**----**	----	----	**01-Nov-2021**	09-Nov-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) 0315_QC102_20211025	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_QC104_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) 0315_QC102_20211025	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_QC104_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) 0315_QC102_20211025	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_QC104_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) 0315_QC102_20211025	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_QC104_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) 0315_QC102_20211025	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_QC104_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	12-Dec-2021	✓

Matrix: **WATER**

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

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) 0315_QC101_20211025, 0315_QC501_20211025	0315_QC302_20211025,	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC103_20211026, 0315_QC502_20211026	0315_QC304_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC105_20211027, 0315_QC503_20211027	0315_QC306_20211027,	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC308_20211028,	0315_QC504_20211028	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0315_QC101_20211025, 0315_QC501_20211025	0315_QC302_20211025,	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC103_20211026, 0315_QC502_20211026	0315_QC304_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC105_20211027, 0315_QC503_20211027	0315_QC306_20211027,	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC308_20211028,	0315_QC504_20211028	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0315_QC101_20211025, 0315_QC501_20211025	0315_QC302_20211025,	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC103_20211026, 0315_QC502_20211026	0315_QC304_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC105_20211027, 0315_QC503_20211027	0315_QC306_20211027,	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC308_20211028,	0315_QC504_20211028	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓

Matrix: **WATER**

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

Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0315_QC101_20211025, 0315_QC501_20211025	0315_QC302_20211025,	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC103_20211026, 0315_QC502_20211026	0315_QC304_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC105_20211027, 0315_QC503_20211027	0315_QC306_20211027,	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC308_20211028,	0315_QC504_20211028	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0315_QC101_20211025, 0315_QC501_20211025	0315_QC302_20211025,	**25-Oct-2021**	**02-Nov-2021**	23-Apr-2022	✓	**03-Nov-2021**	23-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC103_20211026, 0315_QC502_20211026	0315_QC304_20211026,	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	24-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC105_20211027, 0315_QC503_20211027	0315_QC306_20211027,	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC308_20211028,	0315_QC504_20211028	**28-Oct-2021**	**02-Nov-2021**	26-Apr-2022	✓	**03-Nov-2021**	26-Apr-2022	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	14	**14.29**	**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	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

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2139230**		
Client	: **CARDNO VICTORIA 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	: NSW_0315_PFASOMP	Page	: 1 of 3
Order number	: ----	Quote number	: EP2020LANECON0001 (EN/024/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	:		

Dates

Date Samples Received	: 29-Oct-2021 16:20	Issue Date	: 01-Nov-2021
Client Requested Due Date	: 05-Nov-2021	Scheduled Reporting Date	: **05-Nov-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 6.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 17 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Samples QC201, QC202, QC203, QC204 & QC205 will be sent to Eurofins for analysis.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

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

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2139230-002	25-Oct-2021 00:00	0315_QC102_20211025	✓	✓
ES2139230-004	26-Oct-2021 00:00	0315_QC104_20211026	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) WATER No analysis requested	WATER - EP231X PFAS - Full Suite (28 analytes)
ES2139230-001	25-Oct-2021 00:00	0315_QC101_20211025		✓
ES2139230-003	26-Oct-2021 00:00	0315_QC103_20211026		✓
ES2139230-005	27-Oct-2021 00:00	0315_QC105_20211027		✓
ES2139230-006	25-Oct-2021 00:00	0315_QC301_20211025	✓	
ES2139230-007	25-Oct-2021 00:00	0315_QC302_20211025		✓
ES2139230-008	25-Oct-2021 00:00	0315_QC303_20211025	✓	
ES2139230-009	26-Oct-2021 00:00	0315_QC304_20211026		✓
ES2139230-010	27-Oct-2021 00:00	0315_QC305_20211027	✓	
ES2139230-011	27-Oct-2021 00:00	0315_QC306_20211027		✓
ES2139230-012	27-Oct-2021 00:00	0315_QC307_20211027	✓	
ES2139230-013	28-Oct-2021 00:00	0315_QC308_20211028		✓
ES2139230-014	25-Oct-2021 00:00	0315_QC501_20211025		✓
ES2139230-015	26-Oct-2021 00:00	0315_QC502_20211026		✓
ES2139230-016	27-Oct-2021 00:00	0315_QC503_20211027		✓
ES2139230-017	28-Oct-2021 00:00	0315_QC504_20211028		✓

Proactive Holding Time Report

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

Requested Deliverables

ALL INVOICES

- 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	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- A4 - AU Tax Invoice (INV)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]

ESDAT LSPECS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

Cardno

Chain of Custody

Sheet 1 **of** 1

PM Name: [redacted]
Phone: [redacted]
Address: [redacted]
PM Email: [redacted]
Project Number: NSW_0315_PFASOMP
Site:
Laboratory (name, phone, & contact person): ALS

Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sediment	Groundwater	Surface Water	QC	Ice/ Ice Bricks	EP231X - PFAS Standard	HOLD	Forward to Eurofins	Please amend Sample IDs as follows	Please send to Eurofins
0315_QC101_20211025 1		6 x 20 ml	25/10/2021					1		1				
0315_QC201_20211025 X		6 x 20 ml	25/10/2021					1						Yes
0315_QC102_20211025 3		1 x 200 g	25/10/2021					1		1				
0315_QC202_20211025 4		1 x 200 g	25/10/2021					1						Yes
0315_QC103_20211026 X		6 x 20 ml	26/10/2021					1		1				
0315_QC203_20211026 6		6 x 20 ml	26/10/2021					1						Yes
0315_QC104_20211026 X		1 x 200 g	26/10/2021					1		1				
0315_QC204_20211026 8		1 x 200 g	26/10/2021					1						Yes
0315_QC105_20211027 X		6 x 20 ml	27/10/2021					1		1				
0315_QC205_20211027 10		6 x 20 ml	27/10/2021					1						Yes
0315_QC301_20211025 X		2 x 20 ml	25/10/2021					1						
0315_QC302_20211025 12		2 x 20 ml	25/10/2021					1		1				
0315_QC303_20211026 13		2 x 20 ml	26/10/2021					1						
0315_QC304_20211026 14		2 x 20 ml	26/10/2021					1		1				
0315_QC305_20211027 15		2 x 20 ml	27/10/2021					1						
0315_QC306_20211027 16		2 x 20 ml	27/10/2021					1		1				
0315_QC307_20211027 17		2 x 20 ml	28/10/2021					1						
0315_QC308_20211027 18		2 x 20 ml	28/10/2021							1				
0315_QC501_20211025 19		2 x 20 ml	25/10/2021					1		1				
0315_QC502_20211026 20		2 x 20 ml	26/10/2021					1		1				
0315_QC503_20211027 21		2 x 20 ml	27/10/2021					1		1				
0315_QC504_20211028 22		2 x 20 ml	28/10/2021					1		1				

Environmental Division
Sydney
Work Order Reference
ES2139230
Telephone : + 61-2-8784 8555

Sampler: I attest that the proper field sampling proceedures were used during the collection of these samples. Sampler name: [redacted] Date: 29/10/21 1015

Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/5 days) Please circle

rec: Tran 29/10/21 4:40

Page of

Revision 1
Approved 23 May 2013

DEF19008_E1_GWM-SWM_SED_QC.xls

Printed 29/10/2021

CERTIFICATE OF ANALYSIS

Work Order	: **ES2139232**	Page	: 1 of 5
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021 16:30
Order number	: ----	Date Analysis Commenced	: 02-Nov-2021
C-O-C number	: ----	Issue Date	: 03-Nov-2021 18:17
Sampler	: ----		
Site	:		
Quote number	: EN/024/20		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[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: GROUNDWATER (Matrix: WATER)			Sample ID	0315_MW625_20211026	----	----	----	----
			Sampling date / time	26-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2139232-001	--------	--------	--------	--------
				Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0315_MW625_20211026	----	----	----	----
			Sampling date / time	26-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2139232-001	--------	--------	--------	--------
				Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**104**	----	----	----	----
13C8-PFOA	----	0.02	%	**101**	----	----	----	----

Surrogate Control Limits

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

QUALITY CONTROL REPORT

Work Order	: **ES2139232**	Page	: 1 of 7
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021
Order number	: ----	Date Analysis Commenced	: 02-Nov-2021
C-O-C number	: ----	Issue Date	: 03-Nov-2021
Sampler	: ----		
Site	:		
Quote number	: EN/024/20		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.14	0.16	8.5	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2139231-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.13	9.3	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989510) - continued									
ES2139231-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139231-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory 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: 3989510) - continued									
ES2139231-001	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139231-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.43	0.46	6.7	0% - 20%
ES2139231-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989510)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	96.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	89.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	91.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	119	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989510)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	108	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	99.8	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	100	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	84.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989510)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	91.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	76.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	90.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	83.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	90.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	91.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	93.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989510)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	112	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	112	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	104	67.0	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989510) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	87.6	71.4	144

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989510)							
ES2139231-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	80.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	91.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	87.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	76.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	66.6	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	103	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989510)							
ES2139231-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	101	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	93.4	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	84.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	91.0	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	86.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	93.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	82.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	79.4	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	83.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	111	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989510)							
ES2139231-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	89.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	75.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	89.3	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.0	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	93.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	95.0	65.0	136

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989510) - continued							
ES2139231-002	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989510)							
ES2139231-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	105	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	94.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	95.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	87.8	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2139232**	Page	: 1 of 4
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021
Site	:	Issue Date	: 03-Nov-2021
Sampler	: ----	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0315_MW625_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0315_MW625_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0315_MW625_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0315_MW625_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0315_MW625_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**02-Nov-2021**	24-Apr-2022	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

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

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

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

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2139232**

Client	: **CARDNO VICTORIA 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	: NSW_0315_PFASOMP	Page	: 1 of 2
Order number	: ----	Quote number	: EP2020LANECON0001 (EN/024/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	:		

Dates

Date Samples Received	: 29-Oct-2021 16:30	Issue Date	: 30-Oct-2021
Client Requested Due Date	: 05-Nov-2021	Scheduled Reporting Date	: **05-Nov-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 6.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

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

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)
ES2139232-001	26-Oct-2021 00:00	0315_MW625_20211026	✓

Proactive Holding Time Report

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

Requested Deliverables

ALL INVOICES

- 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 [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]

ESDAT LSPECS

- EDI Format - ESDAT (ESDAT) Email [redacted]
- Electronic SRN for ESdat (ESRN_ESDAT) Email [redacted]

Cardno

Chain of Custody

Sheet 1 of 1

PM Name: [redacted]
Phone: [redacted]
Address: [redacted]
PM Email: [redacted]
Project Number: NSW_0315_PFASOMP   Site:
Laboratory (name, phone, & contact person): ALS

Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Sediment	Groundwater	Surface Water	QC		Sample preservation: Jar/ Ice Bricks				Analysis: EP231X - PFAS Standard	HOLD	Forward to Eurofins	Comments: Please amend Sample IDs as follows	Please send to Eurofins
0315_MW035_20211028 (1)		2 x 20 ml	28/10/2021			1				1				1				

Sampler: I attest that the proper field sampling procedures were used during the collection of these samples.
Relinquished by: (print and signature) | Date | [redacted] | Date 28/10/21 | Time 1015
Relinquished by: (print and signature) | Date | Time | Received by: (print and signature) | Date | Time
Relinquished by: (print and signature) | Date | Time | Received by: (print and signature) | Date | Time

Please supply results electronically in spreadsheet and ESDAT files.
Turn around time: (24 hour/48 hour/3 days/5 days)
Revision 1

rec: Frani 28/10/21 9:32

Page of

Environmental Division
Sydney
Work Order Reference
ES2139232

Telephone : + 61-2-8784 8555

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2139235**	Page	: 1 of 7
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021 16:20
Order number	: ----	Date Analysis Commenced	: 01-Nov-2021
C-O-C number	: ----	Issue Date	: 05-Nov-2021 12:16
Sampler	: ----		
Site	:		
Quote number	: EN/024/20		
No. of samples received	: 5		
No. of samples analysed	: 5		

NATA

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[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: GROUNDWATER (Matrix: WATER)			Sample ID	0315_MW624_20211027	0315_SW614_20211027	0315_MW601_20211027 Received as extra sample	----	----
			Sampling date / time	27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2139235-001	ES2139235-002	ES2139235-005	--------	--------
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	**0.03**	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	**0.03**	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	**0.08**	**0.42**	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	**0.27**	**0.17**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	**0.03**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0315_MW624_20211027	0315_SW614_20211027	0315_MW601_20211027 Received as extra sample	----	----
			Sampling date / time	27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2139235-001	ES2139235-002	ES2139235-005	--------	--------
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	**0.05**	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.05**	**0.35**	**0.68**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	**0.35**	**0.59**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.05**	**0.35**	**0.65**	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**98.6**	**104**	**100**	----	----
13C8-PFOA	----	0.02	%	**99.4**	**98.2**	**118**	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD614_20211027	0315_SD677_20211026	----	----	----
			Sampling date / time	27-Oct-2021 00:00	26-Oct-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2139235-003	ES2139235-004	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**24.7**	**18.3**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0004**	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0110**	**0.0052**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD614_20211027	0315_SD677_20211026	----	----	----
			Sampling date / time	27-Oct-2021 00:00	26-Oct-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2139235-003	ES2139235-004	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0114**	**0.0052**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0114**	**0.0052**	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0114**	**0.0052**	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**102**	**91.5**	----	----	----
13C8-PFOA	----	0.0002	%	**110**	**105**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**

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

Sub-Matrix: **SEDIMENT**

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

QUALITY CONTROL REPORT

Work Order	: **ES2139235**	Page	: 1 of 15
Client	: **CARDNO VICTORIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]4
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021
Order number	: ----	Date Analysis Commenced	: 01-Nov-2021
C-O-C number	: ----	Issue Date	: 05-Nov-2021
Sampler	: ----		
Site	:		
Quote number	: EN/024/20		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3988229)									
ES2139230-004	Anonymous	EA055: Moisture Content	----	0.1	%	33.3	37.7	12.3	0% - 20%
ES2139326-009	Anonymous	EA055: Moisture Content	----	0.1	%	65.8	66.1	0.4	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3990085)									
EP2112535-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2112537-050	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3990085)									
EP2112535-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0005	0.0005	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0003	0.0003	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.0004	54.7	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory 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: 3990085) - continued									
EP2112535-002	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2112537-050	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3990085)									
EP2112535-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2112537-050	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3990085)									
EP2112535-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2112537-050	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.14	0.16	8.5	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2139231-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989511)									
ES2139237-011	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2139237-012	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.13	0.12	0.0	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3989511) - continued									
ES2139237-012	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.13	9.3	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
ES2139231-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989511)									
ES2139237-011	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
ES2139237-012	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.08	0.08	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3989511) - continued									
ES2139237-012	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139231-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989511)									
ES2139237-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3989511) - continued									
ES2139237-011	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139237-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139231-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3989511)									

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 (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3989511) - continued									
ES2139237-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2139237-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.08	0.08	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3989510)									
ES2139231-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.43	0.46	6.7	0% - 20%
ES2139231-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3989511)									
ES2139237-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.05	0.05	0.0	No Limit
ES2139237-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.43	0.42	2.4	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: 3990085)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3990085)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	82.4	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	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	84.0	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	84.8	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3990085)								
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	96.5	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.6	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.9	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.5	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3990085)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	86.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	95.6	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	86.0	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	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3990085) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	96.0	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	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989510)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	96.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	89.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	91.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	119	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989511)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	97.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	86.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	86.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	86.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989510)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	108	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	99.8	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	100	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	84.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989511)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	81.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	79.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	79.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	79.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	81.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	80.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	82.8	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: 3989511) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	95.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	80.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989510)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	91.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	76.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	90.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	83.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	90.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	91.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	93.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989511)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	107	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.7	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	98.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	109	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	91.2	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	88.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989510)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	112	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	112	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	104	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	87.6	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989511)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	88.8	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	90.4	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	87.4	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	82.8	71.4	144

Matrix Spike (MS) Report

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

Sub-Matrix: **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: 3990085)							
EP2112535-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	81.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	82.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	80.4	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	84.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	83.6	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	92.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3990085)							
EP2112535-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	83.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	88.0	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	92.4	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	91.2	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	86.8	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	90.8	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	93.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	96.4	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	89.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	80.4	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	91.3	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3990085)							
EP2112535-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	89.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	97.0	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	90.5	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	91.8	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	92.8	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	89.2	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	88.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3990085)							
EP2112535-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	86.8	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	102	64.0	140

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3990085) - continued							
EP2112535-002	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	93.2	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	107	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989510)							
ES2139231-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	80.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	91.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	87.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	76.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	66.6	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	103	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3989511)							
ES2139237-011	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	83.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	93.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	84.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	84.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	86.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	83.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989510)							
ES2139231-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	101	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	93.4	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	84.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	91.0	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	86.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	93.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	82.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	79.4	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	83.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	111	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989511)							
ES2139237-011	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	84.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	82.0	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	82.4	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	82.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	84.0	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	81.8	69.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3989511) - continued							
ES2139237-011	Anonymous	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	87.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	91.2	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	109	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	107	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	86.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989510)							
ES2139231-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	89.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	75.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	89.3	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.0	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	93.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	95.0	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3989511)							
ES2139237-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	99.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	106	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	105	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	95.1	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	83.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	95.0	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989510)							
ES2139231-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	105	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	94.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	95.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	87.8	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989511)							
ES2139237-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	93.0	63.0	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3989511) - continued							
ES2139237-011	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	78.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	93.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	87.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2139235	Page	: 1 of 5
Client	: CARDNO VICTORIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	[redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 29-Oct-2021
Site	:	Issue Date	: 05-Nov-2021
Sampler	: ----	No. of samples received	: 5
Order number	: ----	No. of samples analysed	: 5

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

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

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) 0315_SD677_20211026	**26-Oct-2021**	**----**	----	----	**01-Nov-2021**	09-Nov-2021	✓
HDPE Soil Jar (EA055) 0315_SD614_20211027	**27-Oct-2021**	**----**	----	----	**01-Nov-2021**	10-Nov-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) 0315_SD677_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_SD614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) 0315_SD677_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_SD614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) 0315_SD677_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_SD614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) 0315_SD677_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_SD614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) 0315_SD677_20211026	**26-Oct-2021**	**02-Nov-2021**	24-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓
HDPE Soil Jar (EP231X) 0315_SD614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	12-Dec-2021	✓

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

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) 0315_MW624_20211027,	0315_SW614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW601_20211027 - Received as extra sample		**27-Oct-2021**	**03-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0315_MW624_20211027,	0315_SW614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW601_20211027 - Received as extra sample		**27-Oct-2021**	**03-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0315_MW624_20211027,	0315_SW614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW601_20211027 - Received as extra sample		**27-Oct-2021**	**03-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0315_MW624_20211027,	0315_SW614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW601_20211027 - Received as extra sample		**27-Oct-2021**	**03-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0315_MW624_20211027,	0315_SW614_20211027	**27-Oct-2021**	**02-Nov-2021**	25-Apr-2022	✓	**02-Nov-2021**	25-Apr-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW601_20211027 - Received as extra sample		**27-Oct-2021**	**03-Nov-2021**	25-Apr-2022	✓	**03-Nov-2021**	25-Apr-2022	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	14	**14.29**	**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	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
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

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	:	**ES2139235**			
Client	:	**CARDNO VICTORIA 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	:	NSW_0315_PFASOMP	Page	:	1 of 3
Order number	:	----	Quote number	:	EP2020LANECON0001 (EN/024/20)
C-O-C number	:	----	QC Level	:	NEPM 2013 B3 & ALS QC Standard
Site	:				
Sampler	:				

Dates

Date Samples Received	:	29-Oct-2021 16:20	Issue Date	:	01-Nov-2021
Client Requested Due Date	:	05-Nov-2021	Scheduled Reporting Date	:	**05-Nov-2021**

Delivery Details

Mode of Delivery	:	Carrier	Security Seal	:	Intact.
No. of coolers/boxes	:	1	Temperature	:	6.3 - Ice present
Receipt Detail	:		No. of samples received / analysed	:	5 / 5

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
- 1/11/21 14:54: This is an updated SRN which indicates the addition of EP231X analysis for Sample #5.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

ES2139235-005 : [27-Oct-2021] : 0315_MW601_20211027 - Received as extra sample

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)
ES2139235-003	27-Oct-2021 00:00	0315_SD614_20211027	✓	✓
ES2139235-004	26-Oct-2021 00:00	0315_SD677_20211026	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)
ES2139235-001	27-Oct-2021 00:00	0315_MW624_20211027	✓
ES2139235-002	27-Oct-2021 00:00	0315_SW614_20211027	✓
ES2139235-005	27-Oct-2021 00:00	0315_MW601_20211027 ...	✓

Proactive Holding Time Report

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

Requested Deliverables

ALL INVOICES

- 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	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- A4 - AU Tax Invoice (INV)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]

ESDAT LSPECS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

Cardno

Chain of Custody

Sheet 1 of 1

PM Name: [redacted]

Phone: [redacted] Fax: [redacted] Mobile: [redacted]

Address: [redacted]

PM Email: [redacted]

Project Number: NSW_0315_PFASOMP Site:

Laboratory (name, phone, & contact person):
ALS

Sample ID		Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Sediment	Sample Matrix: Groundwater	Sample Matrix: Surface Water	Sample Matrix: QC		Sample preservation: Ice/ Ice Bricks				Analysis: EP231X - PFAS Standard	Analysis: HOLD	Analysis: Forward to Eurofins		Comments: Please amend Sample IDs as follows	Comments: Please send to Eurofins
0315_MW824_20211027	1		2 x 20 ml	27/10/2021			1				1				1					
0315_SW654_20211027	2		2 x 20 ml	27/10/2021				1			1				1					
0315_SD814_20211027	3		1 x 200 g	27/10/2021		1					1				1					
0315_SD677_20211026	4		1 x 200 g	26/10/2021		1					1				1					

Environmental Division
Sydney
Work Order Reference
ES2139235
Telephone : + 61-2-8784 8555

Sampler: I attest that the proper field sampling procedures were used during the collection of these samples.		Sampler name: [redacted]		Date: 29/10/21 1015		
Relinquished by (print and signature)	Date	Time	Received by (print and signature)	Date		Time
Relinquished by (print and signature)	Date	Time	Received by (print and signature)	Date		Time
Relinquished by (print and signature)	Date	Time	Received by (print and signature)	Date		Time

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/5 days) Please circle

rec: Fasi 29/10/21 4:42

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Revision 1
Approved 23 May 2013

DEF19006_E1_GWM-SWM_SED_CrownLand.xls

Printed 29/10/2021

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Chain of Custody

Sheet 1 of 1

PM Name: [redacted]
Phone: [redacted]
Address: [redacted]
PM Email: [redacted]
Project Number: NSW_0315_PFASOMP
Site:

Laboratory (name, phone, & contact person):
ALS

	Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Sediment	Sample Matrix: Groundwater	Sample Matrix: Surface Water	Sample Matrix: QC		Sample preservation: Ice/ Ice Bricks				Analysis: EP231X - PFAS Standard	Analysis: HOLD	Analysis: Forward to Eurofins		Comments: Please amend Sample IDs as follows	Comments: Please send to Eurofins
1	0315_QC101_20211025		6 x 20 ml	25/10/2021					1						1					
-	0315_QC201_20211025		6 x 20 ml	25/10/2021					1											Yes
2	0315_QC102_20211025 2		1 x 200 g	25/10/2021					1						1					
-	0315_QC202_20211025		1 x 200 g	25/10/2021					1											Yes
3	0315_QC103_20211026 3		6 x 20 ml	26/10/2021					1						1					
-	0315_QC203_20211026		6 x 20 ml	26/10/2021					1											Yes
4	0315_QC104_20211026 4		1 x 200 g	26/10/2021					1						1					
-	0315_QC204_20211026		1 x 200 g	26/10/2021					1											Yes
5	0315_QC105_20211027		6 x 20 ml	27/10/2021					1						1					
-	0315_QC205_20211027		6 x 20 ml	27/10/2021					1											Yes
6	0315_QC301_20211025		2 x 20 ml	25/10/2021					1											
7	0315_QC302_20211025		2 x 20 ml	25/10/2021					1						1					
8	0315_QC303_20211026		2 x 20 ml	26/10/2021					1											
9	0315_QC304_20211026		2 x 20 ml	26/10/2021					1						1					
10	0315_QC305_20211027		2 x 20 ml	27/10/2021					1											
11	0315_QC306_20211027		2 x 20 ml	27/10/2021					1						1					
12	0315_QC307_20211027		2 x 20 ml	28/10/2021					1											
13	0315_QC308_20211027		2 x 20 ml	28/10/2021											1					
14	0315_QC501_20211025		2 x 20 ml	25/10/2021					1						1					
15	0315_QC502_20211026		2 x 20 ml	26/10/2021					1						1					
16	0315_QC503_20211027		2 x 20 ml	27/10/2021					1						1					
17	0315_QC504_20211028		2 x 20 ml	28/10/2021					1						1					

Environmental Division
Sydney
Work Order Reference
ES2139230
Telephone : + 61-2-8784 8555

Subcon Forward Lab / Split WO: ____
Lab Analysis: Eurofins
Organised By / Date: ____
Relinquished By / Date: ____
Connote / Courier: ____
WO No: ____
Attached By PO / Internal Sheet

Sampler: I attest that the proper field sampling proceedures were used during the collection of these samples.

Sampler name: [redacted]

Date: 29/10/21 1015

Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/5 days) Please circle

rec: Fran 29/10/21 4:00 837707

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S.L. Syd. 1/11/21 5:50Pm 14.2°c

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Chain of Custody

Sheet 1 of 1

PM Name: [redacted]

Phone: [redacted] Fax: [redacted]

Address [redacted] 3000

PM Email [redacted]

Project Number: NSW_0315_PFASOMP Site:

Laboratory (name, phone, & contact person):
ALS

	Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Sediment	Groundwater	Surface Water	QC	Sample preservation: Ice/ Ice Bricks	Analysis: EP231X - PFAS Standard	HOLD	Forward to Eurofins	Comments: Please amend Sample IDs as follows	Please send to Eurofins
1	0315_QC101_20211025		6 x 20 ml	25/10/2021					1		1				
–	0315_QC201_20211025		6 x 20 ml	25/10/2021					1						Yes
2	0315_QC102_20211025		1 x 200 g	25/10/2021					1		1				
–	0315_QC202_20211025		1 x 200 g	25/10/2021					1						Yes
3	0315_QC103_20211026		6 x 20 ml	26/10/2021					1		1				
–	0315_QC203_20211026		6 x 20 ml	26/10/2021					1						Yes
4	0315_QC104_20211026		1 x 200 g	26/10/2021					1		1				
–	0315_QC204_20211026		1 x 200 g	26/10/2021					1						Yes
5	0315_QC105_20211027		6 x 20 ml	27/10/2021					1		1				
–	0315_QC205_20211027		6 x 20 ml	27/10/2021					1						Yes
6	0315_QC301_20211025		2 x 20 ml	25/10/2021					1						
7	0315_QC302_20211025		2 x 20 ml	25/10/2021					1		1				
8	0315_QC303_20211026		2 x 20 ml	26/10/2021					1						
9	0315_QC304_20211026		2 x 20 ml	26/10/2021					1		1				
10	0315_QC305_20211027		2 x 20 ml	27/10/2021					1						
11	0315_QC306_20211027		2 x 20 ml	27/10/2021					1		1				
12	0315_QC307_20211027		2 x 20 ml	28/10/2021					1						
13	0315_QC308_20211027		2 x 20 ml	28/10/2021							1				
14	0315_QC501_20211025		2 x 20 ml	25/10/2021					1		1				
15	0315_QC502_20211026		2 x 20 ml	26/10/2021					1		1				
16	0315_QC503_20211027		2 x 20 ml	27/10/2021					1		1				
17	0315_QC504_20211028		2 x 20 ml	28/10/2021					1		1				

Environmental Division
Sydney
Work Order Reference
ES2139230

Telephone : + 61-2-8784 8555

Subcon / Forward Lab / Split WO: ____
Lab / Analysis: Eurofins
Organised By / Date: ____
Relinquished By / Date: ____
Connote / Courier: ____
WO No: ____
Attached By PO / Internal Sheet: ____

Sampler: I attest that the proper field sampling proceedures were used during the collection of these samples. Sampler name: [redacted] Date: 29/10/21 1015

Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/5 days) Please circle

rec: Fax: 29/10/21 4:00 837707

G.L. Syd. 1/11/21 5:50Pm 14.2°c

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eurofins Environment Testing

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA # 1261 Site # 1254

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

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

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Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

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46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

Eurofins Environment Testing NZ Limited
NZBN: 9429046024954

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Cardno Victoria Pty Ltd
Address: [redacted]

Project Name: NSW_0315_PFASOMP
Project ID: NSW_0315_PFASOMP

Order No.:
Report #: 837707
Phone: [redacted]
Fax: [redacted]

Received: Nov 1, 2021 5:50 PM
Due: Nov 8, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						CANCELLED	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0315_QC201_20211025	Oct 25, 2021		Water	S21-No08334		X
2	0315_QC202_20211025	Oct 25, 2021		Soil	S21-No08335	X	
3	0315_QC203_20211026	Oct 26, 2021		Water	S21-No08336		X
4	0315_QC204_20211026	Oct 26, 2021		Soil	S21-No08337	X	
5	0315_QC205_20211027	Oct 27, 2021		Water	S21-No08338		X
Test Counts						2	3

Certificate of Analysis

Cardno Victoria Pty Ltd
[redacted]

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: [redacted]

Report **837707-W**
Project name NSW_0315_PFASOMP
Project ID NSW_0315_PFASOMP
Received Date Nov 01, 2021

Client Sample ID			**0315_QC201_20211025**	**0315_QC203_20211026**	**0315_QC205_20211027**
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**S21-No08334**	**S21-No08336**	**S21-No08338**
Date Sampled			**Oct 25, 2021**	**Oct 26, 2021**	**Oct 27, 2021**
Test/Reference	LOR	Unit			
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	0.06	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	0.07	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	0.02	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	0.03	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	95	94	104
13C5-PFPeA (surr.)	1	%	98	104	110
13C5-PFHxA (surr.)	1	%	116	116	125
13C4-PFHpA (surr.)	1	%	115	116	112
13C8-PFOA (surr.)	1	%	116	113	120
13C5-PFNA (surr.)	1	%	126	117	119
13C6-PFDA (surr.)	1	%	110	94	106
13C2-PFUnDA (surr.)	1	%	94	93	114
13C2-PFDoDA (surr.)	1	%	62	93	118
13C2-PFTeDA (surr.)	1	%	44	63	93
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	108	108	106
D3-N-MeFOSA (surr.)	1	%	39	49	73

Client Sample ID			0315_QC201_20211025	0315_QC203_20211026	0315_QC205_20211027
Sample Matrix			Water	Water	Water
Eurofins Sample No.			S21-No08334	S21-No08336	S21-No08338
Date Sampled			Oct 25, 2021	Oct 26, 2021	Oct 27, 2021
Test/Reference	LOR	Unit			
Perfluoroalkyl sulfonamido substances					
D5-N-EtFOSA (surr.)	1	%	36	49	74
D7-N-MeFOSE (surr.)	1	%	39	58	85
D9-N-EtFOSE (surr.)	1	%	36	55	81
D5-N-EtFOSAA (surr.)	1	%	85	99	127
D3-N-MeFOSAA (surr.)	1	%	90	88	100
Perfluoroalkyl sulfonic acids (PFSAs)					
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	0.02	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	0.02	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	0.31	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	0.02	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	1.0	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	129	126	126
18O2-PFHxS (surr.)	1	%	127	117	114
13C8-PFOS (surr.)	1	%	110	90	111
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	131	125	107
13C2-6:2 FTSA (surr.)	1	%	116	98	97
13C2-8:2 FTSA (surr.)	1	%	109	105	118
13C2-10:2 FTSA (surr.)	1	%	90	116	147
PFASs Summations					
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	1.31	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	1.03	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	1.34	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	1.51	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	1.55	< 0.1

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Sydney	Nov 04, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Sydney	Nov 04, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Sydney	Nov 04, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Sydney	Nov 04, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Sydney	Nov 04, 2021	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Eurofins Environment Testing Australia Pty Ltd
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Sydney [redacted]
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Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth [redacted]

Eurofins Environment Testing NZ Limited
NZBN: 9429046024954

Auckland [redacted]
Christchurch [redacted]

Company Name: Cardno Victoria Pty Ltd
Address: [redacted]

Order No.:
Report #: 837707
Phone: [redacted]
Fax:

Received: Nov 1, 2021 5:50 PM
Due: Nov 8, 2021
Priority: 5 Day
Contact Name: [redacted]

Project Name: NSW_0315_PFASOMP
Project ID: NSW_0315_PFASOMP

Eurofins Analytical Services Manager [redacted]

Sample Detail						CANCELLED	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0315_QC201_20211025	Oct 25, 2021		Water	S21-No08334		X
2	0315_QC202_20211025	Oct 25, 2021		Soil	S21-No08335	X	
3	0315_QC203_20211026	Oct 26, 2021		Water	S21-No08336		X
4	0315_QC204_20211026	Oct 26, 2021		Soil	S21-No08337	X	
5	0315_QC205_20211027	Oct 27, 2021		Water	S21-No08338		X
Test Counts						2	3

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ug/L:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**%:** Percentage
org/100mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR : No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

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

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

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	99			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	100			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	103			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	99			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	105			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	100			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	108			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	104			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	101			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	106			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	103			50-150	Pass	

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Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane sulfonamide (FOSA)			%	94			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	104			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	100			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)			%	97			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)			%	96			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	97			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	105			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)									
Perfluorobutanesulfonic acid (PFBS)			%	88			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	101			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	86			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	84			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	92			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	98			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	99			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	100			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	94			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	102			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	96			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	97			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S21-No10130	NCP	%	108			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S21-No10130	NCP	%	130			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S21-No10130	NCP	%	139			50-150	Pass	
Perfluorononanoic acid (PFNA)	S21-No10130	NCP	%	124			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S21-No10130	NCP	%	111			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S21-No10130	NCP	%	105			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S21-No10130	NCP	%	111			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S21-No10130	NCP	%	56			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S21-No10130	NCP	%	112			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S21-No10130	NCP	%	96			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S21-No10130	NCP	%	108			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S21-No10130	NCP	%	102			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S21-No10130	NCP	%	101			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S21-No10130	NCP	%	106			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S21-No10130	NCP	%	96			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S21-No10130	NCP	%	108			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S21-No10130	NCP	%	95			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S21-No10130	NCP	%	114			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S21-No10130	NCP	%	95			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S21-No10130	NCP	%	98			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S21-No10130	NCP	%	85			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S21-No10130	NCP	%	132			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S21-No10130	NCP	%	72			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S21-No10130	NCP	%	103			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S21-No10130	NCP	%	90			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S21-No10130	NCP	%	100			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S21-No08323	NCP	ug/L	0.03	0.03	6.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S21-No08323	NCP	ug/L	0.05	0.05	9.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S21-No08323	NCP	ug/L	0.05	0.05	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S21-No08323	NCP	ug/L	0.13	0.14	8.0	30%	Pass	
Perfluorononanoic acid (PFNA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S21-No08323	NCP	ug/L	0.02	0.02	9.0	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S21-No08323	NCP	ug/L	0.02	0.02	9.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S21-No08323	NCP	ug/L	0.14	0.16	11	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S21-No08323	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S21-No08323	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager
Senior Analyst-PFAS (NSW)

[redacted]

General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES

Cardno

Bore ID	Property	Easting	Northing	Monitoring Date	Bore Depth (m)	Top of casing (mAHD)	Top of Screen (mBTOC)	Bottom of Screen (mBTOC)	SWL (bTOC)	RL (mAHD)	Water Colour	Turbidity	Other Observations on Bore/Site	Temp (C^0)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)
MW008	On-site	524926.6	6114754.4	27/10/2021	13.5	-			8.74	-	Clear	Low	Large open well underneath windmill. 1000mm diameter. Sleeve deployed.	22.9	1.05	1640	1066	7.51	30.8
MW103	On-site	526845.6	6110958.8	28/10/2021	52.14	225.8	49	52	25.093	200.707	Clear	Low	Well in good condition, sleeve deployed.	20.7	1.95	2275	1478.75	6.45	111.9
MW104	On-site	526597.8	6111277.7	28/10/2021	53.65	231.87	38	53	35.160	196.71	Red/brown	Moderate	Well in good condition, sleeve deployed.	20.5	1.85	4520	2938	6.49	130.8
MW107	On-site	526628.4	6111282.8	25/10/2021	15.5	230.54	12.5	15.5	-		-	-	Well dry	-	-	-	-	-	-
MW109	On-site	525096.0	6114455.5	27/10/2021	34.15	193.62	24.4	33.4	24.42	169.2	Clear	Low	Well in good condition, sleeve deployed. Brown-grey sediment in sleeve.	22.4	0.72	1134	737.1	7.05	96.9
MW110	On-site	525327.6	6114785.0	27/10/2021	21.81	180.29	17.4	20.9	11.765	168.525	Clear	Low	Well in good condition, sleeve deployed	22.5	0.46	2213	1438.45	7.06	85.2
MW601	Off-site	527164.1	6112666.0	25/10/2021	16.825	205.3	10	16	8.06	197.24	Clear	-	Gattic cover bolts warped and difficult to open, well in good condition, sleeve deployed. No parameter data has been recorded	18.2	2.27	766	497.9	7.2	112.7
MW624	Off-site	527138.1	6112814.3	26/10/2021	52.95	205.92	29	51	9.965	195.955	Clear	Low	Well in good condition, sleeve deployed.	17.1	0.39	4294	2791.1	6.79	141.1
MW625	Off-site	524517.0	6114881.7	26/10/2021	22.22	174.572	15.5	21.5	8.37	166.202	Orange/brown	Moderate	Well in good condition, string in well.	22.4	1.4	1764	1146.6	6.43	-158

Location ID	Property	Easting	Northing	Monitoring Date	Observations
SD103	On-base	526271.4	6110348.6	26/10/2021	Frogs and tadpoles observed in water. No odour. Algae and reeds. Sediment sample: 0.1m. Sandy clayey silt, L-MP, brown-Grey, wet, organic matter
SD106	On-base	526717.6	6109926.1	26/10/2021	Creek bed dry, no surface water sample taken. Sediment sample: silty clay, Grey-brown, moist to wet, L-MP, rootlets, trace sands F-M.
SD107	On-base	526752.7	6110464.8	26/10/2021	Cloudy to brown stagnant water. Organic matter observed. Sediment sample: silty clay, LP, trace sands, brown, organic matter observed.
SD108	On-base	526719.2	6110895.1	26/10/2021	Aquatic vegetation observed. No odour. Sediment sample: Sandy silty clay, MP, red-brown F-M sand, trace gravels, organic matter, moist to wet. Sample taken at 0.1m bgl
SD111	On-base	526686.5	6111169.2	26/10/2021	Final overflow dam. Sediment sample: silty clay with trace fine sands, grey brown, low to medium plasticity, organic matter observed.
SD121	On-base	527077.5	6111316.7	26/10/2021	Stagnant brown cloudy water. Algae and small aquatic life observed. Sediment sample: silty clay, L-Mp, red-brown, trace sand, organic matter
SD127	On-base	524610.6	6108182.2	25/10/2021	Sediment sample: brown silty clay, low plasticity, brown, organic matter, with fine to medium sand.
SD136	On-base	526133.0	6110304.1	26/10/2021	Yabby observed in water. Algae and reeds in water. Sediment sample, sandy clay, LP, brown-Grey, organic matter, with silt, no odour, wet
SD614	Off-base	527151.5	6112749.5	27/10/2021	High amounts of vegetation and sediment. Sediment sample: clayey silt: L-Mp, trace sand, organic matter, wet, brown.

Sample ID	Property	Easting	Northing	Monitoring Date	Sample Depth (m)	Water Body Depth	Flow Rate	Water Colour	Turbidity	Other Observations	Temp (C^0)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)
SW103	On-Base	526271.4	6110348.6	26/10/2021	0.02	0.15	Low	Clear	Low	Frogs and tadpoles observed in water. No odour. Algae and reeds.	20.4	11.07	239.2	155.5	7.41	21.5
SW106	On-Base	526717.6	6109926.1	26/10/2021	-	-	-	-	-	Location dry	-	-	-	-	-	-
SW107	On-Base	526752.7	6110464.8	26/10/2021	0.1	0.2	Low	Cloudy	Medium	Cloudy to brown stagnant water. Organic matter observed	20.2	8.14	158.6	103.1	8.48	18.1
SW108	On-Base	526719.2	6110895.1	26/10/2021	0.1	1.5	Low	Clear	Low	Aquatic vegetation observed, no odour.	19.3	6.07	768	499.2	9.43	15.8
SW111	On-Base	526686.5	6111169.2	26/10/2021	0.2	1	Low	Clear	Low	Final overflow dam. Sediment sample, silty clay trace fine sands, trace gravels, Grey-brown, L-M plasticity, organic matter observed.	18.8	3.02	674	438.1	7.94	21.9
SW118	On-Base	526946.5	6110587.0	26/10/2021	-	-	-	-	-	Location dry	-	-	-	-	-	-
SW121	On-Base	527077.5	6111316.7	26/10/2021	0.08	0.1	Low	Cloudy	Medium	Stagnant brown cloudy water. Algae and small aquatic life observed	22.9	6.74	140.7	91.5	8.02	9
SW127	On-Base	524610.6	6108182.2	25/10/2021	0.1	0.5	Low	Clear	Low	Water colour clear to light brown. Sediment sample, brown silty clay, low plasticity, brown, organic matter, with F-M sand.	21.3	5.16	124.3	80.8	7.86	18.6
SW136	On-Base	526132.2	6110304.8	26/10/2021	0.1	0.2	Low	Clear	Low	Yabby observed in water. Algae and reeds in water.	18.7	7.25	296.8	192.9	7.54	35.5
SW140	On-Base	526449.8	6109549.2	27/10/2021	0.1	0.8	Low	Clear	Medium	Sewage pit with white metal removable lid (0.5m radius). North of other sewage pit with concrete lid. Sampled from larger pit inside. Roots and rootlets in smaller pit inside	18	5.34	637	414.1	7.75	33.2
SW144	On-Base	526185.0	6110390.0	27/10/2021	0.1	0.2	Medium	Brown	High	Sewerage odour, faeces and corn observed, brown- Grey water	17.9	0.74	1025	666.3	8.45	-51.3
SW148	On-Base	526404.5	6110931.5	27/10/2021	0.05	0.1	Medium	Cloudy	Medium	Sewerage odour, faecal matter observed	19.4	1.14	1059	688.4	8.46	14.4
SW149	On-Base	526455.0	6111012.0	27/10/2021	-	0	Low	Cloudy	Medium	Sampled from inflow pipe to pit, minimal flow.	18	5.24	975	633.8	8.7	33.7
SW614	Off-Base	527151.5	6112749.5	27/10/2021	0.02	0.05	Low	Cloudy	Medium	Stagnant light brown to cloudy water. High amounts of vegetation and sediment at location.	10.5	6.51	233.4	151.7	6.77	32.9
SW677	Off-Base	526647.3	6114308.7	26/10/2021	-	-	-	-	-	No surface water observed within on or surrounding culvert	-	-	-	-	-	-

F3.01 Equipment Calibration Report
YSI ProPlus Water Quality Meter

This YSI ProPlus Water Quality Meter has been performance checked as per the manufacturer's guidelines[1].

Unit Type: YSI ProPlus
Serial Number: ~~19H402165~~ 18J104328 / 18G103121

The unit has been checked for and comprises of the following items:

Item	Present	Damaged or Absent?
Carry case	☑	
Attached sensors (x4)	☑	
Spare Batteries	☑	
Connector Cable	☑	
Instruction Manual	☑	

The following tests and operational checks have been conducted on the unit:

Item	Test Completed	Test Passed
WQM unit electrodes cleaned and checked	☑	☑
Operations check (screen functions)	☑	☑
Temperature check	☑	☑

Calibration:

Sensor	Cal. Solution	Value	Reading	
pH	pH: Buffer Solution 4.00	4.00	4.00	4.07
pH	pH: Buffer Solution 7.00	7.00	7.05	7.03
pH	pH: Buffer Solution 10.00	10.00	10.02	10.04
Redox	Standard ORP solution	[illegible] mV @ [illegible] °c	241 @ 16°C	243 @ 16°C
O_2	Ambient Air for 100% Dissolved Oxygen	100%	101	103
O_2	Sodium Sulphite for 0% Dissolved Oxygen	0%	0.01	0.03
Conductivity	Standard Conductivity Solution	[illegible] µS/cm @ [illegible] °c	2203 @ 16°C	2206 @ 16°C

Checked/ Calibrated by: [redacted]

Signed: [redacted]

Date: 25/10/21

Scanned and Saved into Fieldwork Folder (Y/N)

Y

[1] YSI Professional Plus – Calibration Tips; Rev A, December 2010.

F3.01 Equipment Calibration Report
YSI ProPlus Water Quality Meter

This YSI ProPlus Water Quality Meter has been performance checked as per the manufacturer's guidelines[1].

Unit Type: YSI ProPlus
Serial Number: 1~~9H102~~165 18J104328/18G103121.

The unit has been checked for and comprises of the following items:

Item	Present	Damaged or Absent?
Carry case	✓	
Attached sensors (x4)	✓	
Spare Batteries	✓	
Connector Cable	✓	
Instruction Manual	✓	

The following tests and operational checks have been conducted on the unit:

Item	Test Completed	Test Passed
WQM unit electrodes cleaned and checked	✓	✓
Operations check (screen functions)	✓	✓
Temperature check	✓	✓

Calibration:

Sensor	Cal. Solution	Value	Reading	
pH	pH: Buffer Solution 4.00	4.00	4.02	4.06
pH	pH: Buffer Solution 7.00	7.00	7.03	7.04
pH	pH: Buffer Solution 10.00	10.00	10.03	10.04
Redox	Standard ORP solution	___ mV @ __°c	241@16	244@16°C
O_2	Ambient Air for 100% Dissolved Oxygen	100%	102	104
O_2	Sodium Sulphite for 0% Dissolved Oxygen	0%	0.02	0.03
Conductivity	Standard Conductivity Solution	___ µS/cm @ __°c	2205 @16°C	2209 @16°C

Checked/ Calibrated by: [redacted]

Signed: [redacted]

Date: 26/10/21

Scanned and Saved into Fieldwork Folder (Y/N)

Y

[1] YSI Professional Plus – Calibration Tips; Rev A, December 2010.

F3.01 Equipment Calibration Report
YSI ProPlus Water Quality Meter

This YSI ProPlus Water Quality Meter has been performance checked as per the manufacturer's guidelines[1].

Unit Type: YSI ProPlus
Serial Number: ~~19H102165~~ 18J104328 / 18G103121

The unit has been checked for and comprises of the following items:

Item	Present	Damaged or Absent?
Carry case	☑	
Attached sensors (x4)	☑	
Spare Batteries	☑	
Connector Cable	☑	
Instruction Manual	☑	

The following tests and operational checks have been conducted on the unit:

Item	Test Completed	Test Passed
WQM unit electrodes cleaned and checked	☑	☑
Operations check (screen functions)	☑	☑
Temperature check	☑	☑

Calibration:

Sensor	Cal. Solution	Value	Reading	
pH	pH: Buffer Solution 4.00	4.00	4.04	4.06
pH	pH: Buffer Solution 7.00	7.00	7.03	7.04
pH	pH: Buffer Solution 10.00	10.00	10.08	10.05
Redox	Standard ORP solution	__ mV @ __°c	245@16°C	248@16°C
O_2	Ambient Air for 100% Dissolved Oxygen	100%	102	105
O_2	Sodium Sulphite for 0% Dissolved Oxygen	0%	0.04	0.06
Conductivity	Standard Conductivity Solution	__ µS/cm @ __°c	2208 @16°C	2205 @16°C

Checked/ Calibrated by: [redacted]

Signed: [redacted]

Date: 22/10/21

Scanned and Saved into Fieldwork Folder (Y/N)

Y

[1] YSI Professional Plus – Calibration Tips; Rev A, December 2010.

F3.01 Equipment Calibration Report
YSI ProPlus Water Quality Meter

This YSI ProPlus Water Quality Meter has been performance checked as per the manufacturer's guidelines[1].

Unit Type: YSI ProPlus
Serial Number: ~~19H102165~~ 18J104328 / 18G103121

The unit has been checked for and comprises of the following items:

Item	Present	Damaged or Absent?
Carry case	☑ ✓	
Attached sensors (x4)	☑ ✓	
Spare Batteries	☑ ✓	
Connector Cable	☑ ✓	
Instruction Manual	☑ ✓	

The following tests and operational checks have been conducted on the unit:

Item	Test Completed	Test Passed
WQM unit electrodes cleaned and checked	☑ ✓	☑ ✓
Operations check (screen functions)	☑ ✓	☑ ✓
Temperature check	☑ ✓	☑

Calibration:

Sensor	Cal. Solution	Value	Reading	
pH	pH: Buffer Solution 4.00	4.00	4.02	4.03
pH	pH: Buffer Solution 7.00	7.00	7.03	7.04
pH	pH: Buffer Solution 10.00	10.00	10.05	10.06
Redox	Standard ORP solution	___ mV @ __°c	242@16	245@16°C
O_2	Ambient Air for 100% Dissolved Oxygen	100%	104	103
O_2	Sodium Sulphite for 0% Dissolved Oxygen	0%	0.02	0.04
Conductivity	Standard Conductivity Solution	___ µS/cm @ __°c	2210 @16°C	2205 @16°C.

Checked/ Calibrated by: [redacted]

Signed: [redacted]

Date: 28/10/21

Scanned and Saved into Fieldwork Folder (Y/N)

Y

[1] YSI Professional Plus – Calibration Tips; Rev A, December 2010.

15/10/2021

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 18G103121

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		370064	pH 9.70
2. pH 7.00		pH 7.00		372012	pH 6.93
3. pH 4.00		pH 4.00		367234	pH 3.96
4. mV		231.8mV		365451/370891	231.9mV
5. EC		2.76mS		369734	2.74mS
6. D.O		0.00ppm		371864	0.02ppm
7. Temp		20.6°C		MultiTherm	20.2°C

Calibrated by: [redacted]

Calibration date: 15/10/2021

Next calibration due: 14/11/2021

14/10/2021

Multi Parameter Water Meter

Air-Met Scientific Pty Ltd
1300 137 067

Instrument YSI Quatro Pro Plus
Serial No. 18J104328

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor		Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		370064	pH 9.96
2. pH 7.00		pH 7.00		372012	pH 7.01
3. pH 4.00		pH 4.00		367234	pH 4.03
4.ORP		234mV		365451/370891	232.8mV
5. EC		2.76mS		369734	2.77mS
6. D.O		0.00ppm		1910294760	0.00ppm
7. Temp		20.2°C		MultiTherm	20.1°C

Calibrated by: [redacted]

Calibration date: 14/10/2021

Next calibration due: 13/11/2021

APPENDIX

E

DATA QUALITY REVIEW

Cardno

Data Quality Review
Blamey Barracks, Kapooka, NSW

This Appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the Assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as trip blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

Cardno undertook a review of its QA/QC as part of the data validation exercise. The findings are summarised below.

<table>
<tr><th>QA/QC Aspects</th><th>Evidence and Evaluation</th></tr>
<tr><td colspan="2">QA Documentation</td></tr>
<tr><td>Sampling and Analysis Quality Plan and Data Quality Objectives</td><td>Cardno was engaged by Department of Defence (the client) to carry out the PFAS Ongoing Monitoring Plan (OMP) of the Blamey Barracks Kapooka, Kapooka, NSW, 2661 (the site).
The monitoring event commenced on 25 October 2021 until 28 October 2021, and is in general accordance with the scope and limitations presented in Cardno’s Sampling and Analysis Quality Plan (SAQP) of 28 October 2021 (Our Ref: OMP002.6.5_Kapooka_SAQP_Rev2).

The assessment was carried out in general compliance with the following:
▪ Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds.
▪ Department of Defence (2019), Contamination Management Manual (DCMM), August 2019.
▪ Department of Defence (2019), Pollution Prevention Guideline - Routine Water Quality Monitoring, Department of Defence, Department of Energy, 2018, Quality System Manual Schedule B15.
▪ EPA NSW (2002), The NSW State Groundwater Dependant Ecosystems Policy, April 2002.
▪ EPA NSW (2004), Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales, Publication 1669.2, March 2004
▪ NSW EPA (2016), Designing Sampling Programs for Sites Potentially Contaminated by PFAS.
▪ EPA NSW (2014), Waste Classification Guidelines – Part 1: Classification of Waste, November 2014.
▪ EPA Victoria (2009), Industrial Waste Resources Guidelines, Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, Publication 701.
▪ Heads of Environmental Protection Authority’s Australia and New Zealand (HEPA) (2020), PFAS National Environmental Management Plan (NEMP) Version 2.0, January 2020.
▪ National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).</td></tr>
</table>

<table>
<tr><th>QA/QC Aspects</th><th>Evidence and Evaluation</th></tr>
<tr><td></td><td>

- National Health and Medical Research Council (NHMRC) (2019), Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water, August 2019.
- USEPA (2000), Guidance for the Data Quality Objectives Process (EPA QA/G-4).

A quality control program was implemented during the investigation and the quality assurance procedures used have been reiterated in the report.
The investigation was carried out in accordance with the Safe Work method Statements (SWMS) and Occupational Health and Safety (OHS) plan for the site. Detailed work plans were also provided for each phase of investigation and are outlined in the SAQP.
The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.</td></tr>
<tr><td>Data Validation Report</td><td>This review constitutes a data validation review. This was supported by an Esdat generated “QAQC Checker” excel report, summarised in Tables B4 and B5, Appendix B.</td></tr>
<tr><td colspan="2">Data Representativeness</td></tr>
<tr><td>Holding Times</td><td>Groundwater and surface water sample analysis holding times were in conformance with EPA Publication IWRG701 2009 ’Sampling and Analysis of Waters, Wastewaters, Soils and Wastes.</td></tr>
<tr><td>Background Samples</td><td>No background samples were collected as part of this assessment.</td></tr>
<tr><td>Equipment Decontamination</td><td>The decontamination methodology conducted during this investigation is documented in the body of the report, and was in general conformance with the SAQP and work plans.
- All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent (Liquinonx), then double rinsed with clean water before the sample collection.</td></tr>
<tr><td colspan="2">Data Precision and Accuracy</td></tr>
<tr><td>QC Testing –
Blind Replicates
(Primary Lab)</td><td>Groundwater
- Acceptance Criteria: RPD < 30%
- Groundwater Samples Analysed: 8
- Blind Replicate Samples Analysed: 1
- Blind Replicate Analyte Pairs: 31
- Number of Analyte Pairs Exceeding Criteria: 0
- Percentage of Analyte Pairs Exceeding Criteria: 0.00%
There were no RPD exceedances observed for PFAS compounds. RPD results are presented in Table B4, Appendix B.

Surface water
- Acceptance Criteria: RPD < 30 %
- Surface water Samples Analysed: 12
- Blind Replicate Samples Analysed: 2
- Blind Replicate Analyte Pairs: 62
- Number of Analyte Pairs Exceeding Criteria: 1
- Percentage of Analyte Pairs Exceeding Criteria: 1.61%
The RPD exceedances associated with PFAS compounds are considered to be minor and likely attributed to low concentrations of analyte pairs. Analyte concentrations from the primary sample and their corresponding blind replicate sample pairs were all within one order of magnitude. A number of RPD exceedances may also be attributed to interlaboratory differences, which can be common and significant, based on a study done by the Queensland Department of Environment and Science and the Victorian Environment Protection Authority</td></tr>
</table>

<table>
<tr><th>QA/QC Aspects</th><th>Evidence and Evaluation</th></tr>
<tr><td></td><td>(Vardy et al, 2018). Overall, these RPD exceedances are not considered to impact the results of the investigation. RPD results are presented in Table B4, Appendix B.
Sediment
▪ Acceptance Criteria: RPD < 30 %
▪ Soil Samples Analysed: 11
▪ Blind Replicate Samples Analysed: 2
▪ Blind Replicate Analyte Pairs: 60
▪ Number of Analyte Pairs Exceeding Criteria: 5
▪ Percentage of Analyte Pairs Exceeding Criteria: 8.33%
The RPD exceedances observed for PFAS compounds were considered to be minor and are due to low reported concentrations of analytes close to the LOR or the heterogeneous nature of the sediment. A number of RPD exceedances may also be attributed to interlaboratory differences, which can be common and significant, based on a study done by the Queensland Department of Environment and Science and the Victorian Environment Protection Authority (Vardy et al, 2018). Since they are generally within the same order of magnitude, it is not considered to impact the results of the investigation. RPD results are presented in Table B5, Appendix B.</td></tr>
<tr><td>QC Testing – Field Splits (Secondary Lab)</td><td>Groundwater
▪ Acceptance Criteria: RPD < 30%
▪ Groundwater Samples Analysed: 8
▪ Blind Replicate Samples Analysed: 1
▪ Blind Replicate Analyte Pairs: 31
▪ Number of Analyte Pairs Exceeding Criteria: 0
▪ Percentage of Analyte Pairs Exceeding Criteria: 0.00%
There were no RPD exceedances observed for PFAS compounds. RPD results are presented in Table B4, Appendix B.
Surface water
▪ Acceptance Criteria: RPD < 30 %
▪ Surface water Samples Analysed: 12
▪ Blind Replicate Samples Analysed: 2
▪ Blind Replicate Analyte Pairs: 62
▪ Number of Analyte Pairs Exceeding Criteria: 6
▪ Percentage of Analyte Pairs Exceeding Criteria: 9.67%
The RPD exceedances associated with PFAS compounds are considered to be minor and likely attributed to low concentrations of analyte pairs. Analyte concentrations from the primary sample and their corresponding blind replicate sample pairs were all within one order of magnitude. A number of RPD exceedances may also be attributed to interlaboratory differences, which can be common and significant, based on a study done by the Queensland Department of Environment and Science and the Victorian Environment Protection Authority (Vardy et al, 2018). Overall, these RPD exceedances are not considered to impact the results of the investigation. RPD results are presented in Table B4, Appendix B.
Sediment
Due to samples being lost between interlaboratory transport from the primary lab to the secondary lab, no sediment field split samples were analysed. Due to the low number of RPD exceedances with Blind Replicate sedimentary samples and the general minor nature of the exceedances, this is considered to not impact the results of the investigation.</td></tr>
<tr><td>Trip Blanks</td><td>Four (4) trip blanks were collected and laboratory tested for PFAS. All analytes were reported below the limit of reporting (LOR). Trip blank results are presented in Table B6, Appendix B.</td></tr>
</table>

QA/QC Aspects	Evidence and Evaluation
Laboratory Internal QC	Evidence of the laboratories internal QC testing is present and complete. Both ALS (the primary laboratory) and Eurofins-mgt performed internal QC with adequate testing and mostly satisfactory results for matrix spikes, method blanks and laboratory duplicates. Exceptions include: Matrix Spike EM2125532—013 had a recovery less than the lower data quality objective.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. Laboratory reports are included in Appendix C of this report.
Calibration of Field Equipment	All field equipment used was calibrated by the equipment supplier. Additionally, daily bump tests were performed of the water quality meter throughout the monitoring event. Certificates are included in Appendix D of this report.
Decontamination and Equipment Blanks	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection. Four rinsate blank samples were tested for PFAS, of which all reported PFAS concentrations below the laboratory LOR. Results are shown in Table B6, Appendix B.
Data Comparability	
Full Review of Data	Once all results have been received, Cardno undertook a full review of the data for any anomalies in consideration of historical data at each location (where available), such as first-time detections or exceedances being reported at locations which have not had detections or exceedances previously. Where potentially anomalous data is identified or suspected, further confirmatory measures were undertaken such as re-extraction and reanalysis of the sample by the laboratory and/or additional data quality review. One sample, SW614 was requested for re-extraction and reanalysis due to a first-time exceedance reported for Sum of PFHxS and PFOS. The original results were confirmed.
Standard Procedures	Fieldwork procedures are detailed in the report and followed the work methods outlined in the SAQP.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Volatile Losses	Volatile losses are not applicable to PFAS.
Sample Integrity	Field Chain of Custody forms are included in Appendix C of this report and demonstrate sample integrity.
Data Completeness	
Completeness of Test Program	The scope of work undertaken was generally consistent with that set out in the Sampling and Analysis Quality Plan (SAQP). Variations to the SAQP are detailed in the Factual Report.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process for surface water and groundwater and therefore, the data set used as the basis for the assessment is considered valid and complete.

APPENDIX

F

INFORMATION ABOUT ENVIRONMENTAL REPORTS

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- ❑ A factual report of the condition of a portion of the site or one aspect of an entire site.
- ❑ Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- ❑ Validation of the success of remediation of a site or a portion of a site.
- ❑ Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as "residential – low density", "commercial" etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a "snapshot" of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such

unexpected occurrences, given the inherent uncertainties in the assessment process.

Cardno uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno. However, however Cardno cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno
13 August 2015

APPENDIX

D

E2 FACTUAL REPORT

Cardno

now

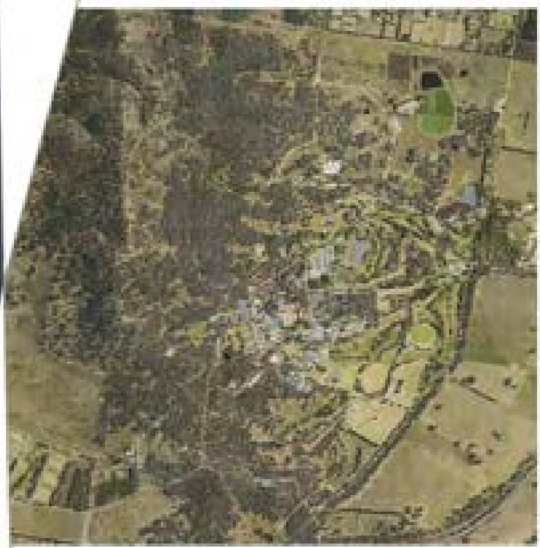
Stantec

PFAS OMP Factual Report

Biannual Sampling Event April/May 2022

Blamey Barracks Kapooka

DEF19008



Prepared for
Department of Defence

9 August 2022

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0	05/07/2022	External Draft		
1	22/07/2022	Revised Draft		
2	9/08/2022	Final		

Table of Contents

Appendices

Tables

List of Abbreviations and Units

Chemical Names

DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Perfluorohexane sulfonic acid
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)

Technical Terms

AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
BGL	Below Ground Level
COC	Chain of Custody
EC	Electrical Conductivity
EPA	Environment Protection Authority
HHERA	Human Health and Ecological Risk Assessment
HSL	Health Screening Level
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
ppm	Parts per Million
µg/L	Micrograms per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity – Water)

Site Specific

OMP	Ongoing Monitoring Plan
Esdat	Environmental data management software

1 Introduction

1.1 Background

Cardno, now Stantec (Cardno) was engaged by the Department of Defence (“Defence” or “the Client”) to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) at Blamey Barracks Kapooka (“the site”). The location of the site is displayed in Figure 1 of Appendix A.

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

> Cardno, 28 October 2021, Reference: DEF19008, *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Blamey Barracks Kapooka*.

For the purposes of this report:

> The “On-Base Management Area” is defined as a portion of the Base including the eastern built up portion of the Base from the Former Quarry in the south to the Wastewater Treatment Plant (WWTP) in the north. It extends as far west as the natural ridgeline that runs north-south through the middle of the Base and to the east to include the Kapooka Creek flow pathway (Figure 1, Appendix A);

> The “Off-Base Management Area” includes the Kapooka Creek flow pathway on public land and all private properties which have some portion of the flow pathway passing through them. This area stretches from the Base, north all the way to the Murrumbidgee River (Figure 1, Appendix A);

> The “Management Area” is comprised of the “On-Base Management Area” and the “Off-Base Management Area” (Figure 1, Appendix A).

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS in groundwater and surface water, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence’s historical use of Aqueous Film Forming Foam (AFFF). The OMP will also provide confirmation of our current understanding of risk.

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

The objectives of the report are:

> To provide a succinct summary of the April/May 2022 sampling event and provision of analytical results with supporting tables and figures.

> To provide confirmation of the current understanding of risk.

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

1.3 Relevant Guidelines

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

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

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

> Department of Defence (2019), *Contamination Management Manual* (DCMM), August 2019.

> Department of Defence (2019b), *Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance - Routine Water Quality Monitoring.*

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

> EPA NSW (2002), *The NSW State Groundwater Dependant Ecosystems Policy*, April 2002.

- EPA NSW (2004), *Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales*, Publication 1669.2, March 2004
- NSW EPA (2016), *Designing Sampling Programs for Sites Potentially Contaminated by PFAS*.
- EPA NSW (2014), *Waste Classification Guidelines – Part 1: Classification of Waste*, November 2014.
- Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, *PFAS National Environmental Management Plan (NEMP) Version 2.0*.
- National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013)* (ASC NEPM).
- National Health and Medical Research Council (NHMRC), August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.
- Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling*.
- U.S. Environmental Protection Agency (EPA), 2000, '*Guidance for the Data Quality Objectives Process (EPA QA/G-4)*'.
- USEPA, 2002, '*Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.*

2 Scope of Work

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

2.1 Review / Revision of the SAQP

Cardno undertook a review of the SAQP prior to commencement of sampling. The SAQP will be reviewed and revised (as required) prior to the next monitoring event scheduled for October 2022.

2.2 Groundwater Monitoring

Sampling of selected groundwater monitoring wells was performed in accordance with the SAQP, applying methods set out in Section 0 of this report. The groundwater monitoring wells monitored as part of the OMP biannual event are presented in Table 2-1, and are shown in Figure 2, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID
Wastewater Treatment Plant	On-Base: MW103, MW104, MW107
Former Commandants House	On-Base: MW008, MW109, MW110 Off-Base: MW625
Kapooka Creek flow pathway	Off-Base: MW601, MW624

2.3 Surface Water Monitoring

The surface water sampling locations monitored as part of the OMP are presented in Table 2-2, and are shown in Figure 2, Appendix A.

Table 2-2 Surface Water Monitoring Locations

Monitoring Area	Location ID
Overland drainage pathways on-Base	On-Base: SW103, SW106, SW107, SW118, SW136
Kapooka Creek	On-Base: SW121 Off-Base: SW614, SW677
Sewer	On-Base: SW140, SW144, SW148, SW149
Wastewater treatment plant ponds	On-Base: SW108, SW111
Overland drainage pathways – Former Quarry	On-Base: SW127

2.4 Sediment Monitoring

The sediment sampling locations monitored as part of the OMP are presented in Table 2-3, and are shown in Figure 2, Appendix A.

Table 2-3 Sediment Monitoring Locations

Monitoring Area	Location ID
Overland drainage pathways on-Base	SD103, SD106, SD107, SD118, SD136
Kapooka Creek	On-Base: SD121 Off-Base: SD614, SD677
Wastewater treatment plant ponds	On-Base: SD108, SD111
Overland drainage pathways – Former Quarry	On-Base: SD127

2.5 Data Management

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

2.6 Deviations from the OMP SAQP

Deviations from the SAQP were attributed to a lack of sampling media, as summarised in Table 2-4. On-site and off-site sampling and testing was undertaken at nine (9) groundwater monitoring wells, twelve (12) surface water monitoring locations and eleven (11) sediment monitoring locations. Three (3) surface water locations could not be sampled as they were found to be dry.

Table 2-4 Deviations from the SAQP

Location	Deviation	Comment/Justification	Impact on Existing Dataset
Surface Water			
SW106	Not Sampled	Location Dry	This is considered to have negligible impact on the investigation as the downstream location SW121 was sampled in this event. The location was not sampled in the previous event during October 2021 as it was also dry.
SW614	Not Sampled	Location Dry	Minor impact - Location last sampled in the October 2021 sampling event. Upstream location has been sampled in this event, but the downstream location (SW677) was dry and not sampled. Sediment data is available.
SW677	Not Sampled	Location Dry	This is considered to have some impact on the investigation as there are no OMP sampling locations downstream (towards the Murrumbidgee River). The location was not sampled in the previous event during October 2021 as it was also dry. However, sediment data is available.

Impact on the understanding of the risk profile is considered to be minimal to none. As noted within the SAQP locations SW614 and SW677 are noted as unlikely to have water present except in the event of recent rain. As a result, sediment samples are also collected from these locations to assist with monitoring the variability in PFAS levels along Kapooka Creek which were sampled during this event. SW106 is one of five locations which provide an overview of the concentrations in surface water feeding into Kapooka Creek as a result of source areas on the eastern portion of the Base. As downstream locations were sampled within this event the impact upon the understanding of the risk profile is considered negligible.

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was undertaken as detailed in Table 3-1.

Table 3-1 Groundwater Sampling Method

Activity	Details
Dates of Field Activity	26 to 29 April 2022
Well Gauging	Standing Water Levels (SWL) were gauged using an interface probe. All wells were measured against a specified mark at the top of the well casing.
Groundwater Field Parameters	Groundwater water quality parameter field measurements (field parameters) were recorded with a water quality meter before sample collection (with the sample in a clean jar). The following field parameters were recorded using a water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Field parameters measured by the water quality meter were recorded on field data records. All field instruments (e.g. water quality meter) were calibrated to optimise the accuracy of the measurements taken. Bump tests were also completed daily by field staff during the monitoring event. Calibration certificates and bump test records have been provided in Appendix D.
Deployment of HydraSleeve®	The HydraSleeves® were deployed with attached weights in order for sample collection to begin at the lowest point of the well screen. HydraSleeves® were deployed during the first biannual sampling event between 25 October – 28 October 2021. Any HydraSleeves® that were found to be worn or damaged were replaced with a new HydraSleeve®.
Retrieval of HydraSleeves® (Sample Collection)	At the majority of locations, HydraSleeve® sampling devices were left in wells from the previous sampling event, ensuring the wells were restabilised following the slight disturbance caused by sampler deployment. Where new HydraSleeve® sampling devices were deployed, they were left in wells for a minimum of 4 hours (if there was no top weight) or for a minimum of 24 hours (if there was a top weight) to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check valve into the sample sleeve. Samples were discharged immediately (to minimise changes in chemistry) via a discharge tube. HydraSleeves® were redeployed after sampling in preparation for the next sampling event. Where insufficient water was available for HydraSleeve® sampling, 3 monitoring well volumes were removed by bailer, or the well was purged dry, prior to bailer sample collection.
Decontamination procedure	Dedicated HydraSleeves® were used at each groundwater monitoring well, thus removing the need for decontamination. Where HydraSleeves® could not be used, dedicated bailers were used instead which also did not require decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.

Activity	Details
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	All groundwater samples were analysed for the full PFAS analytical suite (see SAQP for full list of analytes). The primary laboratory was ALS Global Laboratories (Springvale), and the secondary laboratory (quality control) was Eurofins (Giraween). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.
Laboratory Testing – Quality Control	Groundwater quality control samples were collected as follows and analysed for the full PFAS analytical suite: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples (1 sample). ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples (1 sample). ▪ Rinsate blank samples at 1 per day [collected off re-used sampling equipment (e.g. interface probe)] (5 samples total). ▪ Trip blank samples of 1 per shipment included in the chilled sample containers upon transport to the laboratory (5 samples total).

3.2 Surface Water Sampling Methodology

Surface water monitoring was undertaken using a grab method as detailed in Table 3-2.

Table 3-2 Surface Water Sampling Method

Item	Details
Dates of Field Activity	26 April to 2 May 2022
Water Level Gauging	Water depths were measured where relevant with an interface probe, limiting water disturbance.
Field parameters	Surface water field parameters (i.e. pH, electrical conductivity (EC), oxidation reduction potential (ORP), dissolved oxygen (DO), and temperature) were recorded at the time of sampling using a pre-calibrated water quality meter. Field observations such as odours and flow were also recorded on field sampling sheets.
Sampling Method	Where possible, the samples were collected directly into sample containers. The sample bottles were positioned at least 10 cm below the surface water level and above the sediment bed and orientated with the opening facing downwards to avoid the collection of surface films. Where access to surface water samples was difficult, the samples were collected using a long-handled sampling device with a glass container (scoop) that was lowered directly into the water body. Samples were then decanted into the laboratory-supplied sample containers. Samples were collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) '*Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*'.
Decontamination	All re-usable sampling equipment (e.g. water scoop) were thoroughly washed using phosphate-free detergent (Liquinox), and subsequently double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Sample labelling and naming was in accordance with Annex L of the DCMM.

Item	Details
	Samples were contained in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (COC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	All surface water samples were analysed for the full PFAS analytical suite (see SAQP for full list of analytes). The primary laboratory was ALS Global Laboratories (Springvale), and the secondary laboratory (quality control) was Eurofins (Giraween). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.
Laboratory Testing – Quality Control	Surface water quality control samples were collected as follows and analysed for the full PFAS analytical suite: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples (2 samples). ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples (2 samples). ▪ Rinsate blank samples at 1 per day [collected off re-used sampling equipment (e.g. long-handled sampling device)] (5 sample total). ▪ Trip blank samples of 1 per shipment included in the chilled sample containers upon transport to the laboratory (5 sample total).

3.3 Sediment Sampling Methodology

Sediment monitoring was undertaken as detailed in Table 3-3.

Table 3-3 Sediment Sampling Method

Item	Details
Dates of Field Activity	26 April to 2 May 2022
Sample Collection	Sediment samples were collected at the sediment/water interface, and the approximate midpoint of the flow pathway using the required hand tools (e.g. trowel, hand auger, PVC pipe, etc.), with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation. At each sampling location, the sediment sample was visually assessed and observations (including physical description) recorded on field data sheets.
Decontamination	All re-usable sampling equipment (such as a trowel) were thoroughly washed using phosphate-free detergent (Liquinox), and subsequently double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Sample labelling and naming was in accordance with Annex L of the DCMM. Samples were contained in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (COC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	All sediment samples were analysed for the full PFAS analytical suite (see SAQP for full list of analytes). The primary laboratory was ALS Global Laboratories (Springvale), and the secondary laboratory (quality control) was Eurofins (Giraween). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.

Item	Details
Laboratory Testing – Quality Control	Sediment quality control samples were collected as follows and analysed for the full PFAS analytical suite: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 soil samples (2 samples). ▪ Field triplicate (inter-laboratory) samples at 1 per 10 soil samples (2 samples). ▪ Rinsate blank samples at 1 per day [collected off re-used sampling equipment (e.g. trowel)] (5 samples total). ▪ Trip blank samples of 1 per shipment included in the chilled sample containers upon transport to the laboratory (5 samples total).

3.4 Quality Control / Quality Assurance

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

> QA documentation.

> Bias.

> Data Representativeness.

> Data Precision & Accuracy.

> Data Comparability.

> Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E. A summary of the data validation from the QA/QC review is included in Section 4.5 below.

3.5 Assessment Criteria

3.5.1 Groundwater and Surface Water

The adopted assessment criteria for groundwater and surface water are detailed in Table 3-4.

Table 3-4 Criteria for Groundwater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Human Health - Drinking Water Quality Guideline[1]	0.07[2]	0.56	HEPA 2020
Human Health - Surface Water Recreational	2[2]	10	HEPA 2020
Ecological (95% species protection)	0.13[3]	220	HEPA 2020

1. Drinking Water screening guidelines have been adopted for screening purposes for Industrial Water use, Stock Water use and Agriculture/Parks/Gardens Water use.
2. Combined PFOS and PFHxS.
3. PFOS only. 95% species protection guideline values adopted for screening of results, in accordance with the OMP (Jacobs, 2021c).

3.5.2 Sediment

No national assessment criteria have been established.

4 Field Observations and Results

4.1 Conditions Impacting the Sampling Event

In the seven days prior to the sampling event, 22.2 mm of rain was recorded at the nearest weather station (74272), located on the Kapooka Base. April 2022 rainfall was 73.6 mm, which is higher than the monthly April average between 2018 and 2021 of 31.2 mm.

No on-site activities with the potential to impact sample collection or the results were noted.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Water quality parameter field measurements

Stabilised water quality parameter field measurements, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling record sheets, included in Appendix D. Water quality parameter field measurements were generally consistent with October 2021. Groundwater varied from clear to brown with low to high turbidity and no notable changes were recorded relative to previous monitoring events.

4.2.1.2 Groundwater Elevation and Flow Direction

Groundwater elevation during this sampling event ranged from 166.942 mAHD (MW625) to 201.220 mAHD (MW103).

Regional groundwater flow is inferred to be in a north-westerly direction, towards the Murrumbidgee River, consistent with the previous monitoring event.

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

4.2.2 Groundwater Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria, and are presented in Table B1, Appendix B, and summarised in Table 4-1 below. Of the 9 primary samples that were tested, PFOA was reported above the limit of reporting in 2 samples, and Sum of PFHxS and PFOS in 3 samples.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results >LOR	No. Results Above Criteria	Significant Concentration Changes[3]
PFOS	MW601	0.13[2]	0.20	3	1	-
PFOA	NA	0.56[1]	0.02	2	0	-
Sum of PFHxS and PFOS	MW008, MW107, MW601	0.07[1]	0.65	3	3	-

1. Drinking water assessment criteria
2. Ecological assessment criteria
3. Significant concentration change defined as an order of magnitude increase or decrease

Results have also been compared against available historical data. No locations reported a significant change in concentration for this monitoring event.

A summary of locations where a first-time detection of PFOS, Sum of PFHxS and PFOS or PFOA or a new exceedance of guideline values were reported, is provided in Table 4-2 below. The laboratory reports are provided in Appendix C.

Table 4-2 Summary of Groundwater Results with First-time Detections or Exceedances

Deviation Type	Monitoring Well	Sum of PFHxS + PFOS concentration (µg/L)	PFOA concentration (µg/L)	PFOS concentration (µg/L)

		April 2022	Previous Maximum	April 2022	Previous Maximum	April 2022	Previous Maximum
First-time detections	MW107	**0.14**	**0.1**	0.02	<0.01	0.02	0.02

Note:
Location with first-time detection of PFOS + PFHxS, PFOA or PFOS in latest monitoring round
Location with a new exceedance of lowest adopted guideline values in latest monitoring round
Bold: Exceedance of lowest adopted guideline values

Findings are summarised as follows:

> One groundwater sampling location (MW107) reported a first-time detection of PFOA.

4.2.3 Summary of Monitoring Network Condition and Repairs

In accordance with the October 2021 Factual Report, MW107 was investigated during the April/May 2022 monitoring event as it was suspected that there was a blockage at depth. Initially a downhole groundwater bore camera was inserted in an attempt to view the suspected blockage, however this was unable to clearly diagnose the issue. MW107 was then bailed, with plant roots found to be present within the water obtained. The well was then cleared using a decontaminated stainless-steel bailer which appears to have removed the blockage (likely plant roots that entered the well through the slotted screen) and allowed for the HydraSleeve® to be deployed and a sample taken. The measured depth of well was also consistent with the bore log.

MW103 was also found to be blocked by potential plant roots within the screened interval as the HydraSleeve® tore when being initially retrieved and the well was also cleared using a decontaminated stainless-steel bailer.

During the October 2021 monitoring event it was noted that the gatic lid for MW601 had been vandalised and the gatic lugs damaged. Whilst Cardno was able to open the gatic at the time and sample the well, Jacobs could not open the gatic during sampling in December 2021. The gatic lugs were repaired by Cardno and new bolts installed during the April/May 2022 monitoring event.

Following unblocking of MW103 and MW107, and repairs to MW601, the monitoring network is considered to be in good condition. It is anticipated that due to the proximity of MW103 and MW107 to nearby vegetation, clearing of the wells with a decontaminated stainless steel bailer will be required on an ongoing basis during future monitoring events.

No other changes to the monitoring network condition were noted.

4.3 Surface Water

4.3.1 Summary of Field Observations

4.3.1.1 Water quality parameter field measurements

Stabilised water quality parameter field measurements, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling record sheets, included in Appendix D. Field observations indicate that the same number of surface water locations were dry as in the previous event, with sampled locations having a similar flow rate compared with the previous monitoring event in October 2021. Surface water varied from clear to brown or green with generally moderate turbidity.

4.3.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria, presented in Table B2, Appendix B, and summarised in Table 4-3 below. Of the 12 primary samples that were tested, PFOA was reported above the limit of reporting in 1 sample, and Sum of PFHxS and PFOS in 9 samples.

Table 4-3 Summary of Surface Water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results >LOR	No. Results Above Criteria	Significant Concentration Changes[3]
PFOS	SW103, SW107, SW118, SW121	0.13[2]	0.19	8	4	SW136 (decrease)
PFOA	NA	0.56[1]	0.01	1	-	-
Sum of PFHxS and PFOS	SW103, SW107, SW118, SW121	0.07[1]	0.28	9	4	-

1. Drinking water assessment criteria
2. Ecological assessment criteria
3. Significant concentration change defined as an order of magnitude increase or decrease

Results have also been compared to available historical data. One location has reported a significant change in concentration for this monitoring event.

> SW136: Sum of PFHxS and PFOS has decreased by one order of magnitude from a previous result of 1.93 µg/L in October 2021 to 0.08 µg/L (interlaboratory split sample result) in this event.

All other concentrations reported during this event were generally consistent with previous sampling events.

A summary of locations where a first-time detection of PFOS, Sum of PFHxS and PFOS or PFOA or a new exceedance of guideline values were reported is provided in Table 4-2 below. The laboratory reports are provided in Appendix C.

Table 4-4 Summary of Surface Water Results with First-time Detections or Exceedances

Deviation Type	Surface Water Location	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		April 2022	Previous Maximum	April 2022	Previous Maximum	April 2022	Previous Maximum
First-time detections	SW149	0.02	<0.01	<0.01	<0.01	0.02	<0.01

Note:
Location with first-time detection of PFOS + PFHxS, PFOA or PFOS in latest monitoring round
Location with a new exceedance of lowest adopted guideline values in latest monitoring round
Bold: Exceedance of lowest adopted guideline values

Findings are summarised as follows:

> One surface water monitoring location (SW149) reported a first-time detection of PFOS and Sum of PFHxS and PFOS.

4.4 Sediment

4.4.1 Summary of Field Observations

Odour, colour and other observations recorded during the sediment sampling program are presented in field sampling record sheets, included in Appendix D. Field observations were generally consistent with the previous monitoring event in October 2021.

4.4.2 Laboratory Results

National assessment criteria have not been established for PFAS in sediment. The results of laboratory analysis have been compared against historical results, presented in Table B3, Appendix B and summarised below.

Of the 11 primary samples analysed, 1 sample reported PFOA concentrations above the limit of reporting, and 9 samples reported Sum of PFHxS and PFOS concentrations above the limit of reporting.

Results have also been compared to available historical data. The following locations have reported a significant change in concentration for this monitoring event:

> SD121: Sum of PFHxS and PFOS has decreased by one order of magnitude from a previous result of 0.0197 mg/kg in October 2021 to 0.0009 mg/kg in this event.

All other concentrations reported during this event were generally consistent with previous sampling events.

A summary of locations where a first-time detection of PFOS, Sum of PFHxS and PFOS or PFOA were reported is provided as follows:

> One sediment sampling location (SD106) reported a first-time detection of PFOA.

4.5 Data Validation

The data validation process has concluded that there are no significant systematic errors in the data collection process. Therefore, the data set used as the basis for the surface water and groundwater assessment is considered valid and complete. A detailed Data Quality Review is included in Appendix E.

5 Summary and Conclusions

Cardno conducted the April/May 2022 biannual groundwater, surface water and sediment monitoring event at Blamey Barracks Kapooka as part of the PFAS OMP. On-site and off-site sampling and testing was undertaken at 9 groundwater monitoring wells, 12 surface water locations and 11 sediment locations.

Groundwater levels were gauged in all accessible wells before sampling. Regional groundwater flow is inferred to be in a north-westerly direction, towards the Murrumbidgee River, consistent with the previous monitoring event.

Table 5-1 Summary of Results

Activity	Details
Deviations from OMP SAQP	> Three surface water locations could not be sampled as the locations were dry (SW106, SW614, SW677).
Groundwater Analytical Results	> 9 groundwater samples were collected in total. > One sample reported a first-time detection for PFOA (MW107). > No samples reported a first-time exceedance of any assessment criteria for PFOS, PFOA or Sum of PFHxS and PFOS. > No significant concentration changes were reported.
Surface Water Analytical Results	> 12 surface water samples were collected in total. > One sample reported a first-time detection of PFOS, and Sum of PFHxS and PFOS (SW149). > No samples reported a first-time exceedance of any assessment criteria for PFOS, PFOA or Sum of PFHxS and PFOS. > One sample reported an order of magnitude decrease in Sum of PFHxS and PFOS results compared to the previous event (SW136).
Sediment Analytical Results	> 11 sediment samples were collected in total. > One sample reported a first-time detection of PFOA (SD106). > One sample reported an order of magnitude decrease in Sum of PFHxS and PFOS results compared to the previous event (SD121).
Next Scheduled Monitoring Event	> The next OMP monitoring event is scheduled for October 2022. > SAQP to be reviewed and updated as required prior to the next monitoring event.

6 References

General References

1. ANZECC and ARMCANZ (2000) *Australian Water Quality Guidelines for Fresh and Marine Water Quality.*
2. Department of Defence (2019), *Contamination Management Manual* (DCMM)*,* August 2019.
3. Department of Defence (2019b), Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance - Routine Water Quality Monitoring.
4. Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.
5. Defence (2020) *Defence OMP Factual Report Preparation Guidance*, Revised May 2021.
6. EPA NSW (2002), The NSW State Groundwater Dependant Ecosystems Policy, April 2002.
7. EPA NSW (2004), Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales, Publication 1669.2, March 2004
8. NSW EPA (2016), Designing Sampling Programs for Sites Potentially Contaminated by PFAS.
9. EPA NSW (2014), Waste Classification Guidelines – Part 1: Classification of Waste, November 2014.
10. Environmental Protection Agency (United States EPA; 2002) EPA/240/R-02/004 *Guidance on Environmental Data Verification and Data Validation,* November 2002.
11. The Heads of EPAs Australia and New Zealand (HEPA; 2020) *PFAS National Environmental Management Plan (NEMP) Version 2.0*, January 2020.
12. National Environment Protection Council (NEPC; 1999) *National Environmental Protection (Assessment of Site Contamination) Measure (as amended),* registered May 2013.
13. National Health and Medical Research Council (2011 – updated 2018) *National Water Quality Management Strategy Australian Drinking Water Guidelines*, 6 August 2018.
14. Nation Health and Medical Research Council (NHMRC; 2019) *Guidance on Per and Poly-fluoroalkyl Substances (PFAS) in Recreational Water,* August 2019.
15. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 *Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*.
16. Standards Australia (1999) AS4482.2-1999 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds.*
17. US EPA (2000) *Guidance for the Data Quality Objectives Process* (EPA QA/G-4), United States Environmental Protection Agency.
18. US EPA (2002) *Guidance on Environmental Data Verification and Data Validation,* Reference: EPA/240/R-02/004, United States Environmental Protection Agency, November 2002.

Site Specific References

19. Jacobs (2019) Blamey Barracks *Comprehensive PFAS Investigation. Detailed Site Investigation*, September 2019.
20. Jacobs (2021a) Blamey Barracks *Comprehensive PFAS Investigation. Human Health and Ecological Risk Assessment (HHERA)*, 23 June 2021.
21. Jacobs (2021b) *Blamey Barracks Kapooka; PFAS Management Area Plan (PMAP)*, June 2021.
22. Jacobs (2021c) *PFAS Ongoing Monitoring Plan*, June 2021.
23. Cardno (2021) *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP),* Blamey Barracks Kapooka. Prepared for Department of Defence, October 2021.

APPENDIX

A

FIGURES

Cardno

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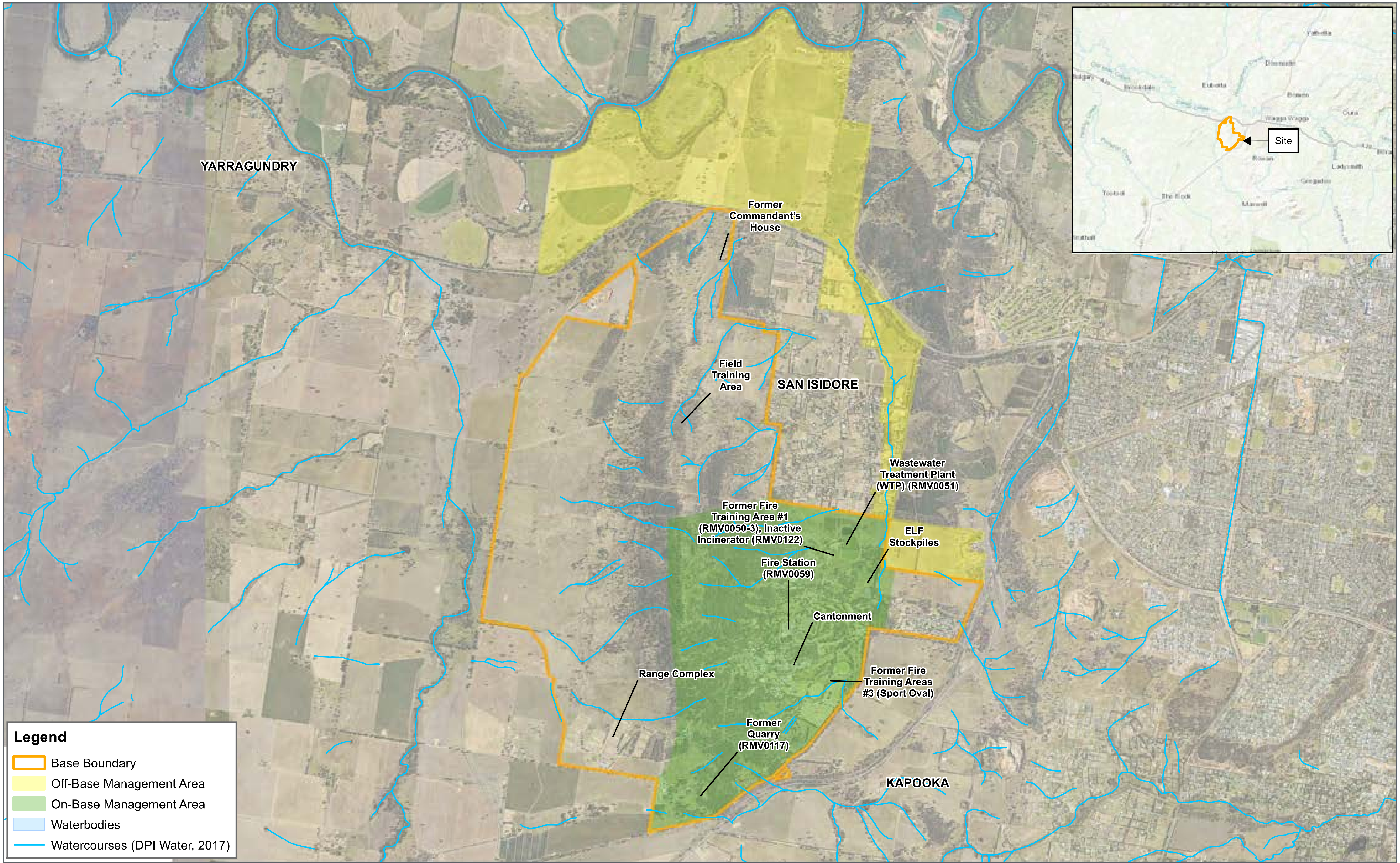

FIGURE 1

1:40,000 Scale at A3

Metres
0 1,000 2,000

Site Locality Plan & Management Areas

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

N

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2022-06-14 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0164-SiteLocalityPlan_K.mxd 02
Aerial Imagery Supplied by Metromap (February, 2022)

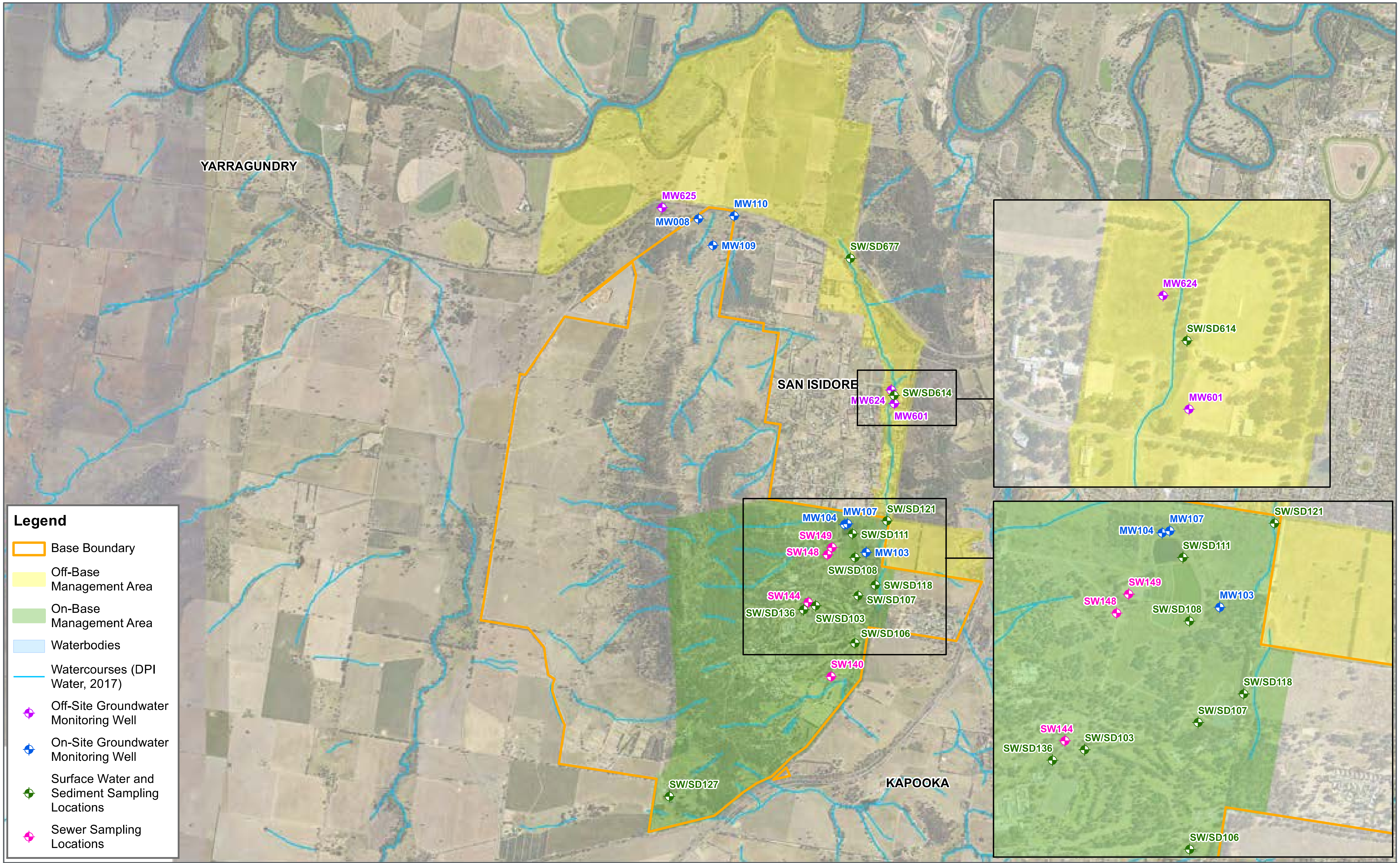

FIGURE 2

1:40,000 Scale at A3

Metres 0 1,000 2,000

Sampling Locations

SAMPLING ANALYSIS AND QUALITY PLAN
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno — Stantec

Map Produced by Cardno now Stantec
Date: 2022-06-14 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0166-SampleLocationsN_K.mxd 02
Aerial Imagery Supplied by Metromap (February, 2022)

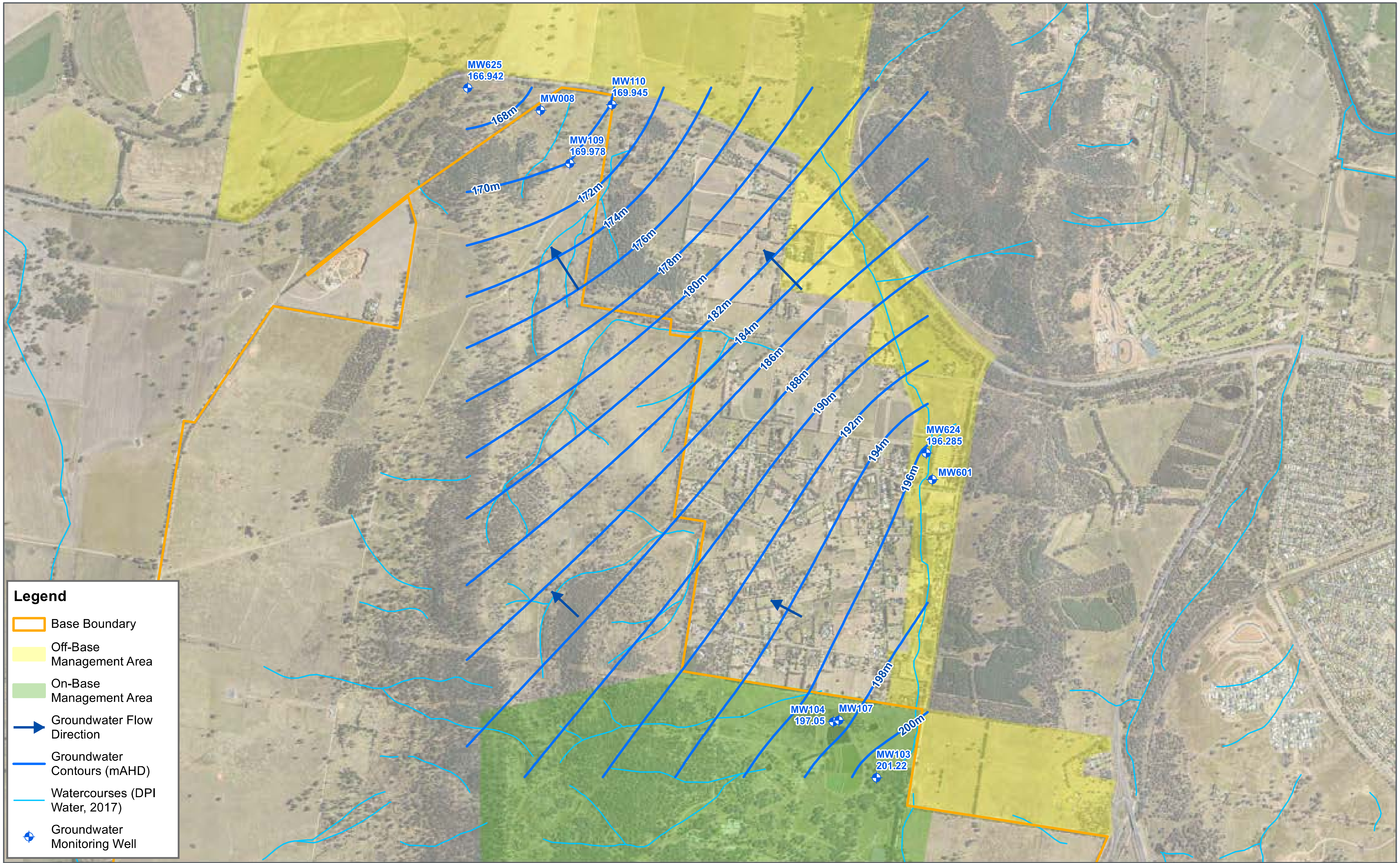

FIGURE 3

1:20,000 Scale at A3

Metres 0 500 1,000

Groundwater Elevation Contours (April, 2022)

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno now Stantec

Map Produced by Cardno now Stantec
Date: 2022-07-21 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0231-GW_Contours_E2_K.mxd 01
Aerial Imagery Supplied by Metromap (February, 2022)

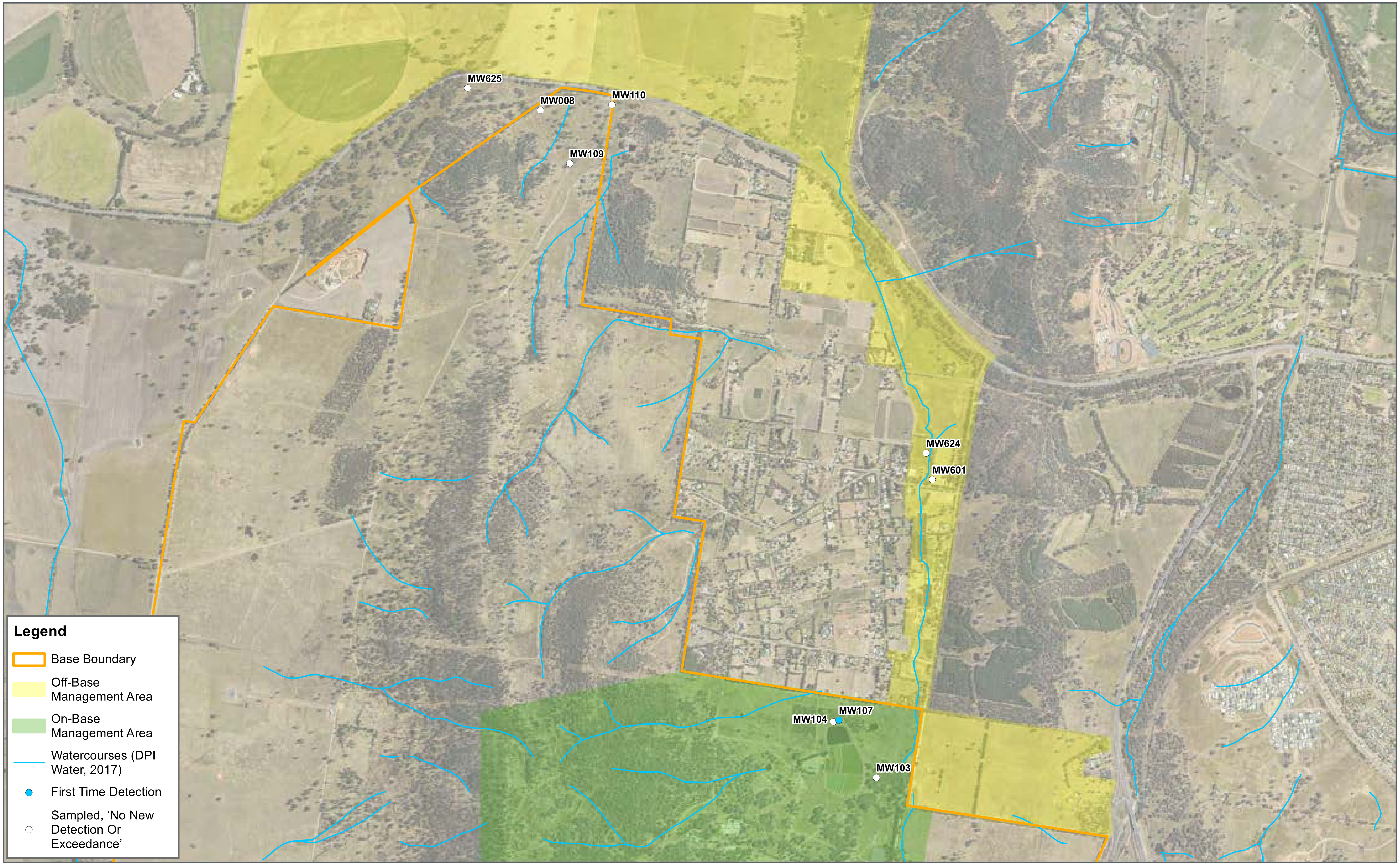

FIGURE 4

1:20,000 Scale at A3

Metres

0 500 1,000

PFAS Results Summary - Goundwater (April, 2022)

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

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Map Produced by Cardno now Stantec
Date: 2022-06-14 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0232-GW_PFAS_Summary_E2_K.mxd 01
Aerial Imagery Supplied by Metromap (February, 2022)

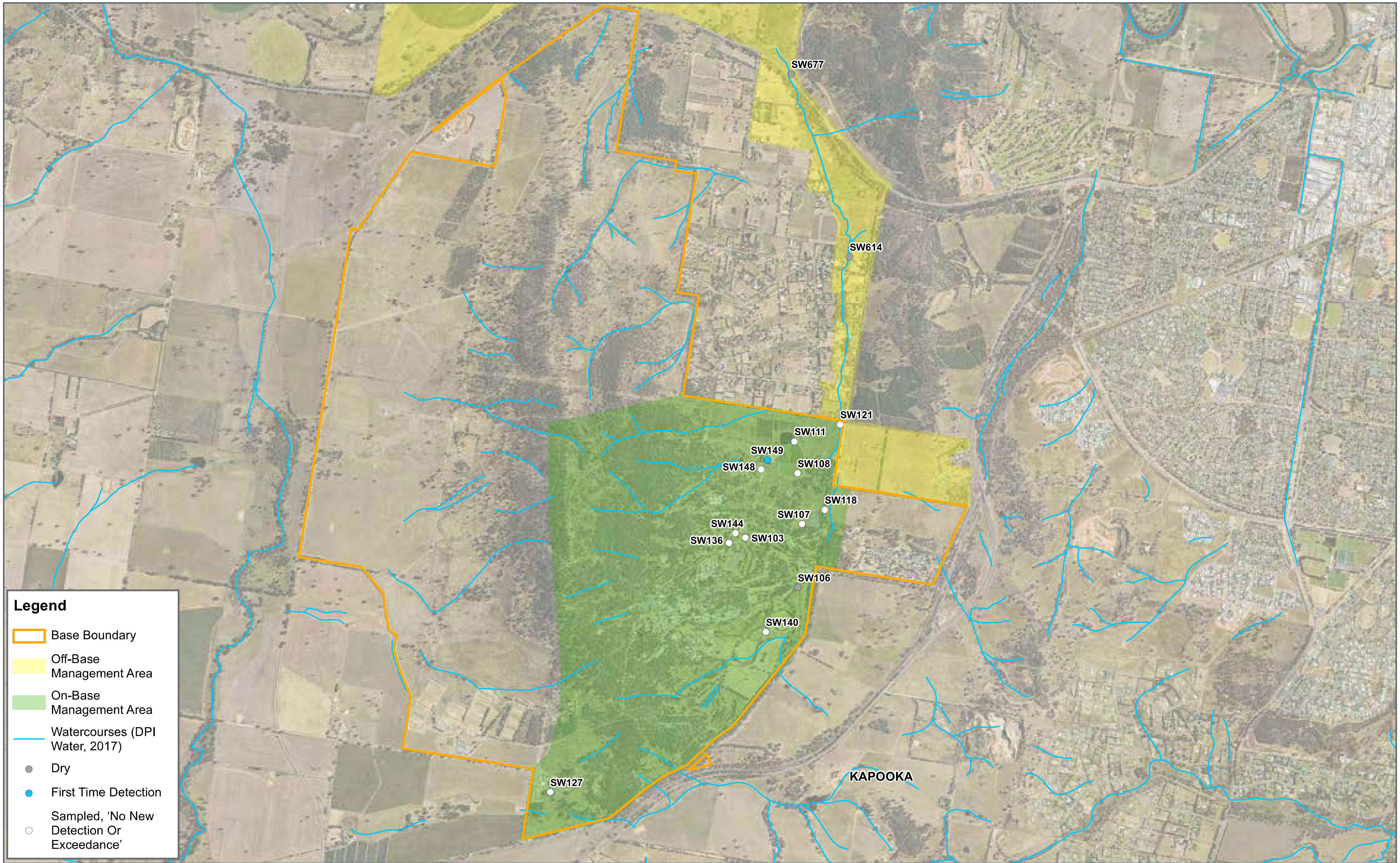

FIGURE 5

1:30,000 Scale at A3

Metres 0 500 1,000

PFAS Results Summary - Surface water (April, 2022)

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

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Map Produced by Cardno now Stantec
Date: 2022-06-14 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0233-SW_PFAS_Summary_E2_K.mxd 01
Aerial Imagery Supplied by Metromap (February 2022)

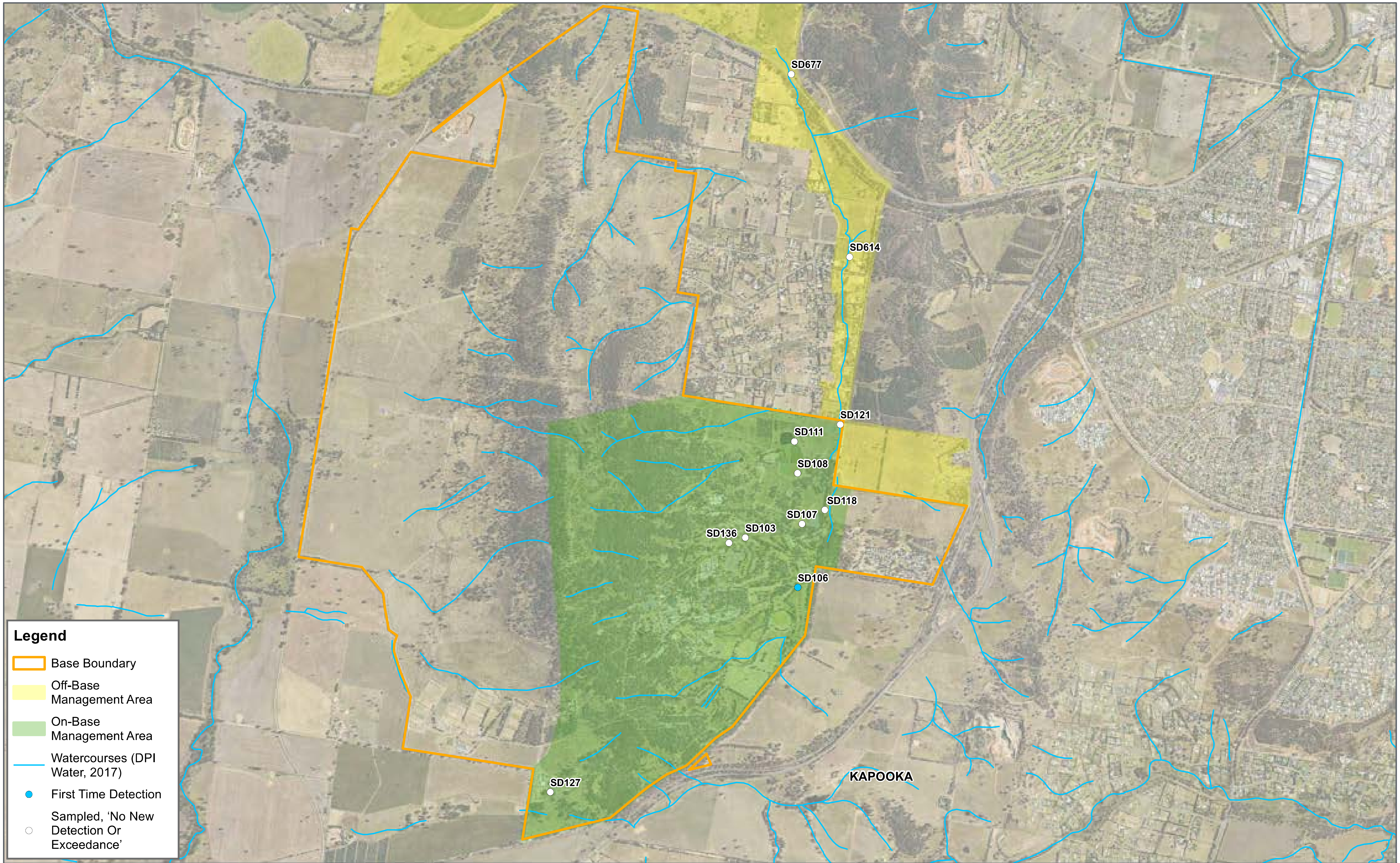

FIGURE 6

1:30,000 Scale at A3

Metres
0 500 1,000

PFAS Results Summary - Sediment (April, 2022)

BIANNUAL SAMPLING EVENT
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

N

Map Produced by Cardno now Stantec
Date: 2022-06-14 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0234-SED_PFAS_Summary_E2_K.mxd 01
Aerial Imagery Supplied by Metromap (February, 2022)

APPENDIX

B

DATA ASSESSMENT TABLES

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						Perfluorocarbons																
						Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)
						µg/L	µg/L	µg/L	µg/L	µg/L	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						0.0003	0.0005	0.0003	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
PFAS NEMP 2.0 Table 1 Health Drinking Water							**0.56**	**0.07**														
PFAS NEMP 2.0 Table 1 Health Recreational Water							*10*	*2*														
PFAS NEMP 2.0 Table 5 Freshwater 95%						0.13	220															
Location Code	**Monitoring Zone**	**Sampled Date**	**Field ID**	**Sample Type**	**Lab Report Number**																	
MW008	On-Base	16/03/2017	0315 MW008 170316	Normal	ES1706394	0.0252	<0.0005	**0.111**	0.0145	0.0088	0.0855	0.0034	<0.0005	0.023	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	On-Base	18/12/2018	0315 QC202 181218	Interlab D	635075	0.09	<0.01	**0.23**	0.01	0.01	0.14	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	On-Base	18/12/2018	0315 MW008 S 181218	Normal	ES1838696	0.04	<0.01	**0.14**	<0.02	<0.02	0.1	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	18/12/2018	0315 QC102 181218	Field D	ES1838696	0.04	<0.01	**0.14**	<0.02	<0.02	0.1	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	18/12/2018	0315 QC104 181218	Field D	ES1838696	0.04	<0.01	**0.15**	<0.02	<0.02	0.11	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	9/03/2020	0315 QC201 200309	Interlab D	239048	0.05	<0.01	**0.18**	0.01	<0.01	0.13	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.1
	On-Base	9/03/2020	0315 MW008 S 200309	Normal	ES2008982	0.06	<0.01	**0.23**	<0.02	<0.02	0.17	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	9/03/2020	0315 QC101 200309	Field D	ES2008982	0.06	<0.01	**0.23**	<0.02	<0.02	0.17	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/10/2021	0315 MW008 20211028	Normal	ES2139229	0.03	<0.01	**0.11**	<0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/04/2022	0315 MW008 20220428	Normal	EM2208205	0.02	<0.01	**0.1**	<0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MW103	On-Base	20/02/2019	0315 MW103 S 190220	Normal	ES1905450	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/10/2021	0315 MW103 20211028	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	29/04/2022	0315 MW103 20220429	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MW104	On-Base	20/02/2019	0315 MW104 S 190220	Normal	ES1905450	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/10/2021	0315 MW104 20211028	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/04/2022	0315 MW104 20220428	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MW107	On-Base	30/01/2019	0315 MW107 P 190130	Normal	ES1902996	<0.01	<0.01	**0.1**	<0.02	<0.02	0.1	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	7/03/2019	0315 MW107 P 190307	Normal	ES1907492	0.02	<0.01	0.07	<0.02	<0.02	0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	29/04/2022	0315 MW107 20220429	Normal	EM2208205	0.02	0.02	**0.14**	0.02	0.02	0.12	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MW109	On-Base	10/03/2020	0315 MW109 S 200310	Normal	ES2008982	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/10/2021	0315 QC205 20211027	Interlab D	837707	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	On-Base	27/10/2021	0315 MW109 20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/10/2021	0315 QC105 20211027	Field D	ES2139230	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/04/2022	0315 MW109 20220427	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/04/2022	0315 QC101 20220427	Field D	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/04/2022	0315 QC201 20220427	Interlab D	889626	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MW110	On-Base	10/03/2020	0315 MW110 S 200310	Normal	ES2008982	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/10/2021	0315 MW110 20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/04/2022	0315 MW110 20220427	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MW601	Off-Base	29/01/2019	0315 QC201 190129	Interlab D	638493	0.01	<0.01	**0.1**	0.01	0.01	0.09	<0.01	<0.01	<0.05	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Off-Base	29/01/2019	0315 MW601 S 190129	Normal	ES1902996	0.01	<0.01	**0.15**	<0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	29/01/2019	0315 QC101 190129	Field D	ES1902996	0.01	<0.01	**0.15**	<0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	18/02/2019	0315 MW601 S 190218	Normal	ES1905450	0.02	<0.01	**0.25**	<0.02	<0.02	0.23	<0.02	<0.02	<0.1	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	12/03/2020	0315 MW601 P 200312	Normal	ES2008982	0.16	0.01	**0.89**	0.06	0.08	0.73	0.03	<0.02	<0.1	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	27/10/2021	0315 MW601 20211027	Normal	ES2139235	0.17	<0.01	**0.59**	0.03	0.03	0.42	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	28/04/2022	0315 MW601 20220428	Normal	EM2208229	0.2	0.01	**0.65**	0.03	0.04	0.45	0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MW624	Off-Base	11/03/2020	0315 MW624 S 200311	Normal	ES2008982	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	27/10/2021	0315 MW624 20211027	Normal	ES2139235	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	20/12/2021	MW624	Normal	EM2125953	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	28/04/2022	0315 MW624 20220428	Normal	EM2208229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MW625	Off-Base	21/05/2020	0315 MW625 S 200521	Normal	ES2017986	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	26/10/2021	0315 MW625 20211026	Normal	ES2139232	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	27/04/2022	0315 MW625 20220427	Normal	EM2208223	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Notes

Denotes first time detection above LOR in latest monitoring round

Denotes new exceedance of lowest adopted screening criteria in latest monitoring round

						Perfluorocarbons														
						Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
						µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/kg	mg/L
LOR						0.0005	0.0005	0.001	0.000001	0.001	0.001	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0003	0.00001	0.00001
PFAS NEMP 2.0 Table 1 Health Drinking Water																				
PFAS NEMP 2.0 Table 1 Health Recreational Water																				
PFAS NEMP 2.0 Table 5 Freshwater 95%																				
Location Code	**Monitoring Zone**	**Sampled Date**	**Field ID**	**Sample Type**	**Lab Report Number**															
MW008	On-Base	16/03/2017	0315 MW008 170316	Normal	ES1706394	<0.0005	<0.0005	<0.001	<0.000001	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	0.16	-	-
	On-Base	18/12/2018	0315 QC202 181218	Interlab D	635075	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	0.25	-	0.00023
	On-Base	18/12/2018	0315 MW008 S 181218	Normal	ES1838696	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.14	-	-
	On-Base	18/12/2018	0315 QC102 181218	Field D	ES1838696	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.14	-	-
	On-Base	18/12/2018	0315 QC104 181218	Field D	ES1838696	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.15	-	-
	On-Base	9/03/2020	0315 QC201 200309	Interlab D	239048	<0.5	<0.1	<0.05	<0.00005	<0.1	<0.5	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	0.19	0.00005	-
	On-Base	9/03/2020	0315 MW008 S 200309	Normal	ES2008982	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.23	-	-
	On-Base	9/03/2020	0315 QC101 200309	Field D	ES2008982	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.23	-	-
	On-Base	28/10/2021	0315 MW008 20211028	Normal	ES2139229	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.11	-	-
	On-Base	28/04/2022	0315 MW008 20220428	Normal	EM2208205	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.1	-	-
MW103	On-Base	20/02/2019	0315 MW103 S 190220	Normal	ES1905450	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	28/10/2021	0315 MW103 20211028	Normal	ES2139229	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	29/04/2022	0315 MW103 20220429	Normal	EM2208205	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW104	On-Base	20/02/2019	0315 MW104 S 190220	Normal	ES1905450	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	28/10/2021	0315 MW104 20211028	Normal	ES2139229	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	28/04/2022	0315 MW104 20220428	Normal	EM2208205	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	0.18	<0.05	<0.05	0.18	-	-
MW107	On-Base	30/01/2019	0315 MW107 P 190130	Normal	ES1902996	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.1	-	-
	On-Base	7/03/2019	0315 MW107 P 190307	Normal	ES1907492	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.07	-	-
	On-Base	29/04/2022	0315 MW107 20220429	Normal	EM2208205	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	0.07	<0.05	<0.05	0.27	-	-
MW109	On-Base	10/03/2020	0315 MW109 S 200310	Normal	ES2008982	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	27/10/2021	0315 QC205 20211027	Interlab D	837707	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	-	<0.00001
	On-Base	27/10/2021	0315 MW109 20211027	Normal	ES2139229	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	27/10/2021	0315 QC105 20211027	Field D	ES2139230	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	27/04/2022	0315 MW109 20220427	Normal	EM2208205	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	27/04/2022	0315 QC101 20220427	Field D	EM2208205	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	27/04/2022	0315 QC201 20220427	Interlab D	889626	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	-	<0.00001
MW110	On-Base	10/03/2020	0315 MW110 S 200310	Normal	ES2008982	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	28/10/2021	0315 MW110 20211027	Normal	ES2139229	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	On-Base	27/04/2022	0315 MW110 20220427	Normal	EM2208205	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW601	Off-Base	29/01/2019	0315 QC201 190129	Interlab D	638493	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	0.14	-	0.0001
	Off-Base	29/01/2019	0315 MW601 S 190129	Normal	ES1902996	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.18	-	-
	Off-Base	29/01/2019	0315 QC101 190129	Field D	ES1902996	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.15	-	-
	Off-Base	18/02/2019	0315 MW601 S 190218	Normal	ES1905450	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.29	-	-
	Off-Base	12/03/2020	0315 MW601 P 200312	Normal	ES2008982	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	1.11	-	-
	Off-Base	27/10/2021	0315 MW601 20211027	Normal	ES2139235	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.68	-	-
	Off-Base	28/04/2022	0315 MW601 20220428	Normal	EM2208229	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.78	-	-
MW624	Off-Base	11/03/2020	0315 MW624 S 200311	Normal	ES2008982	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	Off-Base	27/10/2021	0315 MW624 20211027	Normal	ES2139235	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	0.05	<0.05	<0.05	0.05	-	-
	Off-Base	20/12/2021	MW624	Normal	EM2125953	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	Off-Base	28/04/2022	0315 MW624 20220428	Normal	EM2208229	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
MW625	Off-Base	21/05/2020	0315 MW625 S 200521	Normal	ES2017986	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	Off-Base	26/10/2021	0315 MW625 20211026	Normal	ES2139232	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-
	Off-Base	27/04/2022	0315 MW625 20220427	Normal	EM2208223	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-	-

Notes

Denotes first time detection above LOR in latest monitoring round

Denotes new exceedance of lowest adopted screening criteria in latest monitoring round

Location Code	Monitoring Zone	Sampled Date	Field ID	Sample Type	Lab Report Number	Perfluorocarbons																	
						Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)
						µg/L	µg/L	µg/L	µg/L	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						0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.02
PFAS NEMP 2.0 Table 1 Health Drinking Water							**0.56**	**0.07**													
PFAS NEMP 2.0 Table 1 Health Recreational Water							*10*	*2*													
PFAS NEMP 2.0 Table 5 Freshwater 95%						0.13	220														
SW103	On-Base	10/12/2018	0315_SW103_181210	Normal	ES1837611	0.67	0.05	**1.31**	0.1	0.06	0.64	0.02	<0.02	<0.1	0.13	0.18	0.04	<0.02	<0.02	<0.02	<0.02
	On-Base	26/10/2021	0315_QC203_20211026	Interlab_D	837707	1	0.03	**1.31**	0.02	0.02	0.31	0.02	<0.01	<0.05	0.06	0.07	0.02	<0.01	<0.01	<0.01	<0.01
	On-Base	26/10/2021	0315_QC103_20211026	Field_D	ES2139230	0.74	0.03	**0.99**	0.02	<0.02	0.25	<0.02	<0.02	<0.1	0.06	0.07	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26/10/2021	0315_SW103_20211026	Normal	ES2139229	0.6	0.02	**0.82**	<0.02	<0.02	0.22	<0.02	<0.02	<0.1	0.06	0.06	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/04/2022	0315_SW103_20220428	Normal	EM2208205	0.19	<0.01	**0.28**	<0.02	<0.02	0.09	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW106	On-Base	16/12/2018	0315_SW106_181216	Normal	ES1838218	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW107	On-Base	10/12/2018	0315_SW107_181210	Normal	ES1837611	0.43	0.03	**0.65**	0.02	<0.02	0.22	<0.02	<0.02	<0.1	0.03	0.04	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26/10/2021	0315_SW107_20211026	Normal	ES2139229	0.18	0.01	**0.25**	<0.02	<0.02	0.07	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	2/05/2022	0315_SW107_20220502	Normal	EM2208205	0.15	<0.01	**0.2**	<0.02	<0.02	0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW108	On-Base	15/12/2018	0315_SW108_181215	Normal	ES1838218	0.02	0.02	0.06	0.02	<0.02	0.04	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26/10/2021	0315_SW108_20211026	Normal	ES2139229	0.01	<0.01	0.02	<0.02	<0.02	0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	2/05/2022	0315_SW108_20220502	Normal	EM2208205	0.02	0.01	0.04	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW111	On-Base	15/12/2018	0315_SW111_181215	Normal	ES1838218	0.03	0.02	**0.11**	0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26/10/2021	0315_SW111_20211026	Normal	ES2139229	0.02	<0.01	0.04	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/04/2022	0315_SW111_20220427	Normal	EM2208205	0.02	<0.01	0.04	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW118	On-Base	30/11/2018	0315_SW118_181130	Normal	ES1836659	0.52	0.02	**0.67**	<0.02	<0.02	0.15	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	13/12/2018	0315_SW118_181213	Normal	ES1837950	0.07	<0.01	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/04/2022	0315_SW118_20220428	Normal	EM2208205	0.18	<0.01	**0.24**	<0.02	<0.02	0.06	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW121	On-Base	30/11/2018	0315_SW121_181130	Normal	ES1836659	0.28	0.02	**0.39**	<0.02	<0.02	0.11	<0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26/10/2021	0315_SW121_20211026	Normal	ES2139229	0.22	0.01	**0.31**	<0.02	<0.02	0.09	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/04/2022	0315_SW121_20220428	Normal	EM2208205	0.16	<0.01	**0.21**	<0.02	<0.02	0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW127	On-Base	14/12/2018	0315_SW127_181214	Normal	ES1838218	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	25/10/2021	0315_QC201_20211025	Interlab_D	837707	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	On-Base	25/10/2021	0315_QC101_20211025	Field_D	ES2139230	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	25/10/2021	0315_SW127_20211025	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/04/2022	0315_SW127_20220427	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW136	On-Base	29/01/2019	0315_SW136_190129	Normal	ES1902996	1.48	0.11	***4.15***	0.26	0.24	2.67	0.04	<0.02	<0.1	0.17	0.44	0.16	<0.02	<0.02	<0.02	<0.02
	On-Base	26/10/2021	0315_SW136_20211026	Normal	ES2139229	1.2	0.04	**1.93**	0.06	0.06	0.73	0.03	<0.02	<0.1	0.11	0.19	0.03	<0.02	<0.02	<0.02	<0.02
	On-Base	27/04/2022	0315_QC102_20220427	Field_D	EM2208205	0.05	<0.01	0.07	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/04/2022	0315_QC202_20220427	Interlab_D	889626	0.06	<0.01	**0.08**	<0.01	<0.01	0.02	<0.01	<0.01	<0.05	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	On-Base	27/04/2022	0315_SW136_20220427	Normal	EM2208205	0.04	<0.01	0.05	<0.02	<0.02	0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW140	On-Base	29/01/2019	0315_SW140_190129	Normal	ES1902996	0.03	<0.01	**0.25**	0.04	0.03	0.22	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	26/10/2021	0315_SW140_20211026	Normal	ES2139229	<0.01	<0.01	0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/04/2022	0315_QC103_20220428	Field_D	EM2208205	<0.01	<0.01	0.01	<0.02	<0.02	0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/04/2022	0315_QC203_20220428	Interlab_D	889626	<0.01	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	On-Base	28/04/2022	0315_SW140_20220428	Normal	EM2208205	<0.01	<0.01	0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW144	On-Base	29/01/2019	0315_SW144_190129	Normal	ES1902996	0.01	<0.01	0.03	<0.02	<0.02	0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/10/2021	0315_SW144_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	29/04/2022	0315_SW144_20220429	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW148	On-Base	29/01/2019	0315_SW148_190129	Normal	ES1902996	0.47	0.01	**0.61**	0.02	<0.02	0.14	<0.02	<0.02	<0.1	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/10/2021	0315_SW148_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	28/04/2022	0315_SW148_20220428	Normal	EM2208205	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW149	On-Base	29/01/2019	0315_SW149_190129	Normal	ES1902996	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	27/10/2021	0315_SW149_20211027	Normal	ES2139229	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	On-Base	29/04/2022	0315_SW149_20220429	Normal	EM2208205	0.02	<0.01	0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW614	Off-Base	13/12/2018	0315_SW614_181213	Normal	ES1837950	0.03	<0.01	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Off-Base	27/10/2021	0315_SW614_20211027	Normal	ES2139235	0.27	<0.01	**0.35**	<0.02	<0.02	0.08	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Notes

Denotes first time detection above LOR in latest monitoring round

Denotes new exceedance of lowest adopted screening criteria in latest monitoring round

						Perfluorocarbons														
						Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
						µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR						0.02	0.05	0.02	0.05	0.00005	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.01	0.00001
PFAS NEMP 2.0 Table 1 Health Drinking Water																				
PFAS NEMP 2.0 Table 1 Health Recreational Water																				
PFAS NEMP 2.0 Table 5 Freshwater 95%																				
Location Code	**Monitoring Zone**	**Sampled Date**	**Field ID**	**Sample Type**	**Lab Report Number**															
SW103	On-Base	10/12/2018	0315_SW103_181210	Normal	ES1837611	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	1.89	-
	On-Base	26/10/2021	0315_QC203_20211026	Interlab_D	837707	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	1.55	0.00134
	On-Base	26/10/2021	0315_QC103_20211026	Field_D	ES2139230	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	1.17	-
	On-Base	26/10/2021	0315_SW103_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.96	-
	On-Base	28/04/2022	0315_SW103_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.28	-
SW106	On-Base	16/12/2018	0315_SW106_181216	Normal	ES1838218	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW107	On-Base	10/12/2018	0315_SW107_181210	Normal	ES1837611	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.77	-
	On-Base	26/10/2021	0315_SW107_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.26	-
	On-Base	2/05/2022	0315_SW107_20220502	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.2	-
SW108	On-Base	15/12/2018	0315_SW108_181215	Normal	ES1838218	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.1	-
	On-Base	26/10/2021	0315_SW108_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	-
	On-Base	2/05/2022	0315_SW108_20220502	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.05	-
SW111	On-Base	15/12/2018	0315_SW111_181215	Normal	ES1838218	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.18	-
	On-Base	26/10/2021	0315_SW111_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.04	-
	On-Base	27/04/2022	0315_SW111_20220427	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.04	-
SW118	On-Base	30/11/2018	0315_SW118_181130	Normal	ES1836659	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.72	-
	On-Base	13/12/2018	0315_SW118_181213	Normal	ES1837950	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.07	-
	On-Base	28/04/2022	0315_SW118_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.24	-
SW121	On-Base	30/11/2018	0315_SW121_181130	Normal	ES1836659	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.44	-
	On-Base	26/10/2021	0315_SW121_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.32	-
	On-Base	28/04/2022	0315_SW121_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.21	-
SW127	On-Base	14/12/2018	0315_SW127_181214	Normal	ES1838218	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	25/10/2021	0315_QC201_20211025	Interlab_D	837707	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	<0.00001
	On-Base	25/10/2021	0315_QC101_20211025	Field_D	ES2139230	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	25/10/2021	0315_SW127_20211025	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	27/04/2022	0315_SW127_20220427	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW136	On-Base	29/01/2019	0315_SW136_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	5.57	-
	On-Base	26/10/2021	0315_SW136_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	2.45	-
	On-Base	27/04/2022	0315_QC102_20220427	Field_D	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.07	-
	On-Base	27/04/2022	0315_QC202_20220427	Interlab_D	889626	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	0.11	0.00008
	On-Base	27/04/2022	0315_SW136_20220427	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.05	-
SW140	On-Base	29/01/2019	0315_SW140_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.32	-
	On-Base	26/10/2021	0315_SW140_20211026	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	-
	On-Base	28/04/2022	0315_QC103_20220428	Field_D	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.01	-
	On-Base	28/04/2022	0315_QC203_20220428	Interlab_D	889626	<0.01	<0.01	<0.05	<0.05	<0.00005	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01	<0.1	0.00002
	On-Base	28/04/2022	0315_SW140_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	-
SW144	On-Base	29/01/2019	0315_SW144_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.03	-
	On-Base	27/10/2021	0315_SW144_20211027	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	29/04/2022	0315_SW144_20220429	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
SW148	On-Base	29/01/2019	0315_SW148_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.66	-
	On-Base	27/10/2021	0315_SW148_20211027	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	28/04/2022	0315_SW148_20220428	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	0.06	<0.05	<0.05	0.06	-
SW149	On-Base	29/01/2019	0315_SW149_190129	Normal	ES1902996	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	27/10/2021	0315_SW149_20211027	Normal	ES2139229	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.01	-
	On-Base	29/04/2022	0315_SW149_20220429	Normal	EM2208205	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	0.07	<0.05	<0.05	0.09	-
SW614	Off-Base	13/12/2018	0315_SW614_181213	Normal	ES1837950	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.03	-
	Off-Base	27/10/2021	0315_SW614_20211027	Normal	ES2139235	<0.02	<0.05	<0.02	<0.05	<0.00005	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.35	-

Notes

Denotes first time detection above LOR in latest monitoring round

Denotes new exceedance of lowest adopted screening criteria in latest monitoring round

Location Code	Monitoring Zone	Sampled Date Time	Field ID	Sample Type	Lab Report Number	Perfluorocarbons: Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	Sum of PFHxS and PFOS	Perfluorononanesulfonic acid (PFNS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluoroheptanoic acid (PFHpA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR						0.0002	0.0002	0.0002	0.005	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.005	0.0002	0.0002	0.0002
SD103	On-Base	10/12/2018	0315_SD103_181210	Normal	ES1837611	0.0086	<0.0002	0.0096	-	<0.0002	<0.0002	0.001	<0.0002	0.0003	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26/10/2021	0315_QC104_20211026	Field_D	ES2139230	0.0126	<0.0002	0.0132	-	<0.0002	<0.0002	0.0006	<0.0002	0.0006	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26/10/2021	0315_SD103_20211026	Normal	ES2139229	0.014	<0.0002	0.0146	-	<0.0002	<0.0002	0.0006	<0.0002	0.0004	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	28/04/2022	0315_QC105_20220428	Field_D	EM2208205	0.0163	<0.0002	0.0173	-	<0.0002	<0.0002	0.001	<0.0002	0.0005	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0004
	On-Base	28/04/2022	0315_QC205_20220428	Interlab_D	889626	0.013	<0.005	0.013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	On-Base	28/04/2022	0315_SD103_20220428	Normal	EM2208205	0.0163	<0.0002	0.0175	-	<0.0002	<0.0002	0.0012	<0.0002	0.0007	<0.001	<0.0002	0.0002	-	<0.0002	<0.0002	0.0003
SD106	On-Base	16/12/2018	0315_SD106_181216	Normal	ES1838218	0.0076	<0.0002	0.008	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26/10/2021	0315_SD106_20211026	Normal	ES2139229	0.0042	<0.0002	0.0042	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	28/04/2022	0315_SD106_20220428	Normal	EM2208205	0.0042	0.0002	0.0042	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	0.0012
SD107	On-Base	10/12/2018	0315_SD107_181210	Normal	ES1837611	0.0142	<0.0002	0.0149	-	<0.0002	<0.0002	0.0007	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26/10/2021	0315_SD107_20211026	Normal	ES2139229	0.0051	<0.0002	0.0051	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	2/05/2022	0315_SD107_20220502	Normal	EM2208205	0.0037	<0.0002	0.0042	-	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD108	On-Base	15/12/2018	0315_SD108_181215	Normal	ES1838218	0.0004	<0.0002	0.0004	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26/10/2021	0315_SD108_20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	2/05/2022	0315_SD108_20220502	Normal	EM2208205	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD111	On-Base	15/12/2018	0315_SD111_181215	Normal	ES1838218	0.0041	<0.0002	0.0045	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	0.0003	<0.0002
	On-Base	26/10/2021	0315_SD111_20211026	Normal	ES2139229	0.0008	<0.0002	0.0008	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	27/04/2022	0315_SD111_20220427	Normal	EM2208205	0.0005	<0.0002	0.0005	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD118	On-Base	30/11/2018	0315_SD118_181130	Normal	ES1836659	0.0037	<0.0002	0.0037	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26/10/2021	0315_SD118_20211026	Normal	ES2139229	0.0045	<0.0002	0.0045	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	28/04/2022	0315_SD118_20220428	Normal	EM2208205	0.0077	<0.0002	0.0077	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD121	On-Base	30/11/2018	0315_SD121_181130	Normal	ES1836659	0.0238	<0.0002	0.0246	-	<0.0002	<0.0002	0.0008	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	26/10/2021	0315_SD121_20211026	Normal	ES2139229	0.0016	<0.0002	0.0016	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	21/12/2021	QC101_211221	Field_D	EM2125953	0.0194	<0.0002	0.0197	-	<0.0002	-	0.0003	-	-	<0.001	<0.0002	<0.0002	-	<0.0002	-	-
	On-Base	21/12/2021	QC201_211221	Interlab_D	853128	0.033	<0.005	0.033	-	-	-	<0.005	-	-	-	-	-	-	-	-	-
	On-Base	21/12/2021	SD121	Normal	EM2125953	0.0184	<0.0002	0.0188	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	28/04/2022	0315_SD121_20220428	Normal	EM2208205	0.0009	<0.0002	0.0009	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD127	On-Base	14/12/2018	0315_SD127_181214	Normal	ES1838218	0.0007	<0.0002	0.0007	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	25/10/2021	0315_QC102_20211025	Field_D	ES2139230	0.0003	<0.0002	0.0003	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	25/10/2021	0315_SD127_20211026	Normal	ES2139229	0.0005	<0.0002	0.0005	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	27/04/2022	0315_SD127_20220427	Normal	EM2208205	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD136	On-Base	26/10/2021	0315_SD136_20211026	Normal	ES2139229	0.0046	<0.0002	0.005	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	On-Base	27/04/2022	0315_QC104_20220427	Field_D	EM2208205	0.0606	<0.0002	0.0631	-	<0.0002	<0.0002	0.0025	0.0002	0.0005	<0.001	<0.0002	0.0004	-	<0.0002	<0.0002	<0.0002
	On-Base	27/04/2022	0315_QC204_20220427	Interlab_D	889626	0.052	<0.005	0.052	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	On-Base	27/04/2022	0315_SD136_20220427	Normal	EM2208205	0.0393	<0.0002	0.0411	-	<0.0002	<0.0002	0.0018	<0.0002	0.0004	<0.001	<0.0002	0.0003	-	<0.0002	<0.0002	<0.0002
SD614	Off-Base	18/12/2018	0315_SD614_181218	Normal	ES1838696	0.0094	<0.0002	0.0097	-	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	27/10/2021	0315_SD614_20211027	Normal	ES2139235	0.011	<0.0002	0.0114	-	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	20/12/2021	SD614	Normal	EM2125953	0.0093	<0.0002	0.0095	-	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	28/04/2022	0315_SD614_20220428	Normal	EM2208229	0.0075	<0.0002	0.0077	-	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
SD677	Off-Base	26/10/2021	0315_SD677_20211026	Normal	ES2139235	0.0052	<0.0002	0.0052	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	21/12/2021	SD677	Normal	EM2125953	0.0075	<0.0002	0.0075	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002
	Off-Base	28/04/2022	0315_SD677_20220428	Normal	EM2208229	0.0068	<0.0002	0.0068	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002

Notes

Denotes first time detection above LOR in latest monitoring round

Denotes new exceedance of lowest adopted screening criteria in latest monitoring round

						Perfluorocarbons																	
						Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*
						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						0.0002	0.0002	0.0002	0.0005	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.005	0.005
Location Code	Monitoring Zone	Sampled Date Time	Field ID	Sample Type	Lab Report Number																		
SD103	On-Base	10/12/2018	0315 SD103 181210	Normal	ES1837611	<0.0002	<0.0002	<0.0002	<0.0005	0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0102	-	-
	On-Base	26/10/2021	0315 QC104 20211026	Field D	ES2139230	<0.0002	<0.0002	<0.0002	<0.0005	0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0142	-	-
	On-Base	26/10/2021	0315 SD103 20211026	Normal	ES2139229	<0.0002	0.0003	<0.0002	<0.0005	0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0156	-	-
	On-Base	28/04/2022	0315 QC105 20220428	Field D	EM2208205	0.0002	0.0003	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0187	-	-
	On-Base	28/04/2022	0315 QC205 20220428	Interlab D	889626	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	0.013	0.013
	On-Base	28/04/2022	0315 SD103 20220428	Normal	EM2208205	0.0002	0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0191	-	-
SD106	On-Base	16/12/2018	0315 SD106 181216	Normal	ES1838218	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.008	-	-
	On-Base	26/10/2021	0315 SD106 20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0042	-	-
	On-Base	28/04/2022	0315 SD106 20220428	Normal	EM2208205	<0.0002	0.0004	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0004	<0.0005	<0.0005	<0.0005	<0.0005	0.0064	-	-
SD107	On-Base	10/12/2018	0315 SD107 181210	Normal	ES1837611	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0149	-	-
	On-Base	26/10/2021	0315 SD107 20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0051	-	-
	On-Base	2/05/2022	0315 SD107 20220502	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0042	-	-
SD108	On-Base	15/12/2018	0315 SD108 181215	Normal	ES1838218	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	-	-
	On-Base	26/10/2021	0315 SD108 20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	-	-
	On-Base	2/05/2022	0315 SD108 20220502	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	-	-
SD111	On-Base	15/12/2018	0315 SD111 181215	Normal	ES1838218	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0048	-	-
	On-Base	26/10/2021	0315 SD111 20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	-	-
	On-Base	27/04/2022	0315 SD111 20220427	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	-	-
SD118	On-Base	30/11/2018	0315 SD118 181130	Normal	ES1836659	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0037	-	-
	On-Base	26/10/2021	0315 SD118 20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0045	-	-
	On-Base	28/04/2022	0315 SD118 20220428	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0077	-	-
SD121	On-Base	30/11/2018	0315 SD121 181130	Normal	ES1836659	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0246	-	-
	On-Base	26/10/2021	0315 SD121 20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	-	-
	On-Base	21/12/2021	QC101 211221	Field D	EM2125953	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-
	On-Base	21/12/2021	QC201 211221	Interlab D	853128	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	0.033	0.033
	On-Base	21/12/2021	SD121	Normal	EM2125953	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0188	-	-
	On-Base	28/04/2022	0315 SD121 20220428	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	-	-
SD127	On-Base	14/12/2018	0315 SD127 181214	Normal	ES1838218	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	-	-
	On-Base	25/10/2021	0315 QC102 20211025	Field D	ES2139230	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	-	-
	On-Base	25/10/2021	0315 SD127 20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	-	-
	On-Base	27/04/2022	0315 SD127 20220427	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	-	-
SD136	On-Base	26/10/2021	0315 SD136 20211026	Normal	ES2139229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.005	-	-
	On-Base	27/04/2022	0315 QC104 20220427	Field D	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0642	-	-
	On-Base	27/04/2022	0315 QC204 20220427	Interlab D	889626	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	0.052	0.052	0.052
	On-Base	27/04/2022	0315 SD136 20220427	Normal	EM2208205	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0418	-	-
SD614	Off-Base	18/12/2018	0315 SD614 181218	Normal	ES1838696	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0097	-	-
	Off-Base	27/10/2021	0315 SD614 20211027	Normal	ES2139235	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0114	-	-
	Off-Base	20/12/2021	SD614	Normal	EM2125953	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0095	-	-
	Off-Base	28/04/2022	0315 SD614 20220428	Normal	EM2208229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0077	-	-
SD677	Off-Base	26/10/2021	0315 SD677 20211026	Normal	ES2139235	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0052	-	-
	Off-Base	21/12/2021	SD677	Normal	EM2125953	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0075	-	-
	Off-Base	28/04/2022	0315 SD677 20220428	Normal	EM2208229	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0068	-	-

Notes

Denotes first time detection above LOR in latest monitoring round

Denotes new exceedance of lowest adopted screening criteria in latest monitoring round

Table B4: Water RPD Results

ChemName	Units	LOR	EM2208205 0315_MW109_20220427 27/04/2022	EM2208205 0315_QC101_20220427 27/04/2022	RPD	EM2208205 0315_SW136_20220427 27/04/2022	EM2208205 0315_QC102_20220427 27/04/2022	RPD	EM2208205 0315_SW140_20220428 28/04/2022	EM2208205 0315_QC103_20220428 28/04/2022	RPD
Sum of WA DWER PFAS (n=10)*	ug/L	0.01 : 0.05 (Interlab)	<0.01	<0.01	0	**0.05**	**0.07**	**33**	**0.02**	**0.01**	**67**
Perfluorocarbons											
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	0.04	0.05	22	<0.01	<0.01	0
Perfluorooctanoate (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	**0.05**	**0.07**	**33**	**0.02**	**0.01**	**67**
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	**0.01**	**0.02**	**67**	**0.02**	**0.01**	**67**
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	mg/l	5e-005	<0.00005	<0.00005	0	<0.00005	<0.00005	0	<0.00005	<0.00005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<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
8:2 Fluorotelomer sulfonate (8:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
Sum of PFAS	µg/L	0.01 : 0.1 (Interlab)	<0.01	<0.01	0	**0.05**	**0.07**	**33**	**0.02**	**0.01**	**67**

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

		Lab Report Number	EM2208205	889626		EM2208205	889626		EM2208205	889626	
		Field ID	0315_MW109_20220427	0315_QC201_20220427	**RPD**	0315_SW136_20220427	0315_QC202_20220427	**RPD**	0315_SW140_20220428	0315_QC203_20220428	**RPD**
		Sampled Date	27/04/2022	27/04/2022		27/04/2022	27/04/2022		28/04/2022	28/04/2022	
ChemName	**Units**	**LOR**									
Sum of WA DWER PFAS (n=10)*	ug/L	0.01 : 0.05 (Interlab)	<0.01	<0.05	0	**0.05**	**0.11**	**75**	0.02	<0.05	0
Perfluorocarbons											
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	**0.04**	**0.06**	**40**	<0.01	<0.01	0
Perfluorooctanoate (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	**0.05**	**0.08**	**46**	0.02	0.02	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	**0.01**	**0.02**	**67**	0.02	0.02	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.05	0	<0.1	<0.05	0	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	0.01	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.01	0	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	<0.05	<0.01	0	<0.05	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.05	0	<0.02	<0.05	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	mg/l	5e-005	<0.00005	<0.00005	0	<0.00005	<0.00005	0	<0.00005	<0.00005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.05	0	<0.02	<0.05	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.05	0	<0.02	<0.05	0	<0.02	<0.05	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	<0.05	<0.01	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonate (8:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	<0.05	<0.01	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.01	0	<0.05	<0.01	0	<0.05	<0.01	0
Sum of PFAS	µg/L	0.01 : 0.1 (Interlab)	<0.01	<0.1	0	**0.05**	**0.11**	**75**	0.02	<0.1	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (1-10 x EQL); 30 (10-30 x E

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any me

Table B5: Soil RPD Results

ChemName	Units	LOR												
		Lab Report Number	EM2208205	EM2208205		EM2208205	EM2208205		EM2208205	889626		EM2208205	889626	
		Field ID	0315_SD103_20220428	0315_QC105_20220428	**RPD**	0315_SD136_20220427	0315_QC104_20220427	**RPD**	0315_SD136_20220427	0315_QC204_20220427	**RPD**	0315_SD103_20220428	0315_QC205_20220428	**RPD**
		Sampled Date	28/04/2022	28/04/2022		27/04/2022	27/04/2022		27/04/2022	27/04/2022		28/04/2022	28/04/2022	
Moisture Content	%	0.1	**25**	**38.3**	**42**	22.4	26	15	22.4			25		
Perfluorocarbons														
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002 : 0.005 (Interlab)	0.0163	0.0163	0	**0.0393**	**0.0606**	**43**	0.0393	0.052	28	0.0163	0.013	23
Perfluorooctanoate (PFOA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Sum of PFHxS and PFOS	mg/kg	0.0002 : 0.005 (Interlab)	0.0175	0.0173	1	**0.0411**	**0.0631**	**42**	0.0411	0.052	23	0.0175	0.013	30
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002 : 0.005 (Interlab)	0.0012	0.001	18	**0.0018**	**0.0025**	**33**	0.0018	<0.005	0	0.0012	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorodecanesulfonic acid (PFDS)	mg/kg	0.0002 : 0.005 (Interlab)	**0.0007**	**0.0005**	**33**	0.0004	0.0005	22	0.0004	<0.005	0	0.0007	<0.005	0
Perfluorobutanoic acid (PFBA)	mg/kg	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002 : 0.005 (Interlab)	0.0002	<0.0002	0	0.0003	0.0004	29	0.0003	<0.005	0	0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002 : 0.005 (Interlab)	0.0003	0.0004	29	<0.0002	<0.0002	0	<0.0002	<0.005	0	0.0003	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002 : 0.005 (Interlab)	0.0002	0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002 : 0.005 (Interlab)	**0.0002**	**0.0003**	**40**	<0.0002	<0.0002	0	<0.0002	<0.005	0	0.0002	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonate (8:2 FtS)	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
Sum of PFAS	mg/kg	0.0002 : 0.05 (Interlab)	0.0191	0.0187	2	**0.0418**	**0.0642**	**42**	0.0418	0.052	22	0.0191	<0.05	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (1-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

		Lab Report Number	EM2208205	EM2208205	EM2208205	EM2208205	EM2208205	EM2208205	EM2208205	EM2208205	EM2208205	EM2208205
		Field ID	0315_QC301_20220426	0315_QC303_20220427	0315_QC305_20220428	0315_QC307_20220429	0315_QC309_20220502	0315_QC501_20220426	0315_QC503_20220427	0315_QC505_20220428	0315_QC507_20220429	0315_QC509_20220502
		Sampled Date	26/04/2022	27/04/2022	28/04/2022	29/04/2022	2/05/2022	26/04/2022	27/04/2022	28/04/2022	29/04/2022	2/05/2022
		Sample Type	Rinsate	Rinsate	Rinsate	Rinsate	Rinsate	Trip_B	Trip_B	Trip_B	Trip_B	Trip_B
ChemName	**Units**	**LOR**										
Sum of WA DWER PFAS (n=10)*	ug/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorocarbons												
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctanoate (PFOA)	µg/L	0.01	<0.01	<0.01	<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	<0.01	<0.01	<0.01
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	mg/l	0.00005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005	<5e-005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonate (8:2 FtS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of PFAS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

APPENDIX

C

LABORATORY CERTIFICATES

Cardno

now

Stantec

Cardno

Chain of Custody

PM Name: [redacted]

Phone: [redacted] Fax: [redacted] Mobile: [redacted]

Address: [redacted]

PM Email: [redacted]

Results Email (please email results to all listed):

[redacted]

Project Number: NSW_0315_PFASOMP **Site:**

Laboratory (name, phone, & contact person): Eurofins Mgt [redacted]

Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Sediment	Sample Matrix: Groundwater	Sample Matrix: Surface Water	Sample Matrix: QC	Sample Matrix	Sample preservation: Ice/ Ice Bricks	Sample preservation	Sample preservation	Sample preservation	Analysis: EP231X - PFAS Standard	Analysis: HOLD	Analysis	Analysis	Comments: Please amend Sample IDs as follows	Comments
0315_QC201_20220427		2 x 20 ml	4/27/2022			X				X				X					
0315_QC202_20220427		2 x 20 ml	4/27/2022				X			X				X					
0315_QC203_20220428		2 x 20 ml	4/28/2022				X			X				X					
0315_QC204_20220427		2 x 20 ml	4/27/2022		X					X				X					
0315_QC205_20220428		2 x 20 ml	4/28/2022		X					X				X					

Sampler: I attest that the proper field sampling proceedures were used during the collection of these samples. Sampler name: [redacted] Date: 4/05/2022

Relinquished by: (print and signature)	Date 16/05/2	Time 1600	Received by: (print and signature) JL [redacted]	Date 16/5/22	Time 6:23 Pm
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/**5 days**) Please circle

889626

Page of

Eurofins Environment Testing

[redacted]

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Eurofins Environment Testing NZ Limited
NZBN: 9429046024954

Melbourne
[redacted]

Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (VIC)
Contact name:	ALL INVOICES
Project name:	Not provided
Project ID:	NSW_0315_PFASOMP
Turnaround time:	5 Day
Date/Time received	May 16, 2022 6:23 PM
Eurofins reference	889626

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Samples received by the laboratory after 5.30pm are deemed to have been received the following working day.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:
[redacted]

Results will be delivered electronically via email to ALL INVOICES - [redacted]

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (VIC) email address.

Global Leader - Results you can trust

eurofins | Environment Testing

web: www.eurofins.com.au
email [redacted]

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521
Melbourne
[redacted]

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898
[redacted]

Eurofins Environment Testing NZ Limited
NZBN: 9429046024954
[redacted]

Company Name: Stantec Australia Pty Ltd (VIC)
Address: [redacted]

Project Name:
Project ID: NSW_0315_PFASOMP

Order No.:
Report #: 889626
Phone:
Fax:

Received: May 16, 2022 6:23 PM
Due: May 24, 2022
Priority: 5 Day
Contact Name: ALL INVOICES

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0315_QC201_20220427	Apr 27, 2022		Water	S22-My0042871		X
2	0315_QC202_20220427	Apr 27, 2022		Water	S22-My0042872		X
3	0315_QC203_20220428	Apr 28, 2022		Water	S22-My0042873		X
4	0315_QC204_20220427	Apr 27, 2022		Soil	S22-My0042874	X	X
5	0315_QC205_20220428	Apr 28, 2022		Soil	S22-My0042875	X	X
Test Counts						2	5

Certificate of Analysis

Stantec Australia Pty Ltd
[redacted]

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **ALL INVOICES**

Report	**889626-S**
Project name	
Project ID	NSW_0315_PFASOMP
Received Date	May 16, 2022

Client Sample ID			**0315_QC204_20220427**	**0315_QC205_20220428**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S22-My0042874**	**S22-My0042875**
Date Sampled			**Apr 27, 2022**	**Apr 28, 2022**
Test/Reference	LOR	Unit		
% Moisture	1	%	22	28
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)N11	5	ug/kg	< 5	< 5
Perfluoropentanoic acid (PFPeA)N11	5	ug/kg	< 5	< 5
Perfluorohexanoic acid (PFHxA)N11	5	ug/kg	< 5	< 5
Perfluoroheptanoic acid (PFHpA)N11	5	ug/kg	< 5	< 5
Perfluorooctanoic acid (PFOA)N11	5	ug/kg	< 5	< 5
Perfluorononanoic acid (PFNA)N11	5	ug/kg	< 5	< 5
Perfluorodecanoic acid (PFDA)N11	5	ug/kg	< 5	< 5
Perfluoroundecanoic acid (PFUnDA)N11	5	ug/kg	< 5	< 5
Perfluorododecanoic acid (PFDoDA)N11	5	ug/kg	< 5	< 5
Perfluorotridecanoic acid (PFTrDA)N15	5	ug/kg	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA)N11	5	ug/kg	< 5	< 5
13C4-PFBA (surr.)	1	%	91	91
13C5-PFPeA (surr.)	1	%	106	98
13C5-PFHxA (surr.)	1	%	96	96
13C4-PFHpA (surr.)	1	%	91	86
13C8-PFOA (surr.)	1	%	102	106
13C5-PFNA (surr.)	1	%	93	93
13C6-PFDA (surr.)	1	%	89	92
13C2-PFUnDA (surr.)	1	%	87	95
13C2-PFDoDA (surr.)	1	%	96	100
13C2-PFTeDA (surr.)	1	%	93	102
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)N11	5	ug/kg	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)N11	5	ug/kg	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)N11	5	ug/kg	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)N11	5	ug/kg	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)N11	5	ug/kg	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)N11	10	ug/kg	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)N11	10	ug/kg	< 10	< 10

Client Sample ID			0315_QC204_20220427	0315_QC205_20220428
Sample Matrix			Soil	Soil
Eurofins Sample No.			S22-My0042874	S22-My0042875
Date Sampled			Apr 27, 2022	Apr 28, 2022
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances				
13C8-FOSA (surr.)	1	%	94	94
D3-N-MeFOSA (surr.)	1	%	83	86
D5-N-EtFOSA (surr.)	1	%	86	83
D7-N-MeFOSE (surr.)	1	%	81	80
D9-N-EtFOSE (surr.)	1	%	84	80
D5-N-EtFOSAA (surr.)	1	%	87	98
D3-N-MeFOSAA (surr.)	1	%	86	92
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	[N09]52	[N09]13
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	< 5
13C3-PFBS (surr.)	1	%	97	92
18O2-PFHxS (surr.)	1	%	89	93
13C8-PFOS (surr.)	1	%	87	101
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	100	101
13C2-6:2 FTSA (surr.)	1	%	93	99
13C2-8:2 FTSA (surr.)	1	%	95	97
13C2-10:2 FTSA (surr.)	1	%	97	109
PFASs Summations				
Sum (PFHxS + PFOS)*	5	ug/kg	52	13
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	52	13
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	52	13
Sum of WA DWER PFAS (n=10)*	10	ug/kg	52	13
Sum of PFASs (n=30)*	50	ug/kg	52	< 50

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
% Moisture	Sydney	May 18, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Sydney	May 25, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Sydney	May 25, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Sydney	May 25, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Sydney	May 25, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Sydney	May 18, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

Company Name:	Stantec Australia Pty Ltd (VIC)	**Order No.:**		**Received:**	May 16, 2022 6:23 PM
Address:	[redacted]	**Report #:**	889626	**Due:**	May 24, 2022
		Phone:		**Priority:**	5 Day
		Fax:		**Contact Name:**	ALL INVOICES
Project Name:					
Project ID:	NSW_0315_PFASOMP				

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0315_QC201_20220427	Apr 27, 2022		Water	S22-My0042871		X
2	0315_QC202_20220427	Apr 27, 2022		Water	S22-My0042872		X
3	0315_QC203_20220428	Apr 28, 2022		Water	S22-My0042873		X
4	0315_QC204_20220427	Apr 27, 2022		Soil	S22-My0042874	X	X
5	0315_QC205_20220428	Apr 28, 2022		Soil	S22-My0042875	X	X
Test Counts						2	5

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	116			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	121			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	116			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	115			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	114			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	123			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	122			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	125			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	115			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	120			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	119			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	114			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	119			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	115			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	120			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	120			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	114			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	120			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	106			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	111			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	101			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	101			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	111			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	102			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	116			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	112			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	105			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	110			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	123			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	116			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S22-My0055614	NCP	%	117			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S22-My0055614	NCP	%	120			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S22-My0055614	NCP	%	123			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S22-My0055614	NCP	%	124			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S22-My0055614	NCP	%	125			50-150	Pass	
Perfluorononanoic acid (PFNA)	S22-My0055614	NCP	%	122			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S22-My0055614	NCP	%	124			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S22-My0055614	NCP	%	129			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S22-My0055614	NCP	%	128			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S22-My0055614	NCP	%	118			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S22-My0055614	NCP	%	121			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S22-My0055614	NCP	%	117			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S22-My0055614	NCP	%	120			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S22-My0055614	NCP	%	118			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S22-My0055614	NCP	%	116			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S22-My0055614	NCP	%	119			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S22-My0055614	NCP	%	124			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S22-My0055614	NCP	%	127			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S22-My0055614	NCP	%	102			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S22-My0055614	NCP	%	118			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S22-My0055614	NCP	%	99			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S22-My0055614	NCP	%	101			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S22-My0055614	NCP	%	107			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S22-My0055614	NCP	%	106			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S22-My0055614	NCP	%	107			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S22-My0055614	NCP	%	124			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S22-My0055614	NCP	%	110			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S22-My0055614	NCP	%	109			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S22-My0055614	NCP	%	109			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S22-My0055614	NCP	%	115			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	N22-My0045071	NCP	%	24	30	20	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S22-My0061569	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S22-My0061569	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S22-My0061569	NCP	ug/kg	12	12	3.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S22-My0061569	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S22-My0061569	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted]	Analytical Services Manager
[redacted]	Senior Analyst-PFAS
[redacted]	Senior Analyst-Sample Properties

[redacted]

General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

Certificate of Analysis

Stantec Australia Pty Ltd
[redacted]

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **ALL INVOICES**

Report **889626-W**
Project name
Project ID NSW_0315_PFASOMP
Received Date May 16, 2022

Client Sample ID			**0315_QC201_20220427**	**0315_QC202_20220427**	**0315_QC203_20220428**
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**S22-My0042871**	**S22-My0042872**	**S22-My0042873**
Date Sampled			**Apr 27, 2022**	**Apr 27, 2022**	**Apr 28, 2022**
Test/Reference	LOR	Unit			
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA)N11	0.05	ug/L	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)N11	0.01	ug/L	< 0.01	N09 0.02	< 0.01
Perfluorohexanoic acid (PFHxA)N11	0.01	ug/L	< 0.01	N09 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)N11	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)N11	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)N11	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)N11	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)N11	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)N11	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)N15	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)N11	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	94	97	88
13C5-PFPeA (surr.)	1	%	118	105	105
13C5-PFHxA (surr.)	1	%	110	109	100
13C4-PFHpA (surr.)	1	%	110	112	100
13C8-PFOA (surr.)	1	%	109	118	108
13C5-PFNA (surr.)	1	%	107	111	99
13C6-PFDA (surr.)	1	%	104	105	96
13C2-PFUnDA (surr.)	1	%	101	90	89
13C2-PFDoDA (surr.)	1	%	117	84	79
13C2-PFTeDA (surr.)	1	%	83	63	49
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA)N11	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)N11	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)N11	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)N11	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)N11	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)N11	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)N11	0.05	ug/L	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	102	83	91
D3-N-MeFOSA (surr.)	1	%	88	63	55

Client Sample ID			0315_QC201_20220427	0315_QC202_20220427	0315_QC203_20220428
Sample Matrix			Water	Water	Water
Eurofins Sample No.			S22-My0042871	S22-My0042872	S22-My0042873
Date Sampled			Apr 27, 2022	Apr 27, 2022	Apr 28, 2022
Test/Reference	LOR	Unit			
Perfluoroalkyl sulfonamido substances					
D5-N-EtFOSA (surr.)	1	%	87	61	55
D7-N-MeFOSE (surr.)	1	%	79	56	62
D9-N-EtFOSE (surr.)	1	%	81	57	61
D5-N-EtFOSAA (surr.)	1	%	113	89	89
D3-N-MeFOSAA (surr.)	1	%	99	96	81
Perfluoroalkyl sulfonic acids (PFSAs)					
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	[N09]0.02	0.02
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	0.06	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	113	118	102
18O2-PFHxS (surr.)	1	%	111	113	103
13C8-PFOS (surr.)	1	%	109	106	95
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	127	172	135
13C2-6:2 FTSA (surr.)	1	%	139	197	141
13C2-8:2 FTSA (surr.)	1	%	189	174	183
13C2-10:2 FTSA (surr.)	1	%	108	112	75
PFASs Summations					
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	0.08	0.02
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	0.06	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	0.08	0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	0.11	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	0.11	< 0.1

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Sydney	May 18, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Sydney	May 18, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Sydney	May 18, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Sydney	May 18, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Sydney	May 18, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

Company Name:	Stantec Australia Pty Ltd (VIC)	**Order No.:**		**Received:**	May 16, 2022 6:23 PM
Address:	[redacted]	**Report #:**	889626	**Due:**	May 24, 2022
		Phone:		**Priority:**	5 Day
		Fax:		**Contact Name:**	ALL INVOICES
Project Name:					
Project ID:	NSW_0315_PFASOMP				

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0315_QC201_20220427	Apr 27, 2022		Water	S22-My0042871		X
2	0315_QC202_20220427	Apr 27, 2022		Water	S22-My0042872		X
3	0315_QC203_20220428	Apr 28, 2022		Water	S22-My0042873		X
4	0315_QC204_20220427	Apr 27, 2022		Soil	S22-My0042874	X	X
5	0315_QC205_20220428	Apr 28, 2022		Soil	S22-My0042875	X	X
Test Counts						2	5

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**μg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	98			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	100			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	98			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	102			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	99			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	98			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	100			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	97			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	91			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	101			50-150	Pass	

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	94			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	100			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	94			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	95			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	99			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	89			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	100			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	89			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	101			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	84			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	85			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	91			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	96			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	97			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	97			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	93			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	85			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S22-My0030965	NCP	%	101			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S22-My0030965	NCP	%	105			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S22-My0030965	NCP	%	117			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S22-My0030965	NCP	%	100			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S22-My0030965	NCP	%	122			50-150	Pass	
Perfluorononanoic acid (PFNA)	S22-My0030965	NCP	%	109			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S22-My0030965	NCP	%	105			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S22-My0030965	NCP	%	112			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S22-My0030965	NCP	%	106			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S22-My0030965	NCP	%	94			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S22-My0030965	NCP	%	112			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S22-My0030965	NCP	%	98			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S22-My0030965	NCP	%	105			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S22-My0030965	NCP	%	102			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S22-My0030965	NCP	%	99			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S22-My0030965	NCP	%	107			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S22-My0030965	NCP	%	101			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S22-My0030965	NCP	%	101			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S22-My0030965	NCP	%	99			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S22-My0047306	NCP	%	101			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S22-My0030965	NCP	%	94			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S22-My0030965	NCP	%	93			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S22-My0030965	NCP	%	68			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S22-My0047306	NCP	%	95			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S22-My0047306	NCP	%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S22-My0047306	NCP	%	103			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S22-My0030965	NCP	%	93			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S22-My0030965	NCP	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S22-My0030965	NCP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S22-My0030965	NCP	%	105			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S22-My0029037	NCP	ug/L	0.12	0.12	3.0	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S22-My0029037	NCP	ug/L	0.36	0.38	6.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S22-My0029037	NCP	ug/L	0.34	0.36	5.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S22-My0029037	NCP	ug/L	0.11	0.12	4.0	30%	Pass	
Perfluorooctanoic acid (PFOA)	S22-My0029037	NCP	ug/L	0.02	0.02	7.0	30%	Pass	
Perfluorononanoic acid (PFNA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	S22-My0029037	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S22-My0029037	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S22-My0029037	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S22-My0029037	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S22-My0029037	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S22-My0029037	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S22-My0029037	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S22-My0029037	NCP	ug/L	0.10	0.10	7.0	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S22-My0029037	NCP	ug/L	0.03	0.03	1.0	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S22-My0029037	NCP	ug/L	0.07	0.07	2.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S22-My0029037	NCP	ug/L	0.22	0.22	1.0	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S22-My0029037	NCP	ug/L	0.03	0.03	5.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S22-My0029037	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S22-My0029037	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager
[redacted]

[redacted]

[redacted]

General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM2208205**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: Customer Services EM
Address	: [redacted]	Address	: [redacted]
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: NSW_0315_FPASOMP	Page	: 1 of 4
Order number	: ----	Quote number	: EP2017MWHAUS0015 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 05-May-2022 15:30	Issue Date	: 06-May-2022
Client Requested Due Date	: 12-May-2022	Scheduled Reporting Date	: **12-May-2022**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 4.5°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 56 / 42

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EM2208205-032 : [02-May-2022] : 0315_Drum01_20220502

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*	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EM2208205-007	28-Apr-2022 00:00	0315_SD103_20220428		✓	✓
EM2208205-008	28-Apr-2022 00:00	0315_SD106_20220428		✓	✓
EM2208205-009	28-Apr-2022 00:00	0315_SD107_20220428	✓		
EM2208205-010	02-May-2022 00:00	0315_SD107_20220502		✓	✓
EM2208205-011	27-Apr-2022 00:00	0315_SD108_20220427	✓		
EM2208205-012	02-May-2022 00:00	0315_SD108_20220502		✓	✓
EM2208205-013	27-Apr-2022 00:00	0315_SD111_20220427		✓	✓
EM2208205-014	28-Apr-2022 00:00	0315_SD118_20220428		✓	✓
EM2208205-015	28-Apr-2022 00:00	0315_SD121_20220428		✓	✓
EM2208205-016	27-Apr-2022 00:00	0315_SD127_20220427		✓	✓
EM2208205-017	27-Apr-2022 00:00	0315_SD136_20220427		✓	✓
EM2208205-052	28-Apr-2022 00:00	0315_QC105_20220428		✓	✓
EM2208205-053	27-Apr-2022 00:00	0315_QC104_20220427		✓	✓

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	(On Hold) WATER No analysis requested	WATER - EP231X PFAS - Full Suite (28 analytes)
EM2208205-001	29-Apr-2022 00:00	0315_MW103_20220429		✓
EM2208205-002	28-Apr-2022 00:00	0315_MW104_20220428		✓
EM2208205-003	29-Apr-2022 00:00	0315_MW107_20220429		✓
EM2208205-004	27-Apr-2022 00:00	0315_MW109_20220427		✓
EM2208205-005	27-Apr-2022 00:00	0315_MW110_20220427		✓
EM2208205-006	28-Apr-2022 00:00	0315_MW008_20220428		✓
EM2208205-018	28-Apr-2022 00:00	0315_SW103_20220428		✓
EM2208205-019	28-Apr-2022 00:00	0315_SW107_20220428	✓	
EM2208205-020	02-May-2022 00:00	0315_SW107_20220502		✓

			(On Hold) WATER No analysis requested	WATER - EP231X PFAS - Full Suite (28 analytes)
EM2208205-021	27-Apr-2022 00:00	0315_SW108_20220427	✓	
EM2208205-022	02-May-2022 00:00	0315_SW108_20220502		✓
EM2208205-023	27-Apr-2022 00:00	0315_SW111_20220427		✓
EM2208205-024	28-Apr-2022 00:00	0315_SW118_20220428		✓
EM2208205-025	28-Apr-2022 00:00	0315_SW121_20220428		✓
EM2208205-026	27-Apr-2022 00:00	0315_SW127_20220427		✓
EM2208205-027	27-Apr-2022 00:00	0315_SW136_20220427		✓
EM2208205-028	28-Apr-2022 00:00	0315_SW140_20220428		✓
EM2208205-029	29-Apr-2022 00:00	0315_SW144_20220429		✓
EM2208205-030	28-Apr-2022 00:00	0315_SW148_20220428		✓
EM2208205-031	29-Apr-2022 00:00	0315_SW149_20220429		✓
EM2208205-032	02-May-2022 00:00	0315_Drum01_20220502	✓	
EM2208205-033	26-Apr-2022 00:00	0315_QC301_20220426		✓
EM2208205-034	26-Apr-2022 00:00	0315_QC302_20220426	✓	
EM2208205-035	27-Apr-2022 00:00	0315_QC303_20220427		✓
EM2208205-036	27-Apr-2022 00:00	0315_QC304_20220427	✓	
EM2208205-037	28-Apr-2022 00:00	0315_QC305_20220428		✓
EM2208205-038	28-Apr-2022 00:00	0315_QC306_20220428	✓	
EM2208205-039	29-Apr-2022 00:00	0315_QC307_20220429		✓
EM2208205-040	29-Apr-2022 00:00	0315_QC308_20220429	✓	
EM2208205-041	02-May-2022 00:00	0315_QC309_20220502		✓
EM2208205-042	26-Apr-2022 00:00	0315_QC501_20220426		✓
EM2208205-043	26-Apr-2022 00:00	0315_QC502_20220426	✓	
EM2208205-044	27-Apr-2022 00:00	0315_QC503_20220427		✓
EM2208205-045	27-Apr-2022 00:00	0315_QC504_20220427	✓	
EM2208205-046	28-Apr-2022 00:00	0315_QC505_20220428		✓
EM2208205-047	28-Apr-2022 00:00	0315_QC506_20220428	✓	
EM2208205-048	29-Apr-2022 00:00	0315_QC507_20220429		✓
EM2208205-049	29-Apr-2022 00:00	0315_QC508_20220429	✓	
EM2208205-050	02-May-2022 00:00	0315_QC509_20220502		✓
EM2208205-051	27-Apr-2022 00:00	0315_QC101_20220427		✓
EM2208205-054	27-Apr-2022 00:00	0315_QC102_20220427		✓
EM2208205-055	28-Apr-2022 00:00	0315_QC103_20220428		✓
EM2208205-056	27-Apr-2022 00:00	0315_MW103_20220427	✓	

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS ADDRESS

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

DERP LAB REPORTS

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

CERTIFICATE OF ANALYSIS

Work Order	: **EM2208205**	Page	: 1 of 23
Amendment	: **1**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: Customer Services EM
Address	: [redacted]	Address	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 05-May-2022 15:30
Order number	: ----	Date Analysis Commenced	: 06-May-2022
C-O-C number	: ----	Issue Date	: 16-May-2022 10:11
Sampler	: ----		
Site	: ----		
Quote number	: SY/139/19_Wagga		
No. of samples received	: 56		
No. of samples analysed	: 42		

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	[redacted]
[redacted]	Senior Organic Chemist	[redacted]

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 (16/05/2022): This report has been amended as a result of incorrect project id , have corrected based on coc. All analysis results are as per the previous report.
- Amendment (12/05/2022):This report has been amended due to incorrect quote applied. All analysis results are as per the previous report.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	**0315_SD103_20220428**	**0315_SD106_20220428**	**0315_SD107_20220502**	**0315_SD108_20220502**	**0315_SD111_20220427**
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	02-May-2022 00:00	02-May-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	**EM2208205-007**	**EM2208205-008**	**EM2208205-010**	**EM2208205-012**	**EM2208205-013**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**25.0**	**24.0**	**29.0**	**19.6**	**20.8**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0012**	<0.0002	**0.0005**	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0163**	**0.0042**	**0.0037**	<0.0002	**0.0005**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	**0.0007**	<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	**0.0003**	**0.0012**	<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**	**0.0004**	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD103_20220428	0315_SD106_20220428	0315_SD107_20220502	0315_SD108_20220502	0315_SD111_20220427
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	02-May-2022 00:00	02-May-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-007	EM2208205-008	EM2208205-010	EM2208205-012	EM2208205-013
				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	**0.0004**	<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	**0.0191**	**0.0064**	**0.0042**	<0.0002	**0.0005**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0175**	**0.0042**	**0.0042**	<0.0002	**0.0005**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0177**	**0.0044**	**0.0042**	<0.0002	**0.0005**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**87.9**	**92.6**	**90.9**	**114**	**95.6**
13C8-PFOA	----	0.0002	%	**107**	**92.4**	**94.6**	**108**	**111**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD118_20220428	0315_SD121_20220428	0315_SD127_20220427	0315_SD136_20220427	0315_QC105_20220428
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	27-Apr-2022 00:00	27-Apr-2022 00:00	28-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-014	EM2208205-015	EM2208205-016	EM2208205-017	EM2208205-052
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	17.6	21.7	25.2	22.4	38.3
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	**0.0018**	**0.0010**
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	**0.0077**	**0.0009**	<0.0002	**0.0393**	**0.0163**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0004**	**0.0005**
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	**0.0003**	<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	**0.0004**
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	**0.0003**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0315_SD118_20220428	0315_SD121_20220428	0315_SD127_20220427	0315_SD136_20220427	0315_QC105_20220428
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	27-Apr-2022 00:00	27-Apr-2022 00:00	28-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-014	EM2208205-015	EM2208205-016	EM2208205-017	EM2208205-052
				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	**0.0077**	**0.0009**	<0.0002	**0.0418**	**0.0187**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0077**	**0.0009**	<0.0002	**0.0411**	**0.0173**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0077**	**0.0009**	<0.0002	**0.0414**	**0.0173**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**99.5**	**122**	**97.7**	**105**	**101**
13C8-PFOA	----	0.0002	%	**97.8**	**121**	**114**	**91.2**	**108**

Analytical Results

Sub-Matrix: SILT (Matrix: SOIL)			Sample ID	0315_QC104_20220427	----	----	----	----
			Sampling date / time	27-Apr-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2208205-053	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**26.0**	----	----	----	----
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	**0.0025**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0002**	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0606**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	**0.0005**	----	----	----	----
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	**0.0004**	----	----	----	----
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: **SILT** (Matrix: **SOIL**)			Sample ID	**0315_QC104_20220427**	----	----	----	----
			Sampling date / time	27-Apr-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	**EM2208205-053**	--------	--------	--------	--------
				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	**0.0642**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0631**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0635**	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**93.8**	----	----	----	----
13C8-PFOA	----	0.0002	%	**87.8**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_MW103_20220429	0315_MW104_20220428	0315_MW107_20220429	0315_MW109_20220427	0315_MW110_20220427
			Sampling date / time	29-Apr-2022 00:00	28-Apr-2022 00:00	29-Apr-2022 00:00	27-Apr-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-001	EM2208205-002	EM2208205-003	EM2208205-004	EM2208205-005
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	**0.02**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	**0.02**	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	**0.12**	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	**0.02**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<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	**0.02**	<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	0315_MW103_20220429	0315_MW104_20220428	0315_MW107_20220429	0315_MW109_20220427	0315_MW110_20220427
			Sampling date / time	29-Apr-2022 00:00	28-Apr-2022 00:00	29-Apr-2022 00:00	27-Apr-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-001	EM2208205-002	EM2208205-003	EM2208205-004	EM2208205-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	**0.18**	**0.07**	<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	**0.18**	**0.27**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	**0.14**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	**0.18**	**0.25**	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**96.3**	**90.4**	**97.3**	**89.3**	**80.8**
13C8-PFOA	----	0.02	%	**85.1**	**89.8**	**93.6**	**85.5**	**89.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_MW008_20220428	0315_SW103_20220428	0315_SW107_20220502	0315_SW108_20220502	0315_SW111_20220427
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	02-May-2022 00:00	02-May-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-006	EM2208205-018	EM2208205-020	EM2208205-022	EM2208205-023
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	**0.08**	**0.09**	**0.05**	**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**	**0.19**	**0.15**	**0.02**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	**0.01**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_MW008_20220428	0315_SW103_20220428	0315_SW107_20220502	0315_SW108_20220502	0315_SW111_20220427
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	02-May-2022 00:00	02-May-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-006	EM2208205-018	EM2208205-020	EM2208205-022	EM2208205-023
				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	**0.10**	**0.28**	**0.20**	**0.05**	**0.04**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.10**	**0.28**	**0.20**	**0.04**	**0.04**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.10**	**0.28**	**0.20**	**0.05**	**0.04**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**97.8**	**86.6**	**85.3**	**93.1**	**83.4**
13C8-PFOA	----	0.02	%	**96.8**	**97.7**	**91.8**	**95.4**	**96.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_SW118_20220428	0315_SW121_20220428	0315_SW127_20220427	0315_SW136_20220427	0315_SW140_20220428
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	27-Apr-2022 00:00	27-Apr-2022 00:00	28-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-024	EM2208205-025	EM2208205-026	EM2208205-027	EM2208205-028
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	**0.06**	**0.05**	<0.01	**0.01**	**0.02**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.18**	**0.16**	<0.01	**0.04**	<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	0315_SW118_20220428	0315_SW121_20220428	0315_SW127_20220427	0315_SW136_20220427	0315_SW140_20220428
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	27-Apr-2022 00:00	27-Apr-2022 00:00	28-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-024	EM2208205-025	EM2208205-026	EM2208205-027	EM2208205-028
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.24**	**0.21**	<0.01	**0.05**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.24**	**0.21**	<0.01	**0.05**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.24**	**0.21**	<0.01	**0.05**	**0.02**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**80.8**	**86.8**	**84.7**	**94.2**	**93.7**
13C8-PFOA	----	0.02	%	**85.4**	**87.4**	**91.1**	**90.6**	**87.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_SW144_20220429	0315_SW148_20220428	0315_SW149_20220429	0315_QC301_20220426	0315_QC303_20220427
			Sampling date / time	29-Apr-2022 00:00	28-Apr-2022 00:00	29-Apr-2022 00:00	26-Apr-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-029	EM2208205-030	EM2208205-031	EM2208205-033	EM2208205-035
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	**0.02**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<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	0315_SW144_20220429	0315_SW148_20220428	0315_SW149_20220429	0315_QC301_20220426	0315_QC303_20220427
			Sampling date / time	29-Apr-2022 00:00	28-Apr-2022 00:00	29-Apr-2022 00:00	26-Apr-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-029	EM2208205-030	EM2208205-031	EM2208205-033	EM2208205-035
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	**0.06**	**0.07**	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	**0.06**	**0.09**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	**0.02**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	**0.06**	**0.09**	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**80.7**	**90.6**	**90.7**	**92.5**	**92.5**
13C8-PFOA	----	0.02	%	**96.6**	**92.4**	**96.2**	**85.5**	**91.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC305_20220428	0315_QC307_20220429	0315_QC309_20220502	0315_QC501_20220426	0315_QC503_20220427
			Sampling date / time	28-Apr-2022 00:00	29-Apr-2022 00:00	02-May-2022 00:00	26-Apr-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-037	EM2208205-039	EM2208205-041	EM2208205-042	EM2208205-044
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC305_20220428	0315_QC307_20220429	0315_QC309_20220502	0315_QC501_20220426	0315_QC503_20220427
			Sampling date / time	28-Apr-2022 00:00	29-Apr-2022 00:00	02-May-2022 00:00	26-Apr-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-037	EM2208205-039	EM2208205-041	EM2208205-042	EM2208205-044
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<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	%	**86.9**	**102**	**95.6**	**93.3**	**92.1**
13C8-PFOA	----	0.02	%	**87.1**	**90.5**	**97.5**	**90.6**	**96.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC505_20220428	0315_QC507_20220429	0315_QC509_20220502	0315_QC101_20220427	0315_QC102_20220427
			Sampling date / time	28-Apr-2022 00:00	29-Apr-2022 00:00	02-May-2022 00:00	27-Apr-2022 00:00	27-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EM2208205-046	EM2208205-048	EM2208205-050	EM2208205-051	EM2208205-054
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	**0.02**
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	**0.05**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Compound	CAS Number	LOR	Unit	0315_QC505_20220428	0315_QC507_20220429	0315_QC509_20220502	0315_QC101_20220427	0315_QC102_20220427
Sampling date / time				28-Apr-2022 00:00	29-Apr-2022 00:00	02-May-2022 00:00	27-Apr-2022 00:00	27-Apr-2022 00:00
				EM2208205-046	EM2208205-048	EM2208205-050	EM2208205-051	EM2208205-054
				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	**0.07**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	**0.07**
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	**0.07**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**94.0**	**96.1**	**96.2**	**90.3**	**92.4**
13C8-PFOA	----	0.02	%	**101**	**96.5**	**96.9**	**96.1**	**93.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC103_20220428	----	----	----	----
			Sampling date / time	28-Apr-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2208205-055	--------	--------	--------	--------
				Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	**0.01**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_QC103_20220428	----	----	----	----
			Sampling date / time	28-Apr-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2208205-055	--------	--------	--------	--------
				Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.01**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.01**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.01**	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**101**	----	----	----	----
13C8-PFOA	----	0.02	%	**101**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	Recovery Limits (%) Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	68	136
13C8-PFOA	----	69	133

Sub-Matrix: **SILT**

Compound	CAS Number	Recovery Limits (%) Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	68	136
13C8-PFOA	----	69	133

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EM2208205**			
Amendment	: **1**			
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: Customer Services EM
Address	: [redacted]	Address	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 05-May-2022
Order number	: ----	Date Analysis Commenced	: 06-May-2022
C-O-C number	: ----	Issue Date	: 16-May-2022
Sampler	: ----		
Site	: ----		
Quote number	: SY/139/19_Wagga		
No. of samples received	: 56		
No. of samples analysed	: 42		

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	[redacted]
[redacted]	Senior Organic Chemist	[redacted]

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4327245)									
EM2208205-007	0315_SD103_20220428	EA055: Moisture Content	----	0.1	%	25.0	24.9	0.0	0% - 20%
EM2208205-053	0315_QC104_20220427	EA055: Moisture Content	----	0.1	%	26.0	26.0	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4327351)									
EM2208193-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0004	0.0007	53.9	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EM2208205-015	0315_SD121_20220428	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0009	0.0006	46.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4327351)									
EM2208193-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4327351) - continued									
EM2208193-001	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EM2208205-015	0315_SD121_20220428	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4327351)									
EM2208193-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2208205-015	0315_SD121_20220428	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4327351)									
EM2208193-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2208205-015	0315_SD121_20220428	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4327351)									
EM2208193-001	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0004	0.0009	76.9	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0004	0.0007	54.5	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0004	0.0009	76.9	No Limit
EM2208205-015	0315_SD121_20220428	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0009	0.0006	40.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0009	0.0006	40.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0009	0.0006	40.0	No Limit

Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4327742)									
EM2208205-020	0315_SW107_20220502	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.15	0.15	0.0	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4330275)									
EM2208205-022	0315_SW108_20220502	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory 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: 4330275) - continued									
EM2208205-022	0315_SW108_20220502	EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4327742)									
EM2208205-020	0315_SW107_20220502	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4330275)									
EM2208205-022	0315_SW108_20220502	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4327742)									
EM2208205-020	0315_SW107_20220502	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4330275)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4330275) - continued									
EM2208205-022	0315_SW108_20220502	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4327742)									
EM2208205-020	0315_SW107_20220502	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4330275)									
EM2208205-022	0315_SW108_20220502	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4327742)									
EM2208205-020	0315_SW107_20220502	EP231X: Sum of PFAS	----	0.01	µg/L	0.20	0.20	0.0	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.20	0.20	0.0	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.20	0.20	0.0	0% - 20%
EP231P: PFAS Sums (QC Lot: 4330275)									
EM2208205-022	0315_SW108_20220502	EP231X: Sum of PFAS	----	0.01	µg/L	0.05	0.06	18.2	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.04	0.03	28.6	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231P: PFAS Sums (QC Lot: 4330275) - continued									
EM2208205-022	0315_SW108_20220502	EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.05	0.06	18.2	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: 4327351)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00111 mg/kg	96.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	120	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0014 mg/kg	94.9	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	132	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	86.7	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00121 mg/kg	92.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4327351)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	84.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.9	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.3	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.9	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.2	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.8	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4327351)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.5	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	104	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.8	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.0	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.1	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4327351)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	92.2	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00119 mg/kg	104	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	95.4	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4327351) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00121 mg/kg	82.1	70.0	130
EP231P: PFAS Sums (QCLot: 4327351)								
EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4327742)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.222 µg/L	101	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.235 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.228 µg/L	91.5	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	95.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	95.9	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4330275)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.222 µg/L	107	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.235 µg/L	100	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.228 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	105	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	109	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4327742)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	89.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.1	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	92.5	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	100	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	95.7	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	96.9	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	95.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	96.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	91.0	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4330275)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	96.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	84.9	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4330275) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	99.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	104	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	101	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4327742)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	133	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	114	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	104	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	102	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	104	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	93.9	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4330275)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	106	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	113	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	105	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	98.4	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	112	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4327742)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.234 µg/L	90.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.238 µg/L	104	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.242 µg/L	96.4	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4330275)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4330275) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.234 µg/L	101	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.238 µg/L	131	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	105	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.242 µg/L	85.2	70.0	130
EP231P: PFAS Sums (QCLot: 4327742)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 4330275)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **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: 4327351)							
EM2208193-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00111 mg/kg	92.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00118 mg/kg	119	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00114 mg/kg	108	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	121	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	85.3	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00121 mg/kg	91.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4327351)							
EM2208193-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	82.0	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	79.6	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	97.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	91.8	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	93.7	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	83.8	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	94.3	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	85.2	64.0	136

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4327351) - continued							
EM2208193-002	Anonymous	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	91.8	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	78.2	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	94.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4327351)							
EM2208193-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	101	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	89.1	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	97.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	90.9	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	91.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	96.8	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	102	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4327351)							
EM2208193-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	95.3	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00119 mg/kg	108	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	95.7	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00121 mg/kg	70.7	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4327742)							
EM2208205-020	0315_SW107_20220502	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.222 µg/L	92.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.235 µg/L	91.5	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.228 µg/L	87.9	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	108	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	88.3	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	86.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4330275)							
EM2208205-022	0315_SW108_20220502	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.222 µg/L	106	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.235 µg/L	118	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.228 µg/L	110	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	120	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	104	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	100	53.0	142

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4327742)							
EM2208205-020	0315_SW107_20220502	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	88.3	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	79.0	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	102	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	87.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	95.0	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	79.5	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	93.9	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	92.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	102	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	93.1	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	93.8	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4330275)							
EM2208205-022	0315_SW108_20220502	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.5	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	83.1	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	98.5	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	114	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	102	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	105	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	107	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	106	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	95.5	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	102	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4327742)							
EM2208205-020	0315_SW107_20220502	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	98.9	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	113	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	107	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	100.0	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	100	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	105	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	106	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4330275)							
EM2208205-022	0315_SW108_20220502	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	110	67.0	137

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4330275) - continued							
EM2208205-022	0315_SW108_20220502	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	111	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	108	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	106	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	119	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	104	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4327742)							
EM2208205-020	0315_SW107_20220502	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	93.0	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.238 µg/L	115	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	115	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.242 µg/L	84.9	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4330275)							
EM2208205-022	0315_SW108_20220502	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	105	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.238 µg/L	110	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	107	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.242 µg/L	84.0	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2208205**	Page	: 1 of 10
Amendment	: **1**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_PFASOMP	Date Samples Received	: 05-May-2022
Site	: ----	Issue Date	: 16-May-2022
Sampler	: ----	No. of samples received	: 56
Order number	: ----	No. of samples analysed	: 42

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	39	5.13	10.00	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	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) 0315_SD107_20220502, 0315_SD108_20220502	**02-May-2022**	----	----	----	**09-May-2022**	16-May-2022	✓
HDPE Soil Jar (EA055) 0315_SD111_20220427, 0315_SD127_20220427, 0315_SD136_20220427, 0315_QC104_20220427	**27-Apr-2022**	----	----	----	**09-May-2022**	11-May-2022	✓
HDPE Soil Jar (EA055) 0315_SD103_20220428, 0315_SD106_20220428, 0315_SD118_20220428, 0315_SD121_20220428, 0315_QC105_20220428	**28-Apr-2022**	----	----	----	**09-May-2022**	12-May-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) 0315_SD107_20220502, 0315_SD108_20220502	**02-May-2022**	**09-May-2022**	29-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD111_20220427, 0315_SD127_20220427, 0315_SD136_20220427, 0315_QC104_20220427	**27-Apr-2022**	**09-May-2022**	24-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD103_20220428, 0315_SD106_20220428, 0315_SD118_20220428, 0315_SD121_20220428, 0315_QC105_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓

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
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) 0315_SD107_20220502, 0315_SD108_20220502	**02-May-2022**	**09-May-2022**	29-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD111_20220427, 0315_SD127_20220427, 0315_SD136_20220427, 0315_QC104_20220427	**27-Apr-2022**	**09-May-2022**	24-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD103_20220428, 0315_SD106_20220428, 0315_SD118_20220428, 0315_SD121_20220428, 0315_QC105_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) 0315_SD107_20220502, 0315_SD108_20220502	**02-May-2022**	**09-May-2022**	29-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD111_20220427, 0315_SD127_20220427, 0315_SD136_20220427, 0315_QC104_20220427	**27-Apr-2022**	**09-May-2022**	24-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD103_20220428, 0315_SD106_20220428, 0315_SD118_20220428, 0315_SD121_20220428, 0315_QC105_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) 0315_SD107_20220502, 0315_SD108_20220502	**02-May-2022**	**09-May-2022**	29-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD111_20220427, 0315_SD127_20220427, 0315_SD136_20220427, 0315_QC104_20220427	**27-Apr-2022**	**09-May-2022**	24-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD103_20220428, 0315_SD106_20220428, 0315_SD118_20220428, 0315_SD121_20220428, 0315_QC105_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) 0315_SD107_20220502, 0315_SD108_20220502	**02-May-2022**	**09-May-2022**	29-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD111_20220427, 0315_SD127_20220427, 0315_SD136_20220427, 0315_QC104_20220427	**27-Apr-2022**	**09-May-2022**	24-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
HDPE Soil Jar (EP231X) 0315_SD103_20220428, 0315_SD106_20220428, 0315_SD118_20220428, 0315_SD121_20220428, 0315_QC105_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓

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) 0315_SW107_20220502		**02-May-2022**	**10-May-2022**	29-Oct-2022	✓	**10-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW108_20220502, 0315_QC509_20220502	0315_QC309_20220502,	**02-May-2022**	**11-May-2022**	29-Oct-2022	✓	**11-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC301_20220426		**26-Apr-2022**	**10-May-2022**	23-Oct-2022	✓	**10-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC501_20220426		**26-Apr-2022**	**11-May-2022**	23-Oct-2022	✓	**11-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW109_20220427, 0315_SW111_20220427, 0315_SW136_20220427,	0315_MW110_20220427, 0315_SW127_20220427, 0315_QC303_20220427	**27-Apr-2022**	**10-May-2022**	24-Oct-2022	✓	**10-May-2022**	24-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC503_20220427, 0315_QC102_20220427	0315_QC101_20220427,	**27-Apr-2022**	**11-May-2022**	24-Oct-2022	✓	**11-May-2022**	24-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW104_20220428, 0315_SW103_20220428, 0315_SW121_20220428, 0315_SW148_20220428,	0315_MW008_20220428, 0315_SW118_20220428, 0315_SW140_20220428, 0315_QC305_20220428	**28-Apr-2022**	**10-May-2022**	25-Oct-2022	✓	**10-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC505_20220428,	0315_QC103_20220428	**28-Apr-2022**	**11-May-2022**	25-Oct-2022	✓	**11-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW103_20220429, 0315_SW144_20220429,	0315_MW107_20220429, 0315_SW149_20220429	**29-Apr-2022**	**10-May-2022**	26-Oct-2022	✓	**10-May-2022**	26-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC307_20220429,	0315_QC507_20220429	**29-Apr-2022**	**11-May-2022**	26-Oct-2022	✓	**11-May-2022**	26-Oct-2022	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0315_SW107_20220502		**02-May-2022**	**10-May-2022**	29-Oct-2022	✓	**10-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_SW108_20220502, 0315_QC509_20220502	0315_QC309_20220502,	**02-May-2022**	**11-May-2022**	29-Oct-2022	✓	**11-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_QC301_20220426		**26-Apr-2022**	**10-May-2022**	23-Oct-2022	✓	**10-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_QC501_20220426		**26-Apr-2022**	**11-May-2022**	23-Oct-2022	✓	**11-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW109_20220427, 0315_SW111_20220427, 0315_SW136_20220427,	0315_MW110_20220427, 0315_SW127_20220427, 0315_QC303_20220427	**27-Apr-2022**	**10-May-2022**	24-Oct-2022	✓	**10-May-2022**	24-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_QC503_20220427, 0315_QC102_20220427	0315_QC101_20220427,	**27-Apr-2022**	**11-May-2022**	24-Oct-2022	✓	**11-May-2022**	24-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW104_20220428, 0315_SW103_20220428, 0315_SW121_20220428, 0315_SW148_20220428,	0315_MW008_20220428, 0315_SW118_20220428, 0315_SW140_20220428, 0315_QC305_20220428	**28-Apr-2022**	**10-May-2022**	25-Oct-2022	✓	**10-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_QC505_20220428,	0315_QC103_20220428	**28-Apr-2022**	**11-May-2022**	25-Oct-2022	✓	**11-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW103_20220429, 0315_SW144_20220429,	0315_MW107_20220429, 0315_SW149_20220429	**29-Apr-2022**	**10-May-2022**	26-Oct-2022	✓	**10-May-2022**	26-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_QC307_20220429,	0315_QC507_20220429	**29-Apr-2022**	**11-May-2022**	26-Oct-2022	✓	**11-May-2022**	26-Oct-2022	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0315_SW107_20220502		**02-May-2022**	**10-May-2022**	29-Oct-2022	✓	**10-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW108_20220502, 0315_QC509_20220502	0315_QC309_20220502,	**02-May-2022**	**11-May-2022**	29-Oct-2022	✓	**11-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC301_20220426		**26-Apr-2022**	**10-May-2022**	23-Oct-2022	✓	**10-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC501_20220426		**26-Apr-2022**	**11-May-2022**	23-Oct-2022	✓	**11-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW109_20220427, 0315_SW111_20220427, 0315_SW136_20220427,	0315_MW110_20220427, 0315_SW127_20220427, 0315_QC303_20220427	**27-Apr-2022**	**10-May-2022**	24-Oct-2022	✓	**10-May-2022**	24-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC503_20220427, 0315_QC102_20220427	0315_QC101_20220427,	**27-Apr-2022**	**11-May-2022**	24-Oct-2022	✓	**11-May-2022**	24-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW104_20220428, 0315_SW103_20220428, 0315_SW121_20220428, 0315_SW148_20220428,	0315_MW008_20220428, 0315_SW118_20220428, 0315_SW140_20220428, 0315_QC305_20220428	**28-Apr-2022**	**10-May-2022**	25-Oct-2022	✓	**10-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC505_20220428,	0315_QC103_20220428	**28-Apr-2022**	**11-May-2022**	25-Oct-2022	✓	**11-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW103_20220429, 0315_SW144_20220429,	0315_MW107_20220429, 0315_SW149_20220429	**29-Apr-2022**	**10-May-2022**	26-Oct-2022	✓	**10-May-2022**	26-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC307_20220429,	0315_QC507_20220429	**29-Apr-2022**	**11-May-2022**	26-Oct-2022	✓	**11-May-2022**	26-Oct-2022	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0315_SW107_20220502		**02-May-2022**	**10-May-2022**	29-Oct-2022	✓	**10-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_SW108_20220502,	0315_QC309_20220502,	**02-May-2022**	**11-May-2022**	29-Oct-2022	✓	**11-May-2022**	29-Oct-2022	✓
0315_QC509_20220502								
HDPE (no PTFE) (EP231X)								
0315_QC301_20220426		**26-Apr-2022**	**10-May-2022**	23-Oct-2022	✓	**10-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_QC501_20220426		**26-Apr-2022**	**11-May-2022**	23-Oct-2022	✓	**11-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW109_20220427,	0315_MW110_20220427,	**27-Apr-2022**	**10-May-2022**	24-Oct-2022	✓	**10-May-2022**	24-Oct-2022	✓
0315_SW111_20220427,	0315_SW127_20220427,							
0315_SW136_20220427,	0315_QC303_20220427							
HDPE (no PTFE) (EP231X)								
0315_QC503_20220427,	0315_QC101_20220427,	**27-Apr-2022**	**11-May-2022**	24-Oct-2022	✓	**11-May-2022**	24-Oct-2022	✓
0315_QC102_20220427								
HDPE (no PTFE) (EP231X)								
0315_MW104_20220428,	0315_MW008_20220428,	**28-Apr-2022**	**10-May-2022**	25-Oct-2022	✓	**10-May-2022**	25-Oct-2022	✓
0315_SW103_20220428,	0315_SW118_20220428,							
0315_SW121_20220428,	0315_SW140_20220428,							
0315_SW148_20220428,	0315_QC305_20220428							
HDPE (no PTFE) (EP231X)								
0315_QC505_20220428,	0315_QC103_20220428	**28-Apr-2022**	**11-May-2022**	25-Oct-2022	✓	**11-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X)								
0315_MW103_20220429,	0315_MW107_20220429,	**29-Apr-2022**	**10-May-2022**	26-Oct-2022	✓	**10-May-2022**	26-Oct-2022	✓
0315_SW144_20220429,	0315_SW149_20220429							
HDPE (no PTFE) (EP231X)								
0315_QC307_20220429,	0315_QC507_20220429	**29-Apr-2022**	**11-May-2022**	26-Oct-2022	✓	**11-May-2022**	26-Oct-2022	✓

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
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0315_SW107_20220502		**02-May-2022**	**10-May-2022**	29-Oct-2022	✓	**10-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_SW108_20220502, 0315_QC509_20220502	0315_QC309_20220502,	**02-May-2022**	**11-May-2022**	29-Oct-2022	✓	**11-May-2022**	29-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC301_20220426		**26-Apr-2022**	**10-May-2022**	23-Oct-2022	✓	**10-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC501_20220426		**26-Apr-2022**	**11-May-2022**	23-Oct-2022	✓	**11-May-2022**	23-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW109_20220427, 0315_SW111_20220427, 0315_SW136_20220427,	0315_MW110_20220427, 0315_SW127_20220427, 0315_QC303_20220427	**27-Apr-2022**	**10-May-2022**	24-Oct-2022	✓	**10-May-2022**	24-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC503_20220427, 0315_QC102_20220427	0315_QC101_20220427,	**27-Apr-2022**	**11-May-2022**	24-Oct-2022	✓	**11-May-2022**	24-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW104_20220428, 0315_SW103_20220428, 0315_SW121_20220428, 0315_SW148_20220428,	0315_MW008_20220428, 0315_SW118_20220428, 0315_SW140_20220428, 0315_QC305_20220428	**28-Apr-2022**	**10-May-2022**	25-Oct-2022	✓	**10-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC505_20220428,	0315_QC103_20220428	**28-Apr-2022**	**11-May-2022**	25-Oct-2022	✓	**11-May-2022**	25-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_MW103_20220429, 0315_SW144_20220429,	0315_MW107_20220429, 0315_SW149_20220429	**29-Apr-2022**	**10-May-2022**	26-Oct-2022	✓	**10-May-2022**	26-Oct-2022	✓
HDPE (no PTFE) (EP231X) 0315_QC307_20220429,	0315_QC507_20220429	**29-Apr-2022**	**11-May-2022**	26-Oct-2022	✓	**11-May-2022**	26-Oct-2022	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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	39	**5.13**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

Cardno

Chain of Custody

Environmental Division
Melbourne
Work Order Reference
EM2208205

Telephone : + 61-3-8549 9600

PM Name: [redacted]
Phone: [redacted] Fax [redacted] Mobile: [redacted]
Address: [redacted]
PM Email: [redacted]
Results Email (please email results to all listed):
[redacted]

Project Number: NSW_0315_PFASOMP
Laboratory (name, phone, & contact person): [redacted]

Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Sediment	Sample Matrix: Water	Sample preservation: Ice/ Ice Bricks	Analysis: EP231X - PFAS Standard	Analysis: HOLD	Analysis: Forward to Eurofins	Analysis: Discard	Comments: Please amend Sample ID as follows
0315_MW103_20220429	1	2 X 20 ml	29/04/2022			X	X	X				
0315_MW104_20220428	2	2 X 20 ml	28/04/2022			X	X	X				
0315_MW107_20220429	3	2 X 20 ml	29/04/2022			X	X	X				
0315_MW109_20220427	4	2 X 20 ml	27/04/2022			X	X	X				
0315_MW110_20220427	5	2 X 20 ml	27/04/2022			X	X	X				
0315_MW008_20220428	6	2 X 20 ml	28/04/2022			X	X	X				
0315_SD103_20220428	7	1 x 200 g	28/04/2022		X		X	X				
0315_SD106_20220428	8	1 x 200 g	28/04/2022		X		X	X				
0315_SD107_20220428	9	1 x 200 g	28/04/2022		X		X				X	
0315_SD107_20220502	10	3 x 200 g	2/05/2022		X		X	X				
0315_SD108_20220427	11	1 x 200 g	27/04/2022		X		X				X	
0315_SD108_20220502	12	3 x 200 g	2/05/2022		X		X	X				
0315_SD111_20220427	13	1 x 200 g	27/04/2022		X		X	X				
0315_SD118_20220428	14	1 x 200 g	28/04/2022		X		X	X				
0315_SD121_20220428	15	1 x 200 g	28/04/2022		X		X	X				
0315_SD127_20220427	16	1 x 200 g	27/04/2022		X		X	X				
0315_SD136_20220427	17	1 x 200 g	27/04/2022		X		X	X				
0315_SW103_20220428	18	2 X 20 ml	28/04/2022			X	X	X				
0315_SW107_20220428	19	2 X 20 ml	28/04/2022			X	X				X	
0315_SW107_20220502	20	6 X 20 ml	2/05/2022			X	X	X				
0315_SW108_20220427	21	2 X 20 ml	27/04/2022			X	X				X	
0315_SW108_20220502	22	6 X 20 ml	2/05/2022			X	X	X				
0315_SW111_20220427	23	2 X 20 ml	27/04/2022			X	X	X				
0315_SW118_20220428	24	2 X 20 ml	28/04/2022			X	X	X				
0315_SW121_20220428	25	2 X 20 ml	28/04/2022			X	X	X				
0315_SW127_20220427	26	2 X 20 ml	27/04/2022			X	X	X				
0315_SW136_20220427	27	2 X 20 ml	27/04/2022			X	X	X				
0315_SW140_20220428	28	2 X 20 ml	28/04/2022			X	X	X				
0315_SW144_20220429	29	2 X 20 ml	29/04/2022			X	X	X				
0315_SW148_20220428	30	2 X 20 ml	28/04/2022			X	X	X				
0315_SW149_20220429	31	2 X 20 ml	29/04/2022			X	X	X				
0315_Drum01_20220502	32	2 X 20 ml	2/05/2022			X					X	
0315_QC301_20220426	33	2 X 20 ml	26/04/2022			X	X	X				
0315_QC302_20220426	34	2 X 20 ml	26/04/2022			X	X		X			
0315_QC303_20220427	35	2 X 20 ml	27/04/2022			X	X	X				
0315_QC304_20220427	36	2 X 20 ml	27/04/2022			X	X		X			
0315_QC305_20220428	37	2 X 20 ml	28/04/2022			X	X	X				
0315_QC306_20220428	38	2 X 20 ml	28/04/2022			X	X		X			
0315_QC307_20220429	39	2 X 20 ml	29/04/2022			X	X	X				
0315_QC308_20220429	40	2 X 20 ml	29/04/2022			X	X		X			
0315_QC309_20220502	41	2 X 20 ml	2/05/2022			X	X	X				
0315_QC501_20220426	42	2 X 20 ml	26/04/2022			X		X				
0315_QC502_20220426	43	2 X 20 ml	26/04/2022			X			X			
0315_QC503_20220427	44	2 X 20 ml	27/04/2022			X		X				
0315_QC504_20220427	45	2 X 20 ml	27/04/2022			X			X			
0315_QC505_20220428	46	2 X 20 ml	28/04/2022			X		X				
0315_QC506_20220428	47	2 X 20 ml	28/04/2022			X			X			
0315_QC507_20220429	48	2 X 20 ml	29/04/2022			X		X				
0315_QC508_20220429	49	2 X 20 ml	29/04/2022			X			X			
0315_QC509_20220502	50	2 X 20 ml	2/05/2022			X		X				
0315_QC101_20220427	51	2 X 20 ml	27/04/2022			X		X				
0315_QC105_20220428	52	1 x 200 g	28/04/2022		X			X				
0315_QC104_20220427	53	1 x 200 g	27/04/2022		X			X				
0315_QC102_20220427	54	2 X 20 ml	27/04/2022			X		X				
0315_QC103_20220428	55	2 X 20 ml	28/04/2022			X		X				
Extra: 0315_MW103_20220427		27.4.22										

Sampler: I attest that the proper field sampling procedures were used during the collection of these samples.

Relinquished by: (print and signature)	Date	Received by: (print and signature)	Date	Time

Received: 15:30 Carrier: CLIENT
C/note:
Temp: 4.5 °C Seal: Y / N
Ice / Icebricks / NA
55

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/5 day Please circle

Page of

CERTIFICATE OF ANALYSIS

Work Order	: **EM2208223**	Laboratory	: Environmental Division Melbourne
Client	: **STANTEC AUSTRALIA PTY LTD**	Contact	: Customer Services EM
Contact	: [redacted]	Address	: [redacted]
Address	: [redacted]		
Telephone	: ----	Telephone	: [redacted]
Project	: NSW_0315_FPASOMP	Date Samples Received	: 05-May-2022 15:30
Order number	: ----	Date Analysis Commenced	: 06-May-2022
C-O-C number	: ----	Issue Date	: 09-May-2022 12:19
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Organic Chemist	[redacted]

General Comments

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

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

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

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

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

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

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

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_MW625_20220427	----	----	----	----
			Sampling date / time	27-Apr-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2208223-001	--------	--------	--------	--------
				Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0315_MW625_20220427	----	----	----	----
			Sampling date / time	27-Apr-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2208223-001	--------	--------	--------	--------
				Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**97.6**	----	----	----	----
13C8-PFOA	----	0.02	%	**94.5**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2208223**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: Customer Services EM
Address	: [redacted]	Address	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Project	: NSW_0315_FPASOMP	Date Samples Received	: 05-May-2022
Order number	: ----	Date Analysis Commenced	: 06-May-2022
C-O-C number	: ----	Issue Date	: 09-May-2022
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		

NATA

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Organic Chemist	[redacted]

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

- **No Laboratory Duplicate (DUP) Results are required to be reported.**

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4324879)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.222 µg/L	101	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.235 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.228 µg/L	112	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	86.3	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4324879)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	92.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.3	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.9	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	88.3	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	105	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	107	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	100	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	94.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4324879)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	103	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	108	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	99.1	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.6	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	101	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	119	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: 4324879)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.234 µg/L	98.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.238 µg/L	97.3	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	96.6	67.0	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4324879) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.242 µg/L	82.6	70.0	130
EP231P: PFAS Sums (QCLot: 4324879)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2208223**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_FPASOMP	Date Samples Received	: 05-May-2022
Site	: ----	Issue Date	: 09-May-2022
Sampler	: ----	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **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	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation* Date extracted	Due for extraction	Evaluation	*Analysis* Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0315_MW625_20220427	**27-Apr-2022**	**07-May-2022**	24-Oct-2022	✓	**07-May-2022**	24-Oct-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 0315_MW625_20220427	**27-Apr-2022**	**07-May-2022**	24-Oct-2022	✓	**07-May-2022**	24-Oct-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0315_MW625_20220427	**27-Apr-2022**	**07-May-2022**	24-Oct-2022	✓	**07-May-2022**	24-Oct-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0315_MW625_20220427	**27-Apr-2022**	**07-May-2022**	24-Oct-2022	✓	**07-May-2022**	24-Oct-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0315_MW625_20220427	**27-Apr-2022**	**07-May-2022**	24-Oct-2022	✓	**07-May-2022**	24-Oct-2022	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	20	**0.00**	**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	0	20	**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*
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

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

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2208223**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: Customer Services EM
Address	: [redacted]	Address	: [redacted]
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: NSW_0315_FPASOMP	Page	: 1 of 2
Order number	: ----	Quote number	: EP2017MWHAUS0015 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 05-May-2022 15:30	Issue Date	: 06-May-2022
Client Requested Due Date	: 12-May-2022	Scheduled Reporting Date	: **12-May-2022**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 4.5°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

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

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EM2208223-001	27-Apr-2022 00:00	0315_MW625_20220427	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS ADDRESS

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

DERP LAB REPORTS

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

Cardno

Chain of Custody

PM Name: [redacted]

Phone: [redacted] Fax [redacted] Mobile: [redacted]

Address: [redacted]

PM Email: [redacted]

Results Email (please email results to all listed):

[redacted]

Project Number: NSW_0315_PFASOMP

Laboratory (name, phone, & contact person): [redacted]

	Sample ID	Laboratory ID	Container	Sampling		Sample Matrix					Sample preservation				Analysis				Comments	
				Date	Time	Sediment	Groundwater	Surface Water	QC	Water	Ice/ Ice Bricks				EP231X - PFAS Standard	HOLD	Forward to Eurofins	Discard	Please amend Sample IDs as follows	Please send to Eurofins
1	0315_MW625_20220427		2 X 20 ml	27/04/2022			X				X				X					

Environmental Division
Melbourne
Work Order Reference
EM2208223

Telephone : 61-3-8549 9600

Sampler: I attest that the proper field sampling procedures were used during the collection of these samples. Sampler name: [redacted] Date: 04/05/2022

Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time
			JJ	5/5/22	

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/5 day Please circle

Page of

Received: 15:30 Carrier: CLIENT
C/note:
Temp: 4.5 °C Seal: Y / N
Ice / Icebricks / NA

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2208229**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: Customer Services EM
Address	: [redacted]	Address	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Project	: NSW_0315_FPASOMP	Date Samples Received	: 05-May-2022 15:30
Order number	: ----	Date Analysis Commenced	: 06-May-2022
C-O-C number	: ----	Issue Date	: 12-May-2022 11:14
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

NATA

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Organic Chemist	[redacted]
[redacted]	Senior Organic Chemist	[redacted]

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	0315_SD614_20220428	0315_SD677_20220428	----	----	----
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2208229-003	EM2208229-004	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**19.3**	**22.4**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0002**	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0075**	**0.0068**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	0315_SD614_20220428	0315_SD677_20220428	----	----	----
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2208229-003	EM2208229-004	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0077**	**0.0068**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0077**	**0.0068**	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0077**	**0.0068**	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**101**	**89.4**	----	----	----
13C8-PFOA	----	0.0002	%	**99.3**	**89.8**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			*Sample ID*	0315_MW601_20220428	0315_MW624_20220428	----	----	----
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	EM2208229-001	EM2208229-002	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.03**	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.04**	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	**0.45**	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	**0.02**	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.20**	<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	**0.03**	<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	0315_MW601_20220428	0315_MW624_20220428	----	----	----
			Sampling date / time	28-Apr-2022 00:00	28-Apr-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2208229-001	EM2208229-002	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.78**	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.65**	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.72**	<0.01	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**95.6**	**93.1**	----	----	----
13C8-PFOA	----	0.02	%	**97.0**	**104**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	68	136
13C8-PFOA	----	69	133

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EM2208229**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: Customer Services EM
Address	: [redacted]	Address	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Project	: NSW_0315_FPASOMP	Date Samples Received	: 05-May-2022
Order number	: ----	Date Analysis Commenced	: 06-May-2022
C-O-C number	: ----	Issue Date	: 12-May-2022
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
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 Organic Chemist	[redacted]
[redacted]	Senior Organic Chemist	[redacted]

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4326856)									
EM2208184-003	Anonymous	EA055: Moisture Content	----	0.1	%	5.7	5.8	2.7	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4325430)									
EM2208210-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EM2208327-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4325430)									
EM2208210-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4325430) - continued									
EM2208210-001	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EM2208327-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4325430)									
EM2208210-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2208327-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4325430)									

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: 4325430) - continued									
EM2208210-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2208327-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4325430)									
EM2208210-001	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EM2208327-003	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4325430)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00111 mg/kg	91.3	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	91.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0014 mg/kg	73.0	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	89.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	93.7	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00121 mg/kg	88.3	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4325430)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	84.7	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.3	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.8	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.9	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.9	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.1	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.6	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4325430)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.8	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.4	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.3	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.1	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.9	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4325430)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	94.7	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00119 mg/kg	100	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	100	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4325430) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00121 mg/kg	93.9	70.0	130
EP231P: PFAS Sums (QCLot: 4325430)								
EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4324879)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.222 µg/L	101	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.235 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.228 µg/L	112	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	86.3	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4324879)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	92.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.3	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.9	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	88.3	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	105	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	107	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	100	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	94.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4324879)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	103	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	108	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	99.1	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.6	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	101	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	136

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4324879) - continued								
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: 4324879)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.234 µg/L	98.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.238 µg/L	97.3	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	96.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.242 µg/L	82.6	70.0	130
EP231P: PFAS Sums (QCLot: 4324879)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **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: 4325430)							
EM2208210-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00111 mg/kg	93.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00118 mg/kg	77.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00114 mg/kg	88.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	105	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	103	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00121 mg/kg	100	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4325430)							
EM2208210-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	91.3	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	92.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	96.6	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	94.1	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	94.9	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	93.5	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	95.7	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	88.5	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	94.7	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	93.5	66.0	139

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4325430) - continued							
EM2208210-002	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	96.1	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4325430)							
EM2208210-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	95.7	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	91.9	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	84.1	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	86.4	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	97.9	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	85.2	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	99.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4325430)							
EM2208210-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	93.5	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00119 mg/kg	98.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	104	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00121 mg/kg	89.2	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2208229**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: NSW_0315_FPASOMP	Date Samples Received	: 05-May-2022
Site	: ----	Issue Date	: 12-May-2022
Sampler	: ----	No. of samples received	: 4
Order number	: ----	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	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	20	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)								
0315_SD614_20220428,	0315_SD677_20220428	**28-Apr-2022**	**----**	----	----	**09-May-2022**	12-May-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0315_SD614_20220428,	0315_SD677_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
0315_SD614_20220428,	0315_SD677_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
0315_SD614_20220428,	0315_SD677_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0315_SD614_20220428,	0315_SD677_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)								
0315_SD614_20220428,	0315_SD677_20220428	**28-Apr-2022**	**09-May-2022**	25-Oct-2022	✓	**09-May-2022**	18-Jun-2022	✓

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)								
0315_MW601_20220428,	0315_MW624_20220428	**28-Apr-2022**	**07-May-2022**	25-Oct-2022	✓	**07-May-2022**	25-Oct-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0315_MW601_20220428,	0315_MW624_20220428	**28-Apr-2022**	**07-May-2022**	25-Oct-2022	✓	**07-May-2022**	25-Oct-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0315_MW601_20220428,	0315_MW624_20220428	**28-Apr-2022**	**07-May-2022**	25-Oct-2022	✓	**07-May-2022**	25-Oct-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0315_MW601_20220428,	0315_MW624_20220428	**28-Apr-2022**	**07-May-2022**	25-Oct-2022	✓	**07-May-2022**	25-Oct-2022	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0315_MW601_20220428,	0315_MW624_20220428	**28-Apr-2022**	**07-May-2022**	25-Oct-2022	✓	**07-May-2022**	25-Oct-2022	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	10	**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	0	20	**0.00**	**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	0	20	**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.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM2208229**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: Customer Services EM
Address	: [redacted]	Address	: [redacted]
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: NSW_0315_FPASOMP	Page	: 1 of 2
Order number	: ----	Quote number	: EP2017MWHAUS0015 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 05-May-2022 15:30	Issue Date	: 06-May-2022
Client Requested Due Date	: 12-May-2022	Scheduled Reporting Date	: **12-May-2022**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 4.5°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

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

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EM2208229-003	28-Apr-2022 00:00	0315_SD614_20220428	✓	✓
EM2208229-004	28-Apr-2022 00:00	0315_SD677_20220428	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)
EM2208229-001	28-Apr-2022 00:00	0315_MW601_20220428	✓
EM2208229-002	28-Apr-2022 00:00	0315_MW624_20220428	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS ADDRESS

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

DERP LAB REPORTS

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

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Chain of Custody

PM Name: [redacted]

Phone: [redacted] **Fax** [redacted] **Mobile:** [redacted]

Address: [redacted]

PM Email: [redacted]

Results Email (please email results to all listed):
- [redacted]

Project Number: NSW_0315_PFASOMP

Laboratory (name, phone, & contact person): [redacted]

	Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Sediment	Groundwater	Surface Water	QC	Water	Sample preservation: Ice/ Ice Bricks				Analysis: EP231X - PFAS Standard	HOLD	Forward to Eurofins	Discard	Comments: Please amend Sample IDs as follows	Please send to Eurofins
1	0315_MW601_20220428		2 X 20 ml	28/04/2022			X				X				X					
2	0315_MW624_20220428		6 X 20 ml	28/04/2022			X				X				X					
~~3~~	~~[illegible]~~		2 X 20 ml	27/04/2022			X				X				X					
3 ~~4~~	0315_SD614_20220428		3 x 200 g	28/04/2022		X					X				X					
4 ~~5~~	0315_SD677_20220428		1 x 200 g	28/04/2022		X					X				X					

Environmental Division
Melbourne
Work Order Reference
EM2208229

Telephone : [illegible]

Sampler: I attest that the proper field sampling proceedures were used during the collection of these samples. **Sampler name:** [redacted] Date: 04/05/2022

Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time
			JJ	5/5/22	

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/3 days/5 day Please circle

Page of

Received: 15:30 **Carrier:** CLIENT
Cnote:
Temp: 4.5 °C Seal: Y / N
Ice / Icebricks / NA

ALS

Revision 1
Approved 23 May 2013

DEF19008_0315_KMA_E2_Council_COC.xlsx

Printed 5/05/2022

APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES

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Stantec

Bore ID	Property	Easting	Northing	Monitoring Date	Bore Depth (m)	Top of casing (mAHD)	Top of Screen (mBTOC)	Bottom of Screen (mBTOC)	SWL (mbTOC)[1]	RL (mAHD)	Water Colour	Turbidity	Other Observations on Bore/Site	Hydrasleeve Deployment Depth (mBTOC)[2]	Duplicate Samples
MW008	On-site	524926.6	6114754.4	28/04/2022	60.0	-	-	-	7.32	-	Clear	-	Sampled using Low Flow	N/A	-
MW103	On-site	526845.6	6110958.8	29/04/2022	53.50	225.8	49	52	24.580	201.22	Cloudy	Moderate, cloudy grey	-	50.5	-
MW104	On-site	526597.8	6111277.7	28/04/2022	54.44	231.87	38	53	34.820	197.05	Cloudy	Medium	Orange to red fines at base of sleeve	45.6	-
MW107	On-site	526628.4	6111282.8	29/04/2022	14.4	230.54	12.5	15.5	-	-	Cloudy	Low	Orange to grey	14.5	-
MW109	On-site	525096.0	6114455.5	27/04/2022	35.27	193.62	24.4	33.4	23.64	169.98	Cloudy	Low	Light grey	28.2	0315_QC101_20220427 & 0315_QC201_20220427
MW110	On-site	525327.6	6114785.0	27/04/2022	22.30	180.29	17.4	20.9	10.345	169.95	Clear	-	-	17.1	-
MW601	Off-site	527164.1	6112666.0	28/04/2022	17.230	205.3	10	16	7.67	197.63	Brown	Medium	-	12.1	-
MW624	Off-site	527138.1	6112814.3	28/04/2022	53.89	205.92	29	51	9.635	196.29	Brown	Medium	Strong organic odour	45.2	Internal Lab QC Taken
MW625	Off-site	524517.0	6114881.7	27/04/2022	22.17	174.572	15.5	21.5	7.63	166.94	Cloudy	Low	Grey to orange	17.7	-

1. A consolidated gauging round was completed on 26 April 2022.
2. As measured from the top of the Hydrasleeve.

Bore ID	Temp (C^0)	DO (mg/L)	EC (ms/Cm)	TDS (mg/L)	pH	Eh (mV)
MW008	18.5	2.72	1.53	1141	7.02	119.2
MW103	19.7	1.17	2.21	1596	6.24	41.5
MW104	19.7	1.82	4.55	3287	6.44	38.2
MW107	18.2	0.65	2.72	1754	6.99	-18.1
MW109	18.0	1.49	1.30	846	7.06	-102.7
MW110	17.4	3.19	2.53	1643	7.35	-86.3
MW601	18.1	3.39	0.41	309	7.3	169.4
MW624	18.3	1.19	2.60	1689	6.91	95.9
MW625	17.6	1.1	2.04	1329	6.54	-74

F3.04 – Groundwater Sampling Field Record

Site / Project: DEF19008 OMP Blamey Barracks Kapooka	Bore ID Number: MW008
Client: Department of Defence	Job No. DEF19008
Person Sampling: [redacted]	[redacted]

Bore / Site Details

Bore Condition / Locked? Good / No	Type Protect. Cap / Cover: Open well, concrete stickup	Bore Depth (mbTOC): 60
Inner casing/screen type & diameter: 1m diameter concrete well	Screen interval (bgl): Unknown	SWL (mbTOC) 7.270
WL Measurement Point Top of stickup	RL of measurement point (mAHD) Unknown	SWL Date/Time 28/04/2022 10:36am
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Low Flow	Bore Volume (L): Unknown	Purge Date: 28/04/2022
Purge rate (L/min): 0.2	Total Purge volume (L): 5	LNAPL / PSH Thickness (mm) *None / …………mm*

Purge Field Physicochemical Measurements:

	Reading1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	10:36	10:41	10:46	10:51				
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)	3.02	2.79	2.78	2.72				
EC (mS/Cm) ±3%	1.52	1.53	1.53	1.53				
pH ±0.1	6.99	7.01	7.01	7.02				
Eh (mV) ±10mV	138.6	126.9	122.6	119.2				
Temp (^{O}C)	18.4	18.4	18.4	18.5				
SWL (m) after	7.263	7.258	7.275	7.264				
Cum. Volume (L)	2	3	4	5				
Water Colour	Clear	Clear	Clear	Clear				
Turbidity ±10%	V. low	V. low	V. low	V. low				
Other Observations / Notes	None	None	None	None				

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume (mL)	20	20			
Container Type	Plastic	Plastic			
Filtration	No	No			
Preservation	Ice	Ice			
Sample Number (for Lab ID): 0315_MW008_20220428					
QC Dup Sample No.:					

Sample ID	Property	Easting	Northing	Monitoring Date	Sample Depth (m)	Water Body Depth	Flow Rate	Water Colour	Turbidity	Other Observations	Duplicate Samples	Temp (C^0)	DO (mg/L)	EC (ms/Cm)	TDS (mg/L)	pH	Eh (mV)
SW103	On-Base	526271.4	6110348.6	28/04/2022	0.1	0.3	Slow	Cloudy	Medium	No flow observed.	-	18.60	3.32	0.08	59.7	6.66	153.0
SW106	On-Base	526717.6	6109926.1	-	-	-	-	-	-	Not sampled - location dry.	-	-	-	-	-	-	-
SW107	On-Base	526752.7	6110464.8	02/05/2022	0.2	0.5	Slow	Brown	High	-	Internal Lab QC Taken	11.70	8.78	0.01	5.0	7.82	252.4
SW108	On-Base	526719.2	6110895.1	02/05/2022	0.2	1.0	Slow	Green	Low	-	Internal Lab QC Taken	17.30	5.86	0.74	557.1	9.30	184.6
SW111	On-Base	526686.5	6111169.2	27/04/2022	0.1	1	Slow	Clear	Low	-	-	17.50	3.95	0.78	506.4	7.31	-38.3
SW118	On-Base	526946.5	6110587.0	28/04/2022	0.05	0.2	Slow	Brown	Medium	No flow, stagnant puddle.	-	18.70	5.57	0.12	60.2	7.31	135.7
SW121	On-Base	527077.5	6111316.7	28/04/2022	0.1	0.3	Slow	Brown	High	Stagnant, dead bugs on water surface.	-	17.30	4.56	0.14	108.9	7.71	113.0
SW127	On-Base	524610.6	6108182.2	27/04/2022	0.1	0.8	-	Brown	Medium	-	-	16.00	4.50	0.05	32.3	7.08	137.6
SW136	On-Base	526132.2	6110304.8	27/04/2022	0.1	0.4	Medium	Brown	Medium	-	0315_QC102_20220427 & 0315_QC202_20220427	16.90	5.30	0.08	49.4	7.10	169.2
SW140	On-Base	526449.8	6109549.2	28/04/2022	0.1	1.0	Slow	Clear	Low	No odour.	0315_QC103_20220428 & 0315_QC203_20220428	19.10	1.66	0.06	408.2	7.10	21.5
SW144	On-Base	526185.0	6110390.0	29/04/2022	0.1	0.2	Fast	Cloudy	Medium	Strong sewage odour, decaying food chunks present.	-	21.80	0.00	1.08	751.4	8.88	-107.8
SW148	On-Base	526404.5	6110931.5	28/04/2022	0.02	0.1	Medium	Cloudy	Medium	Sewage odour, toilet paper observed, brown, cloudy.	-	21.00	0.21	1.20	841.8	8.31	-82.3
SW149	On-Base	526455.0	6111012.0	29/04/2022	0.01	0	Slow	Cloudy	Medium	Grey.	-	19.80	1.73	1.13	817.1	8.15	17.0
SW614	Off-Base	527151.5	6112749.5	-	-	-	-	-	-	Not sampled - location dry.	-	-	-	-	-	-	-
SW677	Off-Base	526647.3	6114308.7	-	-	-	-	-	-	Not sampled - location dry.	-	-	-	-	-	-	-

Location ID	Property	Easting	Northing	Monitoring Date	Observations	Duplicate Samples
SD103	On-base	526271.4	6110348.6	28/04/2022	Dark brown silty clay, moist, moderate plasticity, no odour, no staining.	0315_QC105_20220428 & 0315_QC205_20220428
SD106	On-base	526717.6	6109926.1	28/04/2022	Sediment sample taken from a depth of 0.1m under reed bed. Dark brown, silty clay, organic material present (plant root), low to moderate plasticity, no odour, no staining.	-
SD107	On-base	526752.7	6110464.8	02/05/2022	Taken from 0.1m, dark brown silty clay, moderate plasticity, some organic material, no odour, no staining.	Internal Lab QC Taken
SD108	On-base	526719.2	6110895.1	02/05/2022	Silty clay with gravels, brown to orange mottled grey, slightly wet, tree rootlets, no odour, no staining.	Internal Lab QC Taken
SD111	On-base	526686.5	6111169.2	27/04/2022	Silty clay, brown mottled grey, slightly wet, moderate-high plasticity, trace rootlets, no odour, no staining, water seeping in at 0.1m depth.	-
SD118	On-base	526946.5	6110587.0	28/04/2022	Sediment sampled from 0.1m, light brown gravelly silty clay, slight organic material, moderate plasticity, moist, no odour, no staining.	-
SD121	On-base	527077.5	6111316.7	28/04/2022	Sediment sampled at 0.1m. Silty clay, reddish brown, moderate plasticity, wet, no odour, no staining.	-
SD127	On-base	524610.6	6108182.2	27/04/2022	Silty clay, gray mottled brown, wet, moderate plasticity, no odour no staining, taken at 0.2m.	-
SD136	On-base	526133.0	6110304.1	27/04/2022	Dark brown with orange mottle, silty clay, slightly moist, moderate plasticity, no odour, no staining.	0315_QC104_20220427 & 0315_QC204_20220427
SD614	Off-base	527151.5	6112749.5	28/04/2022	Sediment sampled at 0.1 depth, silty clay, moderately high plasticity, brown with trace rootlets and gravels, no odour, no staining.	Internal Lab QC Taken
SD677	Off-base	526647.3	6114308.7	28/04/2022	Overgrown. Sediment sampled at 0.1m depth, silty clay brown, slightly moist, trace gravels and rootlets, moderate plasticity, no odour.	-

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 11K101257

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 7.00		pH 7.00		377339	pH 7.03
2. pH 4.00		pH 4.00		380327	pH 3.99
3. mV		236.48mV		380834/378285	236.8mV
4. EC		2.76mS		377099	2.77mS
5. D.O		0%		371864	-0.10%
6. Temp		21.8°C		MultiTherm	21.6°C

Calibrated by: [redacted]

Calibration date: 19/04/2022

Next calibration due: 20/05/2022

26/4/22

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 16G104247

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 7.00		pH 7.00		377339	7.07
2. pH 4.00		pH 4.00		380327	3.95
3. mV		237.8mV		371922/378285	242.6mV
4. EC		2.76mS		377099	2.76
5. D.O		0%		371864	0.02
6. Temp		21		MultiTherm	20.8

Calibrated by: [redacted]

Calibration date: 26/04/2022

Next calibration due: 26/05/2022

Date of Bump Test	Job Number	Unit Brand/ Model	Ambient Air Oxygen Calibration	Zero % Oxygen Solution Calibration	Standard Concentrations	Ambient Temperature (°C)	Bump Test Reading	Bump Test Readings within ±5%?	Comment	Test by (Name)	(Signature)
28/4/22	DEF19008	YSI (Airmet)	100% Saturation? Y N 99.4	0% Calibration? Y N NA 0.20	pH 4.00 Y / N pH 6.887 Y / N ~~pH 9.22~~ Y / N EC: 2,760µS/cm Y / N	16.6	pH 4.00: 4.02 pH 6.88: 7.07 pH 9.22: Temp: EC: 29750@16.6	pH 4.00: (± pH 0.2) Y / N pH 6.88: (± pH 0.2) Y / N ~~pH 9.22: (± pH 0.2)~~ Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N	No pH 10 EC(mS) = 2.55@16.6 EC, temp dependent	[redacted]	[redacted]
29/4/22	DEF19008	YSI (Airmet)	100% Saturation? Y N 103	0% Calibration? Y N NA 0.04	pH 4.00 Y / N pH 6.88 Y / N pH 9.22 Y / N EC: 2,760µS/cm Y / N	17.3	pH 4.00: 4.05 pH 6.88: 7.08 ~~pH 9.22~~: Temp: 17.3 EC: 2933@17.7 2.52	pH 4.00: (± pH 0.2) Y / N pH 6.88: (± pH 0.2) Y / N pH 9.22: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N	ORP = 254 EC(mS) = 252	[redacted]	[redacted]
30/4/22	DEF19008	YSI (Airmet)	100% Saturation? Y N	0% Calibration? Y N NA 0.03	pH 4.00 Y / N pH 6.88 Y / N pH 9.22 Y / N EC: 2,760µS/cm Y / N	16	pH 4.00: 4.06 pH 6.88: 7.03 ~~pH 9.22~~: Temp: 16 EC: 2900@16.2	pH 4.00: (± pH 0.2) Y / N pH 6.88: (± pH 0.2) Y / N pH 9.22: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N	ORP = 257 EC(mS) =	[redacted]	[redacted]
1/5/22	DEF19008	YSI (Airmet)	100% Saturation? Y N	0% Calibration? Y N NA 0.09	pH 4.00 Y / N pH 6.88 Y / N ~~pH 9.22~~ Y / N EC: 2,760µS/cm Y / N	5.4	pH 4.00: 4.05 pH 6.88: 7.05 ~~pH 9.22~~: Temp: 5.4 EC: 2978@7.1	pH 4.00: (± pH 0.2) Y / N pH 6.88: (± pH 0.2) Y / N pH 9.22: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N	ORP = 274 EC(mS) = 1.96	[redacted]	[redacted]
2/5/22	DEF19008	YSI (Airmet)	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 6.88 Y / N ~~pH 9.22~~ Y / N EC: 2,760µS/cm Y / N	6.0	pH 4.00: 4.05 pH 6.88: 6.97 ~~pH 9.22~~: Temp: 6.0 EC: 3100@6.2	pH 4.00: (± pH 0.2) Y / N pH 6.88: (± pH 0.2) Y / N pH 9.22: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N	ORP = 266 EC(mS) = 2.02	[redacted]	[redacted]
3/5/22	DEF19008	YSI Airmet	100% Saturation? Y N	0% Calibration? Y N NA 0.06	pH 4.00 Y / N pH 6.88 Y / N ~~pH 9.22~~ Y / N EC: 2,760µS/cm Y / N	7.1	pH 4.00: 4.03 pH 6.88: 7.03 ~~pH 9.22~~: Temp: 7.1 EC: 3005@6.7	pH 4.00: (± pH 0.2) Y / N pH 6.88: (± pH 0.2) Y / N ~~pH 9.22~~: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N	ORP = 267 EC(mS) = 2.05	[redacted]	[redacted]
			100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 6.88 Y / N pH 9.22 Y / N EC: 2,760µS/cm Y / N		pH 4.00: pH 6.88: pH 9.22: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 6.88: (± pH 0.2) Y / N pH 9.22: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N			
			100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 6.88 Y / N pH 9.22 Y / N EC: 2,760µS/cm Y / N		pH 4.00: pH 6.88: pH 9.22: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 6.88: (± pH 0.2) Y / N pH 9.22: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N			

Date of Bump Test	Job Number	Unit Brand/ Model	Ambient Air Oxygen Calibration		Zero % Oxygen Solution Calibration		Standard Concentrations (Y if all are present)		Ambient Temperature (°C)	Bump Test Reading	Bump Test Readings within ±5%?			Comment	Test by (Name)	(Signature)
28/04		YSI Pro Plus (Cardno YSI serial number: 19H102165)	100% Saturation?	Y	0% Calibration	Y	pH 4.00 pH 7.00 pH 10.00 EC: 10.7 µS/cm @ 16.2 °C ORP: 250 mV @ 15.4 °C	Y Y Y Y Y	16.0	pH 4.00: 4.13 pH 7.00: 7.00 pH 10.00 10.10 EC: 10.78 µS/cm @ 16.2 °C ORP: 240 mV @ 15.9 °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	Y Y Y Y Y Y		[redacted]	
29/04		" "	100% Saturation?	Y	0% Calibration	Y	pH 4.00 pH 7.00 pH 10.00 EC: 11.13 µS/cm @ 17.8 °C ORP: 244 mV @ 17.8 °C	Y Y Y Y Y	17	pH 4.00: 3.66 pH 7.00: 7.27 pH 10.00 10.08 EC: 11.02 µS/cm @ 17.8 °C ORP: 238.6 mV @ 17.8 °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	N N Y Y Y Y	pH Recalibrated	[redacted]	
30/04		" "	100% Saturation?	Y	0% Calibration	Y	pH 4.00 pH 7.00 pH 10.00 EC: 10.79 µS/cm @ 16.5 °C ORP: 247 mV @ 16.5 °C	Y Y Y Y Y	18	pH 4.00: 3.72 pH 7.00: 7.10 pH 10.00 10.07 EC: 10.69 µS/cm @ 16.5 °C ORP: 241.2 mV @ 16.5 °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	Y / N Y / N Y / N Y / N Y / N Y / N	pH Recalibrated	[redacted]	
01/05		" "	100% Saturation?	Y	0% Calibration	Y	pH 4.00 pH 7.00 pH 10.00 EC: 9.10 µS/cm @ 9.7 °C ORP: 263 mV @ 9.4 °C	Y Y Y Y Y	5	pH 4.00: 3.81 pH 7.00: 4.05 pH 10.00 9.94 EC: 9.34 µS/cm @ 9.7 °C ORP: 243.2 mV @ 9.4 °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	Y / N Y / N Y / N Y / N Y / N Y / N		[redacted]	
02/05		" "	100% Saturation?	Y	0% Calibration	Y	pH 4.00 pH 7.00 pH 10.00 EC: 8.5 µS/cm @ 8.0 °C ORP: 267 mV @ 8.7 °C	Y Y Y Y Y	6	pH 4.00: 3.83 pH 7.00: 6.97 pH 10.00 9.46 EC: 8.67 µS/cm @ 8.0 °C ORP: 266.5 mV @ 8.7 °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	Y / N Y / N Y / N Y / N Y / N Y / N		[redacted]	
03/05		" "	100% Saturation?	Y	0% Calibration	Y	pH 4.00 pH 7.00 pH 10.00 EC: 8.8 µS/cm @ 8.4 °C ORP: ~~26~~266 mV @ 8.9 °C	Y Y Y Y Y	6	pH 4.00: 3.83 pH 7.00: 7.05 pH 10.00 9.99 EC: 8.95 µS/cm @ 8.4 °C ORP: 264.7 mV @ 8.9 °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	Y / N Y / N Y / N Y / N Y / N Y / N		[redacted]	
04/05		" "	100% Saturation?	Y	0% Calibration	Y	pH 4.00 pH 7.00 pH 10.00 EC: 10.03 µS/cm @ 13.4 °C ORP: 248 mV @ 13.6 °C	Y Y Y Y Y	12	pH 4.00: 3.78 pH 7.00: 7.15 pH 10.00 10.00 EC: 10.17 µS/cm @ ~~8.4~~ 13.4 °C ORP: 255.1 mV @ ~~8.4~~ 13.6 °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	Y / N Y / N Y / N Y / N Y / N Y / N	pH recalibrated	[redacted]	
			100% Saturation?	Y / N	0% Calibration	Y / N	pH 4.00 pH 7.00 pH 10.00 EC: ____ µS/cm @ ____ °C ORP: ____ mV @ ____ °C	Y / N Y / N Y / N Y / N Y / N		pH 4.00: pH 7.00: pH 10.00 EC: ____ µS/cm @ 13.4 °C ORP: ____ mV @ 13.6 °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	Y / N Y / N Y / N Y / N Y / N Y / N			
			100% Saturation?	Y / N	0% Calibration	Y / N	pH 4.00 pH 7.00 pH 10.00 EC: ____ µS/cm @ ____ °C ORP: ____ mV @ ____ °C	Y / N Y / N Y / N Y / N Y / N		pH 4.00: pH 7.00: pH 10.00 EC: ____ µS/cm @ ____ °C ORP: ____ mV @ ____ °C	pH 4.00: pH 7.00: pH 10.00 EC: ORP: Temp:	(± pH 0.2) (± pH 0.2) (± pH 0.2) (± 150µS/cm) (± 10mV) (± 2^0C)	Y / N Y / N Y / N Y / N Y / N Y / N			

F3.01 Equipment Calibration Report
YSI ProPlus Water Quality Meter

This YSI ProPlus Water Quality Meter has been performance checked as per the manufacturer's guidelines[1].

Unit Type: YSI ProPlus
Serial Number: 19H102165

The unit has been checked for and comprises of the following items:

Item	Present	Damaged or Absent?
Carry case	✓	☐
Attached sensors (x4)	✓	☐
Spare Batteries	✓	☐
Connector Cable	✓	☐
Instruction Manual	✓	☐

The following tests and operational checks have been conducted on the unit:

Item	Test Completed	Test Passed
WQM unit electrodes cleaned and checked	✓	☐
Operations check (screen functions)	✓	☐
Temperature check	✓	☐

Calibration:

Sensor	Cal. Solution	Value	Reading 27/04	01/04
pH	pH: Buffer Solution 4.00	4.00	4.03	4.05
pH	pH: Buffer Solution 7.00	7.00	7.04	7.03
pH	pH: Buffer Solution 10.00	10.00	10.05	10.08
Redox	Standard ORP solution	___ mV @ __ °c	246 mV @ 17 °c	265 @ 10
O_2	Ambient Air for 100% Dissolved Oxygen	100%	~~noq~~ 102	105
O_2	Sodium Sulphite for 0% Dissolved Oxygen	0%	0.00	0.00
Conductivity	Standard Conductivity Solution	___ µS/cm @ __ °c	10.88 ~~µS~~ mS @ 17 °c	9.17 @ 10

Checked/ Calibrated by: [redacted]

Signed: [redacted]

Date: 04/05/2022

[1] YSI Professional Plus – Calibration Tips; Rev A, December 2010.

APPENDIX

E

DATA QUALITY REVIEW

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Data Quality Review
Blamey Barracks, Kapooka, NSW

This Appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the Assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as trip blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

Cardno undertook a review of its QA/QC as part of the data validation exercise. The findings are summarised below.

QA/QC Aspects	Evidence and Evaluation
QA Documentation	
Sampling and Analysis Quality Plan and Data Quality Objectives	Cardno was engaged by Department of Defence (the client) to carry out the PFAS Ongoing Monitoring Plan (OMP) of the Blamey Barracks Kapooka, Kapooka, NSW, 2661 (the site). The monitoring event commenced on 26 April 2022 until 2 May 2022, and is in general accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP) of 28 October 2021 (Our Ref: OMP002.6.5_Kapooka_SAQP_Rev2). The assessment was carried out in general compliance with the following: ▪ Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds. ▪ Department of Defence (2019), Contamination Management Manual (DCMM), August 2019. ▪ Department of Defence (2019), Pollution Prevention Guideline - Routine Water Quality Monitoring, Department of Defence, Department of Energy, 2018, Quality System Manual Schedule B15. ▪ EPA NSW (2002), The NSW State Groundwater Dependant Ecosystems Policy, April 2002. ▪ EPA NSW (2004), Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales, Publication 1669.2, March 2004 ▪ NSW EPA (2016), Designing Sampling Programs for Sites Potentially Contaminated by PFAS. ▪ EPA NSW (2014), Waste Classification Guidelines – Part 1: Classification of Waste, November 2014. ▪ EPA Victoria (2009), Industrial Waste Resources Guidelines, Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, Publication 701. ▪ Heads of Environmental Protection Authority's Australia and New Zealand (HEPA) (2020), PFAS National Environmental Management Plan (NEMP) Version 2.0, January 2020. ▪ National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).

QA/QC Aspects	Evidence and Evaluation
	▪ National Health and Medical Research Council (NHMRC) (2019), Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water, August 2019. ▪ USEPA (2000), Guidance for the Data Quality Objectives Process (EPA QA/G-4). A quality control program was implemented during the investigation and the quality assurance procedures used have been reiterated in the report. The investigation was carried out in accordance with the Safe Work method Statements (SWMS) and Occupational Health and Safety (OHS) plan for the site. Detailed work plans were also provided for each phase of investigation and are outlined in the SAQP. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
Data Validation Report	This review constitutes a data validation review. This was supported by an Esdat generated “QAQC Checker” excel report, summarised in Tables B4 and B5, Appendix B.
Data Representativeness	
Holding Times	Groundwater, surface water and sediment sample analysis holding times were in conformance with EPA Publication IWRG701 2009 *’Sampling and Analysis of Waters, Wastewaters, Soils and Wastes*.
Background Samples	No background samples were collected as part of this assessment.
Equipment Decontamination	The decontamination methodology conducted during this investigation is documented in the body of the report, and was in general conformance with the SAQP and work plans. ▪ All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent (Liquinonx), then double rinsed with clean water before the sample collection.
Data Precision and Accuracy	
QC Testing – Blind Replicates (Primary Lab)	***Groundwater*** ▪ Acceptance Criteria: RPD < 30% ▪ Groundwater Samples Analysed: 9 ▪ Blind Replicate Samples Analysed: 1 ▪ Blind Replicate Analyte Pairs: 28 (excludes ‘analytes’ that are a summation of other analytes) ▪ Number of Analyte Pairs Exceeding Criteria: 0 ▪ Percentage of Analyte Pairs Exceeding Criteria: 0.00% There were no RPD exceedances observed for PFAS compounds. RPD results are presented in Table B4, Appendix B. ***Surface water*** ▪ Acceptance Criteria: RPD < 30 % ▪ Surface water Samples Analysed: 12 ▪ Blind Replicate Samples Analysed: 2 ▪ Blind Replicate Analyte Pairs: 56 (excludes ‘analytes’ that are a summation of other analytes) ▪ Number of Analyte Pairs Exceeding Criteria: 4 ▪ Percentage of Analyte Pairs Exceeding Criteria: 7.14% The RPD exceedances associated with PFAS compounds are considered to be minor and likely attributed to low concentrations of analyte pairs. Analyte concentrations from the primary sample and their corresponding blind replicate sample pairs were all within one order of magnitude. A number of RPD exceedances may also be attributed to interlaboratory differences, which can be common and significant, based on a study done by the Queensland Department of Environment and Science and the Victorian Environment Protection Authority

QA/QC Aspects	Evidence and Evaluation
	(Vardy et al, 2018). Overall, these RPD exceedances are not considered to impact the results of the investigation. RPD results are presented in Table B4, Appendix B. ***Sediment*** ▪ Acceptance Criteria: RPD < 30 % ▪ Soil Samples Analysed: 11 ▪ Blind Replicate Samples Analysed: 2 ▪ Blind Replicate Analyte Pairs: 56 (excludes 'analytes' that are a summation of other analytes) ▪ Number of Analyte Pairs Exceeding Criteria: 4 ▪ Percentage of Analyte Pairs Exceeding Criteria: 7.14% The RPD exceedances observed for PFAS compounds were considered to be minor and are due to low reported concentrations of analytes close to the LOR or the heterogeneous nature of the sediment. A number of RPD exceedances may also be attributed to interlaboratory differences, which can be common and significant, based on a study done by the Queensland Department of Environment and Science and the Victorian Environment Protection Authority (Vardy et al, 2018). Since they are generally within the same order of magnitude, it is not considered to impact the results of the investigation. RPD results are presented in Table B5, Appendix B.
QC Testing – Field Splits (Secondary Lab)	***Groundwater*** ▪ Acceptance Criteria: RPD < 30% ▪ Groundwater Samples Analysed: 9 ▪ Blind Replicate Samples Analysed: 1 ▪ Blind Replicate Analyte Pairs: 28 (excludes 'analytes' that are a summation of other analytes) ▪ Number of Analyte Pairs Exceeding Criteria: 0 ▪ Percentage of Analyte Pairs Exceeding Criteria: 0.00% There were no RPD exceedances observed for PFAS compounds. RPD results are presented in Table B4, Appendix B. ***Surface water*** ▪ Acceptance Criteria: RPD < 30 % ▪ Surface water Samples Analysed: 12 ▪ Blind Replicate Samples Analysed: 2 ▪ Blind Replicate Analyte Pairs: 56 (excludes 'analytes' that are a summation of other analytes) ▪ Number of Analyte Pairs Exceeding Criteria: 2 ▪ Percentage of Analyte Pairs Exceeding Criteria: 3.57% The RPD exceedances associated with PFAS compounds are considered to be minor and likely attributed to low concentrations of analyte pairs. Analyte concentrations from the primary sample and their corresponding blind replicate sample pairs were all within one order of magnitude. A number of RPD exceedances may also be attributed to interlaboratory differences, which can be common and significant, based on a study done by the Queensland Department of Environment and Science and the Victorian Environment Protection Authority (Vardy et al, 2018). Overall, these RPD exceedances are not considered to impact the results of the investigation. RPD results are presented in Table B4, Appendix B. ***Sediment*** ▪ Acceptance Criteria: RPD < 30 % ▪ Soil Samples Analysed: 11 ▪ Blind Replicate Samples Analysed: 2 ▪ Blind Replicate Analyte Pairs: 56 (excludes 'analytes' that are a summation of other analytes)

QA/QC Aspects	Evidence and Evaluation
	▪ Number of Analyte Pairs Exceeding Criteria: 0 ▪ Percentage of Analyte Pairs Exceeding Criteria: 0.00% There were no RPD exceedances observed for PFAS compounds. RPD results are presented in Table B5, Appendix B.
Trip Blanks	Five (5) trip blanks were collected and laboratory tested for PFAS. All analytes were reported below the limit of reporting (LOR). Trip blank results are presented in Table B6, Appendix B.
Laboratory Internal QC	Evidence of the laboratories internal QC testing is present and complete. Both ALS (the primary laboratory) and Eurofins-mgt performed internal QC with adequate testing and mostly satisfactory results for matrix spikes, method blanks and laboratory duplicates.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. Laboratory reports are included in Appendix C of this report.
Calibration of Field Equipment	All field equipment used was calibrated by the equipment supplier. Additionally, daily bump tests were performed of the water quality meter throughout the monitoring event. Certificates are included in Appendix D of this report. EC results did not pass the bump test on 02/05/2022, however, the impact is considered minor as EC data from the E1 event for Kapooka has been compared against the EC values recorded at the SW locations sampled on 02/05/2022. Only two surface water locations (SW107 and SW108) were sampled on this day at Kapooka with the EC values for SW108 considered to be consistent with those recorded in the E1 event and as such are representative. Values for SW107 vary between the two events and are not considered consistent, however, other parameters recorded (which passed the bump test) indicate a change in conditions between the two events - which may be a result of seasonal variation.
Decontamination and Equipment Blanks	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection. Five (5) rinsate blank samples were tested for PFAS, of which all reported PFAS concentrations below the laboratory LOR. Results are shown in Table B6, Appendix B.
Data Comparability	
Full Review of Data	Once all results have been received, Cardno undertook a full review of the data for any anomalies in consideration of historical data at each location (where available), such as first-time detections or exceedances being reported at locations which have not had detections or exceedances previously. Where potentially anomalous data is identified or suspected, further confirmatory measures were undertaken such as re-extraction and reanalysis of the sample by the laboratory and/or additional data quality review. The samples from the following monitoring locations were re-extracted and re-analysed by the laboratory: MW107, SW149 and SD106.
Standard Procedures	Fieldwork procedures are detailed in the report and followed the work methods outlined in the SAQP.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Volatile Losses	Volatile losses are not applicable to PFAS.
Sample Integrity	Field Chain of Custody forms are included in Appendix C of this report and demonstrate sample integrity.

QA/QC Aspects	Evidence and Evaluation
Data Completeness	
Completeness of Test Program	The scope of work undertaken was generally consistent with that set out in the Sampling and Analysis Quality Plan (SAQP). Variations to the SAQP are detailed in the Factual Report.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process for surface water, groundwater or sediment and therefore, the data set used as the basis for the assessment is considered valid and complete.

APPENDIX

F

INFORMATION ABOUT ENVIRONMENTAL REPORTS

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About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as "residential – low density", "commercial" etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a "snapshot" of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such

unexpected occurrences, given the inherent uncertainties in the assessment process.

Cardno uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno. However, however Cardno cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno
13 August 2015

APPENDIX

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SAQP

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PFAS OMP Sampling and Analysis Quality Plan (SAQP)

Blamey Barracks Kapooka

DEF19008

Prepared for
Department of Defence

28 October 2021

Cardno

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Appendices

Tables

1 Introduction

Cardno has been engaged by the Australian Department of Defence ("Defence" or "Client") to prepare a Sampling and Analysis Quality Plan (SAQP) as part of the Ongoing Monitoring Plan (OMP). The SAQP provides details on monitoring locations, sampling methodologies and quality control / quality assurance measures for the monitoring of per- and poly-fluoroalkyl substances (PFAS) in groundwater, surface water and sediment at and around the "Management Area".

The OMP SAQP applies to Blamey Barracks Kapooka and surrounding areas that make up the "Management Area", outlined in Figure 1, Appendix A. For the purposes of this report:

> "the On-Base Management Area" is defined as a portion of the Blamey Barracks Kapooka ("the Base" or "the Site") including the eastern built up portion of the Base from the Former Quarry in the south to the Wastewater Treatment Plant in the north. It extends as far west as the natural ridgeline that runs north-south through the middle of the Base and to the east to include the Kapooka Creek flow pathway;

> "the Off-Base Management Area" includes the Kapooka Creek flow pathway on public land and all private properties which have some portion of the flow pathway passing through them. This area stretches from the Base, north all the way to the Murrumbidgee River;

> "the Management Area" is defined as comprising the On-Base Management Area, and the Off-Base Management Area, as shown on Figure 1, Appendix A.

The Base is located on Commonwealth Land and is regulated under Commonwealth environmental legislation.

The OMP outlines the rationale and scope for monitoring the concentrations and extent of PFAS in groundwater, surface water and sediment originating from the Management Area for an initial 2-year monitoring period (initial implementation period). The initial implementation period consists of biannual sampling events. Findings from the monitoring will be used to assess any changes to the nature and extent of PFAS impact within the environment, where there is an identified potentially elevated risk to a receptor, or a potential future risk to a receptor.

1.1 Purpose & Objectives

The purpose of the OMP is to set out a program of monitoring to continue to assess the changes in the nature and extent of PFAS within the environment, where Defence's historical use of legacy AFFF has led to an identified potentially elevated risk to a receptor, or potential future risk to a receptor (Jacobs, 2021b).

The SAQP provides details on the implementation of the monitoring program at and around the Management Area. The key objectives of the SAQP are to:

1. Summarise background information in relation to the OMP, including site description, environmental setting, and source areas and risk profile.
2. Present the Data Quality Objectives that drive the delivery of the OMP and the Data Quality Indicators which monitoring data collected will be assessed against.
3. Outline the groundwater, surface water and sediment monitoring network, frequency at which they are sampled, the sampling methodology and laboratory testing and quality control details.
4. Specify the adopted assessment criteria and reporting requirements.

These objectives fulfil the recommendations outlined in the Ongoing Monitoring Plan (OMP) (Jacobs, 2021b) to provide supporting data to inform the ongoing management requirements for impacted media on and off-Base contributing to a potentially elevated risk to receptors.

1.2 Previous Reports

The following key reports prepared in relation to the Blamey Barracks Kapooka PFAS Investigation have been used as a basis to develop this SAQP:

> Golder Associates (2017), Preliminary Site Investigation for PFAS Blamey Barracks Kapooka (0315) (1669283_001_R_Rev1). Golder Associates.

> Cardno (2017), Base Engineering Assessment Program. Part 5 Wastewater and Part 6 Storm Water, Kapooka Military Area Property ID: 0315 (No. 360517/100/5 and 360517/100/6). Cardno.

> Jacobs (2019), Blamey Barracks Comprehensive PFAS Investigation – Detailed Site Investigation (No. IS253200-040-NP-RPT-0002 Rev4). Jacobs Group (Australia) Pty Ltd.

> Jacobs (2021a), Blamey Barracks Comprehensive PFAS Investigation – Human Health and Ecological Risk Assessment (No. IS253200-040-NP-RPT-0006 Rev4 (23rd June 2021).

> Jacobs (2021b) PFAS Ongoing Monitoring Plan (OMP) - Blamey Barracks Kapooka, June 2021.

> Jacobs (2021c) PFAS Management Area Plan (PMAP) – Blamey Barracks Kapooka, June 2021.

1.3 Responsible Parties

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

Table 1-1 Responsible Parties

Role	Responsibilities
Department of Defence – Directorate of PFAS Remediation	▪ Implement this OMP. ▪ Engage suitably qualified environmental consultants/contractors to carry out the works specified in the OMP.
Blamey Barracks Kapooka – Base Manager and Environment and Sustainability Manager	▪ Review and approve all necessary permits required for implementation of the works outlined in the OMP.
Environmental Consultant	▪ Obtain necessary permits from Blamey Barracks Kapooka to implement the works outlined in the OMP. ▪ Liaise with local council or water authority to arrange sampling of off-Base waterways, as required. ▪ Undertake the monitoring activities outlined in this SAQP. ▪ Produce a monitoring report that summarises the data and findings of each monitoring event and is consistent with the requirements of this SAQP. ▪ Produce an annual interpretive report (AIR) including recommendations for any potential changes in the location and frequency of sampling which may be incorporated in the revision of the OMP. ▪ Upload analytical data from each monitoring event to the relevant Defence ESdat database.
Department of Defence and Environmental Consultant (lead)	▪ Liaise with off-Base private property owners/relevant authorities to arrange private property access to conduct sampling and ascertain external party requirements that Defence might be able to assist with.
OMP Lead Consultant	▪ Undertake PMAP and OMP Review.

1.4 Relevant Guidelines

This SAQP has been prepared in general accordance with the current ‘industry standards’ for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

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

> Department of Defence (2019a), Contamination Management Manual, August 2019.

> Department of Defence (2019b), Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance - Routine Water Quality Monitoring.

> Department of Defence, Department of Energy (2019), Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3, 2019.

> Environment Protection Authority (EPA) VIC (2000), Groundwater Sampling Guidelines, Publication 669, April 2000.

- EPA NSW (2002), The NSW State Groundwater Dependant Ecosystems Policy, April 2002
- EPA NSW (2004), Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales, Publication 1669.2, March 2004
- EPA NSW (2014), Waste Classification Guidelines – Part 1: Classification of Waste, November 2014
- EPA NSW (2016a), Designing Sampling Programs for Sites Potentially Contaminated by PFAS.
- EPA NSW (2016b), Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste
- Heads of Environmental Protection Authority's Australia and New Zealand (HEPA) (2020), PFAS National Environmental Management Plan (NEMP) Version 2.0, January 2020.
- National Environment Protection Council (NEPC) (1999), National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).
- National Health and Medical Research Council (NHMRC) (2019), Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water, August 2019.
- USEPA (2000), Guidance for the Data Quality Objectives Process (EPA QA/G-4).
- USEPA (2002), Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8).

1.5 Standards of Assessment and Limitations

This SAQP has been prepared in general accordance with the current industry standards for an assessment of this type for the purpose, objectives and scope identified in this report. The SAQP is considered a living document and will be updated as additional monitoring data becomes available.

This SAQP is not any of the following:

- An Environmental Audit Report as defined under the Contaminated Land Management Act 1997.
- A Geotechnical Assessment.
- A Detailed Site Investigation (DSI).
- A Detailed Hydrogeological Assessment.
- A Remediation Action Plan (RAP) report.
- A Site Management Plan (SMP).

2 Site Description

A detailed description of the Base is provided in the OMP (Jacobs, 2021b), which is summarised below.

The Base is located approximately 5.0 km to the west of Wagga Wagga and 160 km west of Canberra. The Base is bound between the Sturt Highway to the north and the Olympic Highway to the east and south. Churches Plain Road runs along the western boundary.

The Base is owned by the Commonwealth of Australia and comprises an area of approximately 1,990 hectares. The Army Recruit Training Centre (ARTC) is located on the Base, providing training to 3,500 Army regular and 2,000 Army Reserve recruits annually (KBR, 2013), in addition to providing specialist training for the Army and other battalions. Recruits are housed on-Base at Blamey Barracks, which comprises a range of functions and amenities. The Base includes approximately 220 buildings and accommodation for up to 1,800 staff (Cardno, 2017). A private lease has been held for stock agistment across grassed areas of the Base for the purposes of fire vegetation management for approximately 20 years. The Base comprises the following areas (as shown in Figure 1, Appendix A):

- Range Complex, which includes ranges and campsites.
- Field Training Areas, primarily used for movement exercises.
- Cantonment, including accommodation and administrative facilities, the Wastewater
- Treatment Plant (WTP) and Fire Station.

> Disused features, which include the Former Quarry, former informal Fire Training Areas and
> Fire Training Pad, Former Commandant's House, Former Incinerator, and Buried Waste Areas.

2.1 Site Definition and Planning

For the purposes of this SAQP report, "the Base" is defined as comprising Blamey Barracks Kapooka. A detailed description of the Base is provided in the OMP (Jacobs, 2021b). The Base location is presented on Figure 1, Appendix A.

Key site identification details are presented in Table 2-1.

Table 2-1 Site Identification Details

Details	Description
Site Address	Blamey Barracks, Kapooka, NSW, 2661
Land Description	Blamey Barracks Kapooka
Owner	Department of Defence
Title Details	▪ Lots 1, 2, 6, 7, 9 & 10 in Deposited Plan (DP) 113507 (6.12 hectare [ha]) ▪ Lots 3, 8, 9, 10, 11 & 12 DP 205379 (153.72 ha) ▪ Lots 1, 2, 3, 4, 5, 6 & 8 DP 262372 (104.98 ha) ▪ Lot 1 DP 389778 (72.86 ha) ▪ Lots 1 & 2 DP 534820 (1279.25 ha) ▪ Lots 1 & 2 DP 627836 (18.26 ha) ▪ Lots 1 & 2 DP 725226 (16.99 ha) ▪ Lots 1, 2, 3 & 4 DP 725227 (42.97 ha) ▪ Lots 58, 59, 64, 65, 66, 85, 87, 88, 89, 90, 91, 92, 93, 113 & 163 DP 754567 (288.80 ha) ▪ Lot 1 DP 851602 (0.28 ha)
Planning Zone / Land use	Commonwealth Land Special Use, SP2 – Infrastructure (Defence)
Local Government Authority (LGA)	Wagga Wagga City Council
Source: Jacobs, June 2021, Blamey Barracks Kapooka PFAS Ongoing Monitoring Plan (Jacobs, 2021b)	

2.2 Surrounding Land Uses and Zoning

Land surrounding the Base is zoned 'Primary Production (RU1)', 'General Residential (R5)', 'Conservation (E2)' and 'Public Recreation (RE1)' in the Wagga Wagga City Council municipality. The surrounding land uses are outlined in Table 2-2.

Table 2-2 Surrounding Land Uses

Direction	Land Use
North	▪ RU1 – Primary Production, around the base and north of the Sturt Highway, consisting of cleared grassland with intermittent houses and farm dams, with primary agricultural activities identified as cattle, sheep and grain farming. ▪ R5 – Large Lot Residential, including San Isidore which is immediately adjacent to the north-eastern boundary of the Base. In addition to large, rural residential properties, it also contains a rural fire station, sporting field and church. ▪ RE1 – Public Recreation, at Pomingalarna Reserve to the north of Sturt Highway, north east of Base.
West	▪ RU1 – Primary Production, west of the base towards Yarragundry, primarily consisting of cleared grassland with intermittent houses and farm dams, with primary agricultural activities identified as cattle, sheep and grain farming.
East	▪ E2 – Conservation, a strip which aligns with forested areas on the ridge to the east of the Base, between the Base and the City of Wagga Wagga. ▪ R1 – General Residential, approximately 3.6km from the eastern boundary of the Base, where the westernmost suburbs of the City of Wagga Wagga are located.

Direction	Land Use
South	▪ Former quarry

3 Environmental Setting

Key details defining the site are summarised in Table 3-1. See Figure 1, Appendix A for key features.

Table 3-1 Key Site Details

Setting	Description (Adapted from Jacobs, 2021c)
Climate	Climate indicators have been recorded at nearby Wagga Wagga Aeronautical Meteorological Office (AMO) (072150) since 1941. Mean maximum temperatures range from 12.8°C in July to 31.9°C in January. Mean annual rainfall at this station in this period is 571.4 mm, with rain falling relatively evenly across the months of the year. The minimum mean monthly rainfall occurs in January with 40.1 mm, and the maximum in October with 55.8 mm. The prevailing wind direction in the morning (9am) is from the east while in the afternoon (3pm) the prevailing winds are from the west and, to a lesser extent, the south west. The Bureau of Meteorology (BoM) Kapooka (Defence) station (074272) has been operational since September 2017, representing a record of only three years. The mean maximum temperature in the last three years at this station is 14.0°C in July and 36.0°C in January. This is slightly warmer compared to mean temperatures of 13.7°C in July and 35.4°C in January over the same period at Wagga Wagga AMO (2017 to present). Meanwhile in the last three years, compared to greater historic trends, rainfall has been less annually and less consistent across the year with greatest average monthly falls in June, November and December (41.3 – 64.2 mm) and lower falls in July, August and September (13.1 – 21.6 mm) recorded at the Defence 074272 station. In the same timeframe (2017 to present), the Wagga Wagga AMO station has recorded lows in mean monthly rainfall generally around February to June (range of 0.0 to 4.0 mm) and highs spread across a range of months mainly in November and December (63.0 to 101.6 mm).
Topography	The regional topography comprises ridges and minor tablelands stepping down westwards and breaking into detached hills with intervening alluvial valley floors. Locally, a ridgeline intersects the Base through the middle from south to north, comprising rocky outcrops, small hills and valleys. Elevations across the Base range from 190 m AHD at the northern extent to 370 m AHD at the peak towards the centre. To the east of the ridge, developed areas including the Barracks drop from approximately 270 m AHD to 230 m AHD from west to east.
Geology	Geology at the Base and surrounding areas consists of four main units including basement Ordovician aged metamorphic and sedimentary rock and Silurian aged Collingullie Granite. These basement lithologies are overlain by colluvial soils on-Base and to the south and alluvial sands and gravels interbedded with clay layers in the north associated with historical meanders of the Murrumbidgee River (Jacobs, 2021).
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the CCMA[2] Soil Health online database indicates that the most southerly section of the site is classified as having a high probability of ASS occurrence and the rest of the site having a low probability of occurrence.
Hydrology	Watershed from rain is controlled by the central north-south trending ridgeline on-Base. To the east of the ridge, surface water drains from west to east in localised channels and feed into Kapooka Creek. Kapooka Creek is ephemeral and begins in the south eastern portion of Base as an unlined channel and runs in a northerly direction towards the Murrumbidgee River. Flow in the creek only occurs during heavy rain fall. Through San Isidore, Kapooka Creek transitions to a series of dams and low-lying areas. North of the Sturt Highway (near where the geology transitions from colluvial soils to alluvial deposits associated with the Murrumbidgee River), Kapooka Creek fans out and becomes discontinuous. Further to the east of Kapooka Creek is another north to south trending ridge line that forms the eastern extent of the valley in which the eastern portion of Base and San Isidore sit. Surface water from areas to the west of the central north-south trending ridge on-Base, including the Former Quarry and Former Commandants House, drain west towards Sandy Creek. Sandy Creek is also ephemeral and comprises a flow channel with intermittent farm dams. During heavy rain fall, Sandy Creek flows northwards and drains into the Murrumbidgee River approximately 7.5 km downstream (i.e. to the west) of Kapooka Creek. The Murrumbidgee River is a major river in the area flowing year-round from east to west and is approximately 80 m in width.
Hydrogeology	Hydrogeological units at the Base and surrounding areas can be grouped into the following:

Setting	Description (Adapted from Jacobs, 2021c)
	▪ Perched water on-Base surrounding the Wastewater Treatment Plant hosted in clay with some silt. Findings in the DSI indicate this perched water isn't laterally continuous and is likely related to the adjacent Wastewater Treatment Plant ponds. ▪ Perched water identified in MW601 along the Kapooka Creek flow path off-Base. Water in MW601 is hosted in colluvial soils at 13.0 mBGL associated with Kapooka Creek. Below this is a consistent clay layer from 25.0 to 30.0 mBGL, which is sufficiently continuous to act as an aquiclude preventing migration of PFAS impacted perched water from Kapooka Creek downwards into regional groundwater. ▪ Regional groundwater is hosted in fractured rock aquifers to the south of the Management Area and on-Base. Groundwater wells in this unit are hosted in granite, shale and siltstone. Regional groundwater is hosted in alluvial deposits in the north of the Management Area, where the geology transitions to interbedded alluvial sandy gravels and clays associated with the Murrumbidgee River.
Environmental Sensitive Areas	The sensitive receptors to the area include (but are not limited to): ▪ Mammals including the Eastern Bentwing-bat (Miniopterus schreibersii oceanensis), and the Squirrel Glider in the Wagga Wagga Local Government Area (Petaurus norfolcensis, endangered population) ▪ Birds including the Grey-crowned Babbler eastern subspecies (Pmatostomus temporalis temporalis), the Rainbow Bee-eater, the Magpie Goose, and the White-bellied Sea-Eagle ▪ Reptiles including the Southern Bell Frog (Litoria raniformis), and Sloane's Froglet (Crinia sloanei) ▪ Semi-aquatic & aquatic biota including Murray Cod (Maccullochella peelii) & Trout Cod (Maccullochella macquariensis) ▪ Grass, trees & other vegetation including the Lower Murray River aquatic ecological community, Grey Box (Eucalyptus microcarpa), Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
Further information can be found in the DSI report (Jacobs, 2019).	

4 Source Areas and Risk

4.1 Source Areas

The Site has been the subject of numerous PFAS investigations, as detailed in section 1.2.

Historical use of firefighting foam products occurred at the Base until approximately 2008. The majority of primary source areas relate to storage or testing of firefighting foam equipment, including the Fire Station, Fire Training Pad, Fire Training Areas, the Parade Ground and the Former Quarry. Primary source areas also include several areas related to waste disposal including the Enhanced Land Force (ELF) Stockpiles and Buried Waste Areas. Two other primary source areas relate to singular or less frequent discharges of firefighting foam products including use for a waterslide at annual Christmas parties from 1995 and 2003, and in response to a fire at the Former Commandant's House in 2006.

Secondary source areas are related to waste treatment and discharge of treated effluent, including the Wastewater Treatment Plant (WTP) and grassy areas on-Base irrigated with treated effluent (Reused Effluent Irrigation Areas).

There are several Source Areas where PFAS has been detected in soil or groundwater at concentrations exceeding the adopted assessment levels. These are shown in Figure 2, Appendix A, and include the following:

Primary sources:

> Fire Station (RMV0050-3)

> Former Fire Training Area #1 (RMV0050-3) and Inactive Incinerator (RMV0122)

> Former Fire Training Area #2 / Inactive Grenade Range (RMV0058)

> Buried Waste Area #3 (RMV0054)

> ELF Stockpiles

> Parade Ground
> Christmas Party Use Area
> Fire Training Pad
> Former Quarry (RMV0117)
> Former Commandants House

Secondary sources:

> Reused Effluent Areas
> WTP (RMV0051)

4.2 Risk Profile

A summary of “elevated” or “unable to be excluded” current and potential risks identified in the Human Health and Ecological Risk Assessment (HHERA) report (Jacobs, 2021a) is provided below.

Current risks:

> Consumption of fish from private dams by residents.
> Consumption of home-slaughtered lamb for meat consumption by residents.
> Cumulative exposure risk to residents through consumption of multiple produce types.
> Direct toxicity to lower order species.
> Bioaccumulation and effects on higher order species.

Potential risks:

> Consumption of home-grown duck eggs by residents.
> Consumption of home-slaughtered pigs for meat consumption by residents.
> Consumption of milk from dairy cattle raised by residents.

5 Data Quality Objectives

This SAQP has been developed based on a set of Data Quality Objectives (DQO) in reference to the DQO presented in the OMP (Jacobs, 2021b), and based on guidance presented in the US Environmental Protection Agency (EPA, 2006), and NEPM 2013 (Schedule B2). The DQO process comprises the following seven steps:

> Step 1: State the problem
> Step 2: Identify the Decision
> Step 3: Identify the Information Inputs
> Step 4: Define the Boundaries of the Study
> Step 5: Develop the Analytical Approach
> Step 6: Specify Performance or Acceptance Criteria
> Step 7: Develop the Plan for Obtaining the Data

The DQO are detailed in Table 5-1.

Table 5-1 Data Quality Objectives

Data Quality Step	Description
Step 1: State the Problem	Historic use of PFAS containing fire-fighting foams on-Base in response to incidents (i.e. fires) and in training has caused PFAS contamination of soil. Contaminated soil source areas are contributing to PFAS discharge in groundwater and surface water along surface drainage pathways off-Base, primarily into Kapooka Creek. These discharges have led to

Data Quality Step	Description
	potentially elevated risks to human health and the environment. Ongoing monitoring is needed to assess the effectiveness of these actions, to provide data for future risk management and to inform management decisions by Defence and relevant NSW government agencies. **Primary Source Areas** Areas where PFAS was detected in soil or groundwater exceeding the adopted assessment levels include areas associated with waste disposal including the ELF Stockpiles and Buried Waste Areas; areas which relate to the use or testing of firefighting foam equipment, including the Fire Station, Fire Training Pad, Former Fire Training Areas, the Parade Ground and the Former Quarry; and two other primary source areas which relate to singular or less frequent discharges of firefighting foam, including the waterslide at the site of annual Christmas parties from 1995 and 2003, and in response to a fire at the Former Commandant's House in 2006. **Secondary Source Areas** Secondary source areas are related to waste treatment and the discharge of treated effluent, including the WTP and Reused Effluent Irrigation Areas.
Step 2: Identify the Decision	Findings from the initial 2-year implementation period will be used to assess any changes to the nature and extent of PFAS impact and whether there are any changes to risks to receptors. This information will feed into any appropriate revisions to the OMP. The OMP is to provide further data to assess the following principal study questions: ▪ What are the changes and trends in the nature, extent and magnitude of PFAS concentrations in the groundwater and surface water within the Management Area? ▪ Has the nature, extent and risk associated with PFAS concentrations changed significantly to warrant refinement of any existing management measures?
Step 3: Identify the Information Inputs	The following inputs are required to resolve the principal study questions outlined in Step 2: ▪ Existing data relevant to PFAS in soil, waters and biota obtained through the DSI, HHERA and other environmental investigations (including the preliminary site investigation). ▪ Understanding of surface water and groundwater flow pathways identified in the DSI and HHERA. ▪ Locations and types of human and environmental receptors as defined in the DSI and HHERA. ▪ New data collected as part of the OMP.
Step 4: Define the Boundaries of the Study	The following are to be undertaken in line with the initial 2-year implementation of the OMP, after which the available data will be reviewed and evaluated to determine if the frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors: ▪ Ongoing monitoring will generally be undertaken within the boundaries of the Management Area (Figure 1, Appendix A) at groundwater, surface water and sediment monitoring locations as outlined in Table 6-1 and Table 6-3. ▪ Monitoring of groundwater, surface water and sediment including sampling will be undertaken twice yearly every six months, nominally one event post-winter (September/October) and one event post-summer (March/April). ▪ Where possible, mobilising to collect samples during or shortly after a significant rainfall event should be attempted for one of the sampling events each year.
Step 5: Develop the Analytical Approach	▪ The analytical and field data will be used to assess changes to the nature, extent and magnitude of PFAS in surface water, sediment and groundwater and to provide supporting data for assessment of management actions, where relevant. ▪ Trends in PFAS concentrations, including an assessment of temporal and spatial changes, should be assessed using an appropriate statistical analysis approach (e.g. using Mann- Kendall, GWSdat or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed ▪ The analytical data will be compared to the relevant assessment levels presented in Section 7 and to the concentrations recorded during prior monitoring rounds [i.e. during the DSI (Jacobs, 2019)] to evaluate changes in the risk profile and whether revision of the HHERA or implemented management measures is warranted.

<table>
<tr><th>Data Quality Step</th><th>Description</th></tr>
<tr><td></td><td>Where exceedances of adopted assessment criteria are reported, further interrogation of data will be undertaken to assess the risk profile and location. A summary of the key decision rules are as follows:
1. Has the analytical data collected as part of the monitoring program met the Data Quality Indicators (DQI) outlined in Table 5-2? If yes, then the data can be used to answer the decision rule below and the principal study questions developed in Step 2. If no, then an assessment of the need to collect additional data will be required.
2. Does the data indicate a change to level of risk defined in the DSI and HHERA? If yes, then further risk assessment will need to be carried out. This may lead to a need to revise the PMAP. If no, then continue monitoring as per the OMP.
3. Does the data conform with the most up to date Conceptual Site Model (CSM)? If yes, then continue monitoring as per the OMP. If no, then further risk assessment will need to be carried out. This may lead to a need to revise the PMAP.
4. Is the data meeting the DQO as outlined in the OMP? If yes, then continue monitoring as per the OMP. If not, then a revision of the OMP should be undertaken.
5. Has the proposed time period of the OMP been achieved? If yes, review the available information and determine if continued monitoring is required. If yes, continue monitoring as per the OMP.
Trigger levels to assist in the above decision rules are detailed in the OMP (Jacobs, 2021b).</td></tr>
<tr><td>Step 6: Specify Performance or Acceptance Criteria</td><td>The potential for significant decision errors will be minimised by completing a robust quality assurance/quality control (QA/QC) program in accordance with National Environmental Protection Measure (NEPM) (NEPC, 2013) and PFAS NEMP (HEPA, 2020) guideline requirements. Standard operating procedures will be closely followed in the field to ensure accurate and representative data acquisition. DQI will be applied to assess usability of data prior to making decisions, based on precision, accuracy, representativeness, comparability and completeness.
The acceptable limit on decision error is 95% compliance with the applied DQI (see Table 5-1). If any of the DQI are not met, further assessment will be necessary to evaluate the significance of the non-conformance and implement corrective actions.</td></tr>
<tr><td>Step 7: Develop the Plan for Obtaining the Data</td><td>The scope of the OMP has been made in consideration of historical activities at the Site, historical investigations and findings (i.e. DSI, groundwater assessments) in the context of developing responses to the principal study questions outlined in Step 2 of the DQO process.
The OMP scope for the first 2 years of monitoring is outlined in Section 6. Following the initial implementation period of 2 years (and review following each monitoring event), the available data will be reviewed and evaluated to determine if any changes to the scope of monitoring are required in order to meet the objectives to provide better understanding of PFAS concentration fluctuations and potential risks to receptors.
As additional information is gathered during the course of this investigation/monitoring, it may be beneficial for the proposed scope of works to be altered from the initial design. Changes to the proposed monitoring may be made based on risk profile reviews and updated CSM, in consultation with the Client and PMAP Lead Consultant.
Other measures adopted to optimise the collection of data to meet the DQO include:
▪ the use of NATA-accredited laboratories for PFAS analysis to ensure laboratory limit of reporting (LOR) are suitable to meet the relevant adopted assessment levels (where possible).
▪ the use of field scientist(s) with relevant experience to ensure all field and laboratory QA/QC protocols are adhered to by the field team.
▪ the adoption of field and analytical techniques that are in accordance with current industry standards, including the PFAS NEMP (HEPA, 2020), and ASC NEPM (NEPC, 2013).</td></tr>
</table>

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

Table 5-2 Data Quality Indicators

Data Quality Indicator	Detail
QA Documentation	Provision of appropriate work plans, DQI and DQO defined for the Site and all QA/QC aspects documented.
Bias	A measure of the potential distortion in an analysis which can result in errors in one direction (e.g. one laboratory consistently higher results or consistent poor spiked matrix recovery). Bias will be assessed with reference to the analysis of spiked matrix samples (NEPC, 1999b).
Representativeness	A qualitative measure of the confidence that data is representative of each medium present on the Site. Use of appropriate and documented sampling methods, sample handling, preservation and transport, and holding times.
Precision:	A quantitative measure of data variability or reproducibility, measured by the calculation of %RPD values for duplicate samples (i.e. measure of agreement). Precision in DQI can be measured as follows: ▪ Percentage of the mean of the measurement such as Relative Percent Difference (i.e. %RPD). The %RPD will be calculated for the field and secondary duplicate (i.e. inter and intra-laboratory analysis); and ▪ Use of similar analytical method and instrument (e.g. for inter-laboratory assessment). The %RPD will be considered as acceptable if the values are less than 30% (NEPC, 2013). Should there be a result that is greater than 30% difference, then a "review should be conducted of the cause (e.g. instrument calibration, appropriateness of method used)" (NEPC, 2013). Laboratory analysis of intra- and inter-laboratory samples (1 per 10 samples collected) to be collected.
Accuracy	A quantitative measure of the closeness of data to a 'true value', measured by the analysis of spike, blank and laboratory control samples (LCS). The LCS consists of a standard reference material or a matrix of known concentration. For the purpose of assessing accuracy it is required that at least one LCS for each process batch[1] be analysed (NEPC, 2013).
Comparability	A qualitative measure of the confidence that data may be considered to be equivalent for each sampling and analytical event. By use of standard procedures, comparable methods, qualified personnel and review of sample integrity. When all results have been received, Cardno will undertake a full review of the data for any anomalies in consideration of historical data at each location (where available), such as first-time detections or exceedances being reported at locations which have not had detections or exceedances previously. If potentially anomalous data is identified or suspected, further confirmatory measures will be undertaken such as re-extraction and reanalysis of the sample by the laboratory and/or additional data quality review.
Completeness	A measure of the amount of usable data (expressed as a percentage - %) from a data collection activity, based on completeness of test program, overall QA/QC completeness and validity of data set.

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

6 Ongoing Monitoring Program

6.1 Groundwater Monitoring

6.1.1 Groundwater Monitoring Network

The network of on-Base and off-Base groundwater monitoring locations sampled as part of the DSI (Jacobs, 2019) and HHERA (Jacobs, 2021a) are summarised in Table 6-1. Existing monitoring wells included in the OMP, and justification, are summarised in Table 6-2 and shown in Figure 3, Appendix A. Well construction details are presented in Appendix C.

Table 6-1 Blamey Barracks Kapooka Groundwater Monitoring Network

Source Area Targeted	Frequency	Location (On-Site/ Off-Site)	Monitoring Well / Bore ID	Rationale
Wastewater Treatment Plant		On-Base	MW103, MW104, MW107	MW103 and MW104 are adjacent to the WTP. MW104 is located on the northern boundary of the WTP. MW103 and MW104 are installed within the regional aquifer, and MW107 is installed within the perched water layer.
Former Commandants House		On-Base	MW008, MW109, MW110	MW008 near the Former Commandants House has had consistent detections of PFAS above laboratory LOR. MW109 and MW110 to be monitored to confirm extent of PFAS in groundwater associated with impacts detected at MW008.
	Once every 6 months	Off-Base	MW625	MW625 is located off-Base and will be monitored to confirm extent of PFAS in groundwater associated with impacts detected at MW008 and potential for future migration down-gradient to the north-west.
Kapooka Creek flow pathway		Off-Base	MW601, MW624	MW601 installed in perched water associated with Kapooka Creek and has reported PFAS concentrations with an apparent increasing trend that needs to be assessed further. MW624, adjacent to Kapooka Creek, is screened in shale in the regional aquifer and has not reported PFAS above the laboratory LOR. Ongoing monitoring is required to monitor for the potential migration of PFAS from the perched water into the regional aquifer.

6.1.2 Monitoring Frequency

Groundwater sampling frequency is listed Table 6-1.

6.1.3 Groundwater Sampling Methodology

Groundwater monitoring will be undertaken as detailed in Table 6-2.

Table 6-2 Groundwater Monitoring Wells – Sampling Method

Activity	Details
Well Gauging	Standing Water Level (SWL) will be gauged using either an interface probe or a water level meter. All wells will be measured against a specified mark at the top of the well casing. A consolidated groundwater gauging event will be undertaken at the commencement of each monitoring event. All groundwater monitoring wells listed in Table 6-1 will be attempted to be gauged.
Groundwater Field Parameters	Groundwater field parameters will be recorded with a water quality meter before sample collection (with the sample in a clean jar) prior to deployment of the HydraSleeve®, or using extra sample water from within the HydraSleeve® decanted into clean jars if the HydraSleeve® is already deployed. With the exception of MW008, sampling will be completed via Hydrasleeve® technique. MW008 will be sampled by low-flow micropurge as specified in the OMP (Jacobs, 2021b), which states that "MW008 is not suitable for sampling with Hydrasleeve due to the approximate one-metre diameter of the well". Groundwater water quality field parameters will be monitored and recorded during groundwater removal (purging), prior to collecting groundwater samples for laboratory analysis. The following field parameters will be recorded using a water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. The Groundwater Sampling Guidelines (EPA VIC, 2000) state that the following parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within; ▪ ± 10% for dissolved oxygen (DO) ▪ ± 3% for electrical conductivity ▪ ± 0.1 for pH ▪ ± 10 mv for redox potential +/- 10% Temp (°C) All field instruments (e.g. water quality meter) will be calibrated prior to field events and as required during monitoring to optimise the accuracy of the measurements taken. The water quality meter will be bump tested daily and re-calibrated as required.
Deployment of HydraSleeve®	HydraSleeves® will be deployed to the base of wells, or a minimum of 2.5m within the screen interval. A top weight will be utilised if water depth of screen requires compression of the HydraSleeve®. As dedicated HydraSleeves® will be used at each groundwater bore, the HydraSleeves® will be redeployed after each sampling event.
Retrieval of HydraSleeves® (Sample Collection)	HydraSleeve® sampling devices will be left in wells for a minimum of 4 hours when deployed with bottom weights only, to allow restabilisation of the well following the slight disturbance caused by sampler deployment. For wells with a shallow water column (nominally less than 2.5m in height, although depends on the length of the HydraSleeve®), HydraSleeve® sampling devices will be deployed with both top and bottom weights, and will be left in the well for a minimum of 24 hours. This is to allow the top weight time to compress the HydraSleeve into the bottom of the well and restabilisation of the well following the slight disturbance caused by sampler deployment. Samples will be collected via continuous pull method at a rate of approximately 30 cm per second, allowing the water to pass through the check value into the sample sleeve.

Activity	Details
	Samples will be discharged immediately (to minimise changes in chemistry) via discharge tube.
Sample collection by low-flow Micropurge (MW008)	Groundwater sampling will commence once the water quality field parameters have stabilised, indicating that they represent natural groundwater in the aquifer. Samples will be collected directly into appropriately preserved laboratory supplied bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody (COC) documentation. Disposable High-Density Polyethylene (HDPE) tubing will be utilised for sampling and will be taken off-site for disposal following completion of sampling.
Sample collection by bailer	Where insufficient water is retrieved with the HydraSleeve®, samples will be collected using disposable bailers. Wells will be purged 3 bore volumes, or until dry, whichever is sooner, prior to sample collection.
Sample identification, preservation transport and holding times	Each sample will be labelled with the sample location, date, project identification number and sampler's initials. Sample labelling and naming will be in accordance with Annex L of the Defence Contamination Management Manual (DCMM). Samples will be collected directly in into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under COC documentation. Sample containers, preservation procedures, sample storage requirements and holding times will be undertaken in accordance with the requirements set out in Australian Standard AS/NZS 5567.1:1998 and AS 4482.1.
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions. ▪ Sample collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. ▪ Calibration records. ▪ Daily bump test records. All sampling documentation including field notes, reporting records, COC documentation, equipment calibration certificates and bump test records, and procedures will be retained within project files.
Decontamination	Dedicated HydraSleeves® will be used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment (such as the interface probe and micropurge pump) will be thoroughly washed using phosphate-free detergent (Liquinox), then double rinsed with clean water before the sample collection.
Laboratory Testing	All groundwater samples will be analysed for the full PFAS analytical suite (see Appendix B).
Laboratory Testing – Quality Control	Groundwater QC samples will be collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples should be sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Trip blank samples of 1 per shipment to be included in the chilled sample containers upon transport to the laboratory. All QC samples will be tested for a full PFAS analytical suite (see Appendix B).
Laboratory Accreditation	All groundwater analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories. ▪ Secondary analysis will be undertaken by Eurofins.

6.2 Surface Water and Sediment Monitoring

6.2.1 Monitoring Locations

The proposed on-Base and off-Base surface water, sediment and sewer monitoring locations are set out in the Figures 3 (Appendix A) and are summarised in Table 6-3. Sampling locations are grouped into areas and justification is provided for each sampling area.

Table 6-3 OMP Surface Water and Sediment Monitoring Locations and Frequency

Sampling Area	Frequency	Location (on-Site/off-Site)	Monitoring locations	Justification (from the OMP; Jacobs, 2021b)
Overland drainage pathways on-Base	Once every six months	On-Base	SW/SD136 SW/SD103 SW/SD106 SW/SD107 SW/SD118	These sample locations are in surface water pathways on the eastern side of the Base that feed into Kapooka Creek. SW/SD136 and SW/SD103 are downstream near to the Fire Station and SW/SD107 is also downstream of the Fire Station and is located in a retention basin which has been considered for use as part of potential management actions in the PMAP. SW/SD106 is in the drainage pathway from treated effluent irrigation areas just prior to Kapooka Creek. SW/SD118 is near Kapooka Creek on-Base. These sampling locations provide an overview of the concentrations in surface water feeding into Kapooka Creek as a result of source areas on the eastern portion of the Base.
Kapooka Creek		On-Base	SW/SD121	Risks identified off-Base in the HHERA are all associated with Kapooka Creek. The three proposed sampling locations include SW/SD121 in an on-Base dam just prior to Kapooka Creek flowing off-Base into San Isidore and two off-Base locations on public land, approximately evenly spaced between the Base and the Murrumbidgee River. The two off-Base locations (SW/SD614 and SW/SD677) are unlikely to have water present unless there has been recent rain. Therefore, it is proposed at a minimum that sediment samples are collected from these locations to assist with monitoring variability in PFAS levels along Kapooka Creek.
		Off-Base	SW/SD614 SW/SD677	
Sewer		On-Base	SW140 SW144 SW148 SW149	Sewer samples SW140 and SW148 are adjacent to former Fire Training Areas. SW144 and SW149 are included as these locations are immediately upstream and downstream of SW148. Similar sampling locations are not available for SW140. If results in the OMP are found to be consistent with those in the DSI, these sampling locations may be reviewed and possibly removed from future OMP monitoring rounds.
Wastewater treatment plant ponds	Once every six months	On-Base	SW/SD108 SW/SD111	The results from previous sampling rounds have shown a slight decreasing trend in PFOS + PFHxS concentration. The objective of these sampling locations is to assess this trend. As with the sewer samples, the need for sampling beyond the first OMP round should be reviewed based on results.
Overland drainage pathways – Former Quarry		On-Base	SW/SD127	Surface water and sediment sampling point downstream of the Former Quarry in the southwest area of the Base. The DSI identified that PFAS from the Former Quarry is considered to be localised and not migrating to Sandy Creek to the west. This sampling point is to monitor this over time and provide a trigger for review if concentrations of PFAS increase and/or decrease over time.

6.2.2 Surface Water and Sediment Monitoring Frequency

The frequency of surface water and sediment monitoring is listed in Table 6-3. This sampling will be conducted in conjunction with the groundwater monitoring described in Section 6.1

6.2.3 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 6-4.

Table 6-4 Surface Water Monitoring

Item	Details
Field parameters	Surface water quality field parameters [i.e. pH, electrical conductivity (EC), oxidation reduction potential (ORP), dissolved oxygen (DO), and temperature] will be recorded at the time of sampling using a pre-calibrated water quality meter. The water quality meter will be bump tested daily and re-calibrated as required. Field observations such as colour, odours, flow direction and strength of flow, suspended solids and sheen presence will also be recorded on field sampling sheets.
Surface Water Sampling Method	Where possible, surface water samples will be collected directly into laboratory supplied sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. The sample container is secured to the end of the sampling device and is then lowered into the water, oriented with the capped opening facing downwards to avoid the collection of surface films. Where depth permits, the sample container should be positioned at least 10 cm below the surface water level and above the sediment bed before reorienting the sample container so that the capped opening is facing upwards, allowing it to fill. Samples will be collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) '*Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'*.
Sewer Sampling Method	Sewer sampling will be completed at maintenance pits. The maintenance cover (a round concrete plug) is to be lifted and a grab sample of water collected directly from the flow via a long-handled sampling device. For sampling within the Wastewater Treatment Plant ponds, the same method as surface water sampling should be followed.
Sample Collection	Water samples will be placed directly into appropriately labelled, laboratory supplied sample bottles and packed in chilled containers for delivery to the laboratory under COC documentation. Sample containers will include water resistant labels attached to the sample bottles.
Sample identification, preservation, transport and holding times.	Each sample will be labelled with the sample location, date, project identification number and sampler's initials. Sample labelling and naming will be in accordance with Annex L of the DCMM. Samples will be contained in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under COC documentation. Sample containers, preservation procedures, sample storage requirements and holding times will comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions. ▪ Sample collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. ▪ Calibration records. ▪ Bump test records. All sample documentation including field notes, reporting records, COC documentation, equipment calibration certificates and bump test records, and procedures will be retained within project files.
Decontamination	All re-usable sampling equipment (such as the long-handled sampling device) will be thoroughly washed using phosphate-free detergent (Liquinox), then double rinsed with clean water before the sample collection.

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td>Laboratory Testing</td><td>All surface water samples will be analysed for the full PFAS analytical suite (see Appendix B).</td></tr>
<tr><td>Laboratory Testing – Quality Control</td><td>Surface water QC samples will be collected at the following frequencies:
Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples.
Field triplicate (inter-laboratory) samples at 1 per 10 water samples should be sent to a secondary laboratory.
Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)].
Trip blank samples of 1 per shipment to be included in the chilled sample containers upon transport to the laboratory.
QC samples will be tested for a full PFAS analytical suite (see Appendix B).</td></tr>
<tr><td>Laboratory Accreditation</td><td>All surface water analysis will be undertaken by the following NATA-accredited laboratories:
Primary analysis will be undertaken by ALS Global Laboratories.
Secondary analysis will be undertaken by Eurofins.</td></tr>
</table>

6.2.4 Sediment Sampling Methodology

The methodology for sediment sampling is detailed in Table 6-5.

Table 6-5 Sediment Investigation Methodology

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td>Sample Collection</td><td>Sediment samples should be collected from the approximate mid-point of the flow pathway, to the extent practicable, and collected from the top ten centimetres after removal of the immediate surface material using hand tools (e.g. trowel, hand auger, PVC pipe, etc.). Sediment samples should be collected after the co-located surface water sample is collected to prevent agitating sediments into the water body and surface water sample matrix. Samples should be placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under COC documentation.
At each sampling location, the sediment sample will be visually assessed and observations (physical description including makeup, colour, visible signs of contamination and moisture) recorded on field data sheets.</td></tr>
<tr><td>Field Records</td><td>Field records will include the following information:
Sampling time, date and name of the sampler.
Weather conditions.
Sample collection method.
Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised.
All sample documentation including field notes, reporting records, COC documentation and procedures will be retained within project files.</td></tr>
<tr><td>Decontamination</td><td>All re-usable sampling equipment (such as a trowel) will be thoroughly washed using phosphate-free detergent (Liquinox), then double rinsed with clean water before the sample collection.</td></tr>
<tr><td>Sample identification, preservation, transport and holding times.</td><td>Each sample will be labelled with the sample location, date, project identification number and sampler's initials. Sample labelling and naming will be in accordance with Annex L of the DCMM.
Samples will be contained in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under COC documentation.
Sample containers, preservation procedures, sample storage requirements and holding times will comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".</td></tr>
<tr><td>Laboratory Testing</td><td>All sediment samples will be analysed for the full PFAS analytical suite (see Appendix B).</td></tr>
</table>

Item	Details
Laboratory Testing – Quality Control	Sediment QC samples will be collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 sediment samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 sediment samples should be sent to a secondary laboratory. All QC samples will be tested for a full PFAS analytical suite (see Appendix B).
Laboratory Accreditation	All sediment sample analysis will be undertaken by the following NATA-accredited laboratories: ▪ Primary analysis will be undertaken by ALS Global Laboratories. ▪ Secondary analysis will be undertaken by Eurofins.

6.3 Quality Control Contingency Measures

In the event there are any issues identified with quality control samples, such as detects being reported in a blank, Cardno will request the laboratories to undertake a detailed review of the results, and to carry out re-analysis of the sample (if necessary) to confirm the detect. In the event that the detect in a blank is confirmed, Cardno will notify Defence and include a discussion as to the potential cause or source of the detect in the blank sample, if it can be determined, in the QA/QC evaluation prepared for each factual report. The QA/QC evaluation will also include discussion of any RPD exceedances, internal laboratory quality outliers or other data quality issues which are identified during the sampling event, and whether any of these issues are considered to impact on the overall reliability and usability of the data set.

7 Assessment Criteria

7.1 Groundwater and Surface Water

The assessment levels adopted for groundwater and surface water in this SAQP are based upon the PFAS screening criteria specified in the OMP (Jacobs, 2021b), which were adopted based on the guidance in the PFAS NEMP (HEPA, 2020). The adopted assessment criteria for groundwater and surface water are detailed in Table 7-1. Screening levels will be reviewed and updated (if deemed necessary) as part of the OMP review process.

Table 7-1 PFAS Criteria for Groundwater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Groundwater and Surface Water			
Human Health - Drinking Water Quality Guideline[1]	0.07[2]	0.56	HEPA 2020
Human Health - Surface Water Recreational	2[2]	10	HEPA 2020
Ecological (95% species protection)	0.13[3]	220	HEPA 2020

Notes:
1. Drinking Water screening guidelines have been adopted for screening purposes for Industrial Water use, Stock Water use and Agriculture/Parks/Gardens Water use.
2. Combined PFOS and PFHxS.
3. PFOS only.

7.2 Sediment

There are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment.

8 Reporting

8.1 Factual Reporting

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

> Introduction.

> Scope of work completed.

> Field activities undertaken and description of sampling methodologies used.

> Field observations (e.g. condition of monitoring wells, description of purged water) and water quality parameter measurements.

> Use of appropriate nomenclature of sampling locations as per DCMM Annex L.

> Summary of any changes to the monitoring network condition that may affect data integrity, or require rectification works, and recommendations for repair, replacement of decommissioning of a location.

> Evaluation of the applicability of adopted assessment criteria.

> Review of the suitability of the data for assessment purposes (QA/QC evaluation).

> Summary tables presenting gauged groundwater levels.

> Presentation of inferred groundwater contours and inferred groundwater flow direction in a figure.

> Summary tables of analytical results in comparison to adopted assessment criteria generated through management of data on the Defence ESdat database, and naming of sampling locations as per DCMM Annex L.

> Figures showing results in accordance with the OMP Factual Report preparation guidance.

> Laboratory reports, COC documentation, field sampling records, data validation and QA/QC details, equipment calibration certificates and other relevant documentation.

> Any deviations from the SAQP encountered during completion of the sampling event.

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

It is noted that projects are active and laboratory data is to be received by the Defence ESdat Web Interface at the time of laboratory reporting to the consultant (Department of Defence, 2019b). The data are live and location data will be uploaded and reconciled as received.

8.2 Interpretive Reporting

Upon completion of each year’s monitoring period, an annual interpretive report will be prepared. The report will be prepared in accordance with the Defence *PFAS OMP Annual Interpretive Report Guidance* document (Department of Defence, 2021b). As a minimum, each interpretive report should include the following:

> The factual information described in Section 8.1.

> Evidence of compliance with the requirements of the SAQP and meeting stated objectives of the OMP.

> Relevant figures depicting sampling locations and site-specific hydrogeological features.

> Use of appropriate nomenclature of sampling locations as per DCMM Annex L.

> Laboratory results and analysis including comparison with relevant screening criteria as identified in each OMP; data to be managed through the Defence ESdat database, and naming of sampling locations as per DCMM Annex L.

> Assessment and commentary on appropriate Quality Assurance/ Quality Control (QA/QC) procedures.

> A discussion of analytical results in relation to the following, taking into account the trigger levels and response measures set out in Section 4.3 of the OMP (Jacobs, 2021b):

  - Trends in PFAS concentrations, including an assessment of temporal changes and/or changes to the extent of PFAS impacts. Trends should be assessed using an appropriate statistical analysis approach (e.g. using Mann-Kendall or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed.
  - Consideration, based on data trends, as to whether any of the existing remediation / management measures should be re-assessed, with a view to potential modification, supplementation or cessation.
  - Assessment of whether changes to the CSM and/or risk assessment are required.
  - Whether recalibration or changes to the groundwater model are required to provide a better understanding of the potential future extent of PFAS impact in groundwater.
- Based on the data obtained, an assessment of the OMP sampling requirements with a view to establishing whether:
  - The number of locations monitored could be reduced, such as where PFAS concentrations are stable and are considered to present a low risk to receptors.
  - Additional monitoring locations are required, including the installation of new monitoring wells or sampling of additional existing wells (and/or private bores) to provide better understanding of the nature, extent or magnitude of PFAS impacts in a particular portion of the Management Area.
  - The frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors.
- An overview of remedial works or construction and maintenance activities undertaken in the management area during the reporting period, which may impact the CSM.
- All deviations from the SAQP encountered in the previous year's monitoring will be documented, along with a statement of how these deviations impact on the data quality objectives or overall objectives of the OMP.
- A statement as to whether the risk profile has changed overall, or at any specific location in the Management Area (on-Site and off-Site). Based on potential changes to the risk profile, recommendations would be made as to whether this should trigger an OMP and/or PMAP review, or other actions.

8.3 Provision of Results to Off-Base Landowners

In addition to the reporting of groundwater, surface water and sediment data collected off-Base in the factual and interpretive reports described in Section 8.1 and Section 8.2, the analytical results of off-Base sampling will also need to be reported to the landowners, by way of a factual results letter. The results letters will be delivered to the landowners following Defence review and approval and include the following information, as a minimum:

- A brief description of the purpose of the OMP;
- The PFAS assessment levels relevant at the time of sampling;
- The laboratory LORs;
- The analytical results of the samples collected;
- A description of how the data will be used; and
- Contact details of the appropriate Defence representative.

In the event that the results exceed screening criteria, a follow-up consultation will be conducted with the property owner by telephone unless otherwise directed.

Note: Identifying data for private properties, such as addresses, will not be included on the Defence ESdat database. However, the groundwater, surface water, soil, and sediment data will be included in the ESdat database.

8.4 SAQP Review

Prior to each monitoring event, the SAQP will be reviewed to ensure it complies with the following guidelines:

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

> National Environment Protection (Assessment of Site Contamination) Measure (NEPM), National Environment Protection Council (NEPC), 2013;

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

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

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

> State guidelines: Environment Protection Authority (EPA) or equivalent state environmental regulators relevant guidelines e.g. Victoria's Industrial Waste Resource Guidelines (IWRG) Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, Publication 701.

Any changes to the SAQP identified as part of the review are to be documented by way of a revision of the SAQP.

Table 8-1 OMP SAQP History

Version	Effective Date	Description of Revision	Key Changes
2	21 October 2021	Final	-

9 References

General References

1. Australian Standard AS 4482-2005, Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds.
2. Department of Defence (2019a), Contamination Management Manual, August 2019.
3. Department of Defence (2019b), Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance - Routine Water Quality Monitoring.
4. Department of Defence (2021a), *PFAS OMP Factual Report Guidance*, May 2021.
5. Department of Defence (2021b), PFAS OMP Annual Interpretive Report Guidance, May 2021.
6. Department of Defence, Department of Energy (2019), Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3, 2019.
7. Environment Protection Authority VIC (EPA) (2000), Groundwater Sampling Guidelines, Publication 669, April 2000.
8. EPA NSW (1997), Contaminated Land Management Act, No 140, Current Version 11 December 2020.
9. EPA NSW (2002), The NSW State Groundwater Dependent Ecosystems Policy.
10. EPA NSW (2004), Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales, Publication 1669.2, March 2004.
11. EPA NSW (2014), Waste Classification Guidelines – Part 1: Classification of Waste, November 2014
12. EPA NSW (2016a), Designing Sampling Programs for Sites Potentially Contaminated by PFAS.
13. EPA NSW (2016b), Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste
14. Heads of Environmental Protection Authority's Australia and New Zealand (HEPA) (2020), PFAS National Environmental Management Plan (NEMP) Version 2.0, January 2020.
15. National Environment Protection Council (NEPC) (1999 – amended 2013), National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).
16. National Health and Medical Research Council (NHMRC) (2019), Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water, August 2019.
17. USEPA (2000), Guidance for the Data Quality Objectives Process (EPA QA/G-4).
18. USEPA (2002), Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8).
19. Wagga Wagga City Council (2013). Wagga Wagga Spatial Plan 2013 -2043. https://wagga.nsw.gov.au/__data/assets/pdf_file/0004/26509/Wagga-Wagga-Spatial-Plan-2013-2043.pdf. Accessed 17th August 2020.

Site Specific References

20. KBR (2013), Kapooka Training Area Sustainability Monitoring and Reporting Plan (No. MEN208-TDEV-GEB-0005 Rev0). Kellogg Brown & Root Pty Ltd.
21. Golder (2017), Preliminary Site Investigation for PFAS Blamey Barracks Kapooka (0315) (No.1669283_001_R_Rev1). Golder Associates Pty Ltd.
22. Cardno (2017), Base Engineering Assessment Program. Part 5 Wastewater and Part 6 Storm Water, Kapooka Military Area Property ID: 0315 (No. 360517/100/5 and 360517/100/6). Cardno.
23. AECOM (2018), Stage 2 Detailed Site Investigation Report, Blamey Barracks, Kapooka (0315) (No. 60551084). AECOM.
24. Jacobs (2019), Blamey Barracks Comprehensive PFAS Investigation – Detailed Site Investigation (No. IS253200-040-NP-RPT-0002 Rev4). Jacobs Group (Australia) Pty Ltd.

25. Jacobs (2021a), Blamey Barracks Comprehensive PFAS Investigation – Human Health and Ecological Risk Assessment (No. IS253200-040-NP-RPT-0006 Rev4 (23rd June 2021).
26. Jacobs (2021b), PFAS Ongoing Monitoring Plan (OMP) - Blamey Barracks Kapooka, June 2021.
27. Jacobs (2021c), PFAS Management Area Plan (PMAP) – Blamey Barracks Kapooka, June 2021.

APPENDIX

A

FIGURES

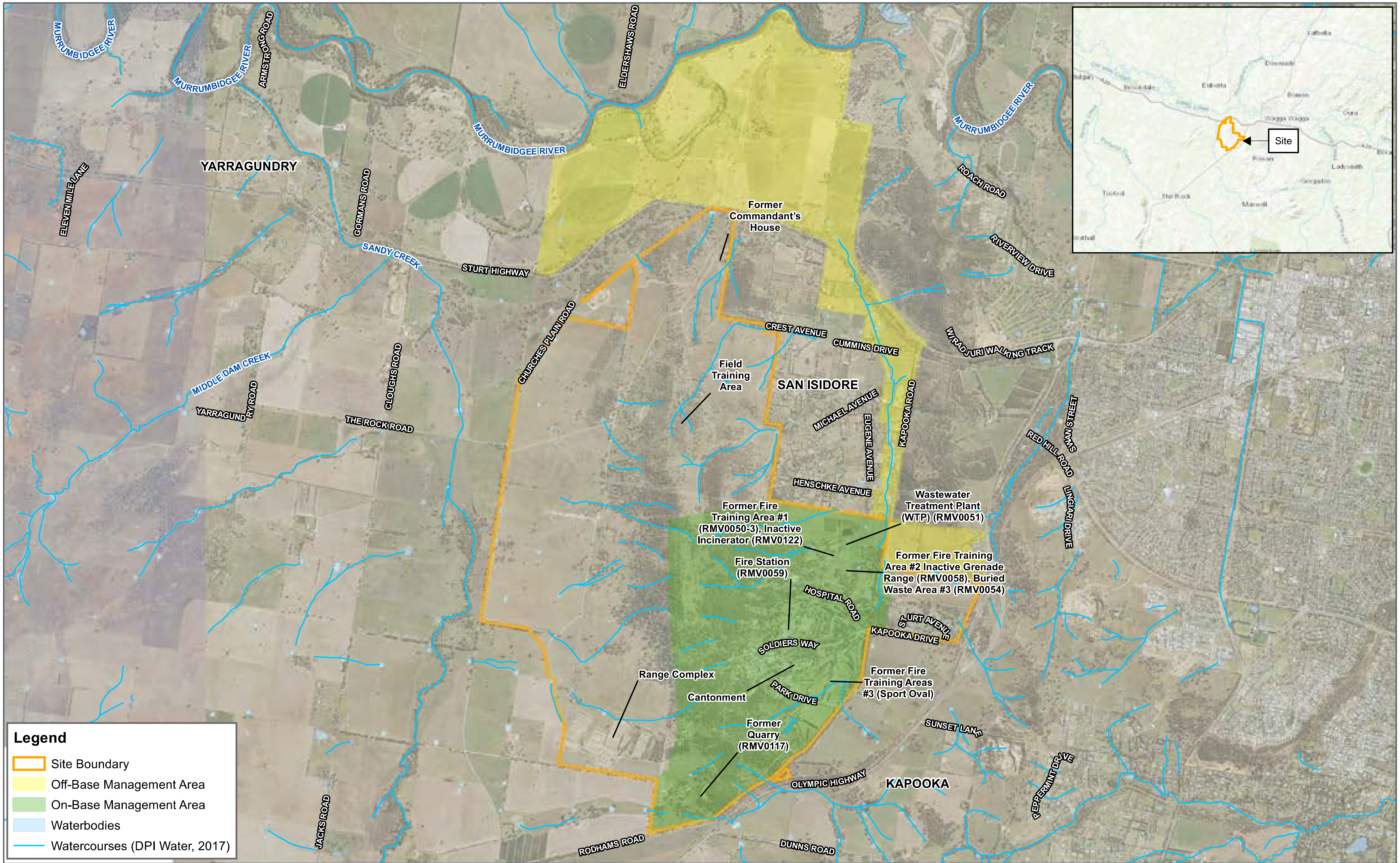

FIGURE 1

1:40,000 Scale at A3

Metres

0 1,000 2,000

Site Locality Plan & Management Areas

SAMPLING ANALYSIS AND QUALITY PLAN
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Map Produced by Cardno
Date: 2021-09-27 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0164-SiteLocalityPlan_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

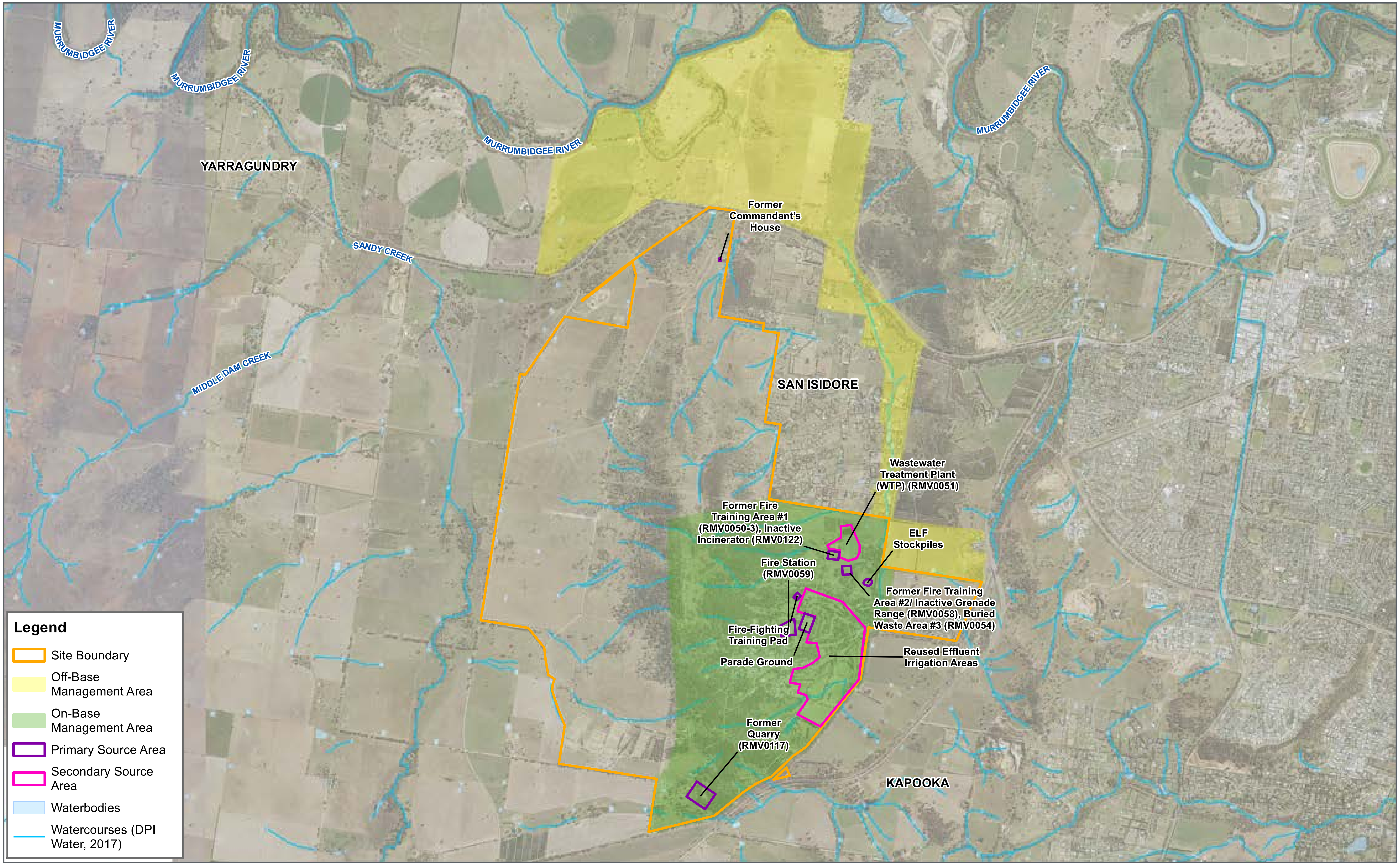

FIGURE 2

1:40,000 Scale at A3

Metres

0 1,000 2,000

Source Areas

SAMPLING ANALYSIS AND QUALITY PLAN
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Map Produced by Cardno
Date: 2021-10-21 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0165-SourceAreas_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

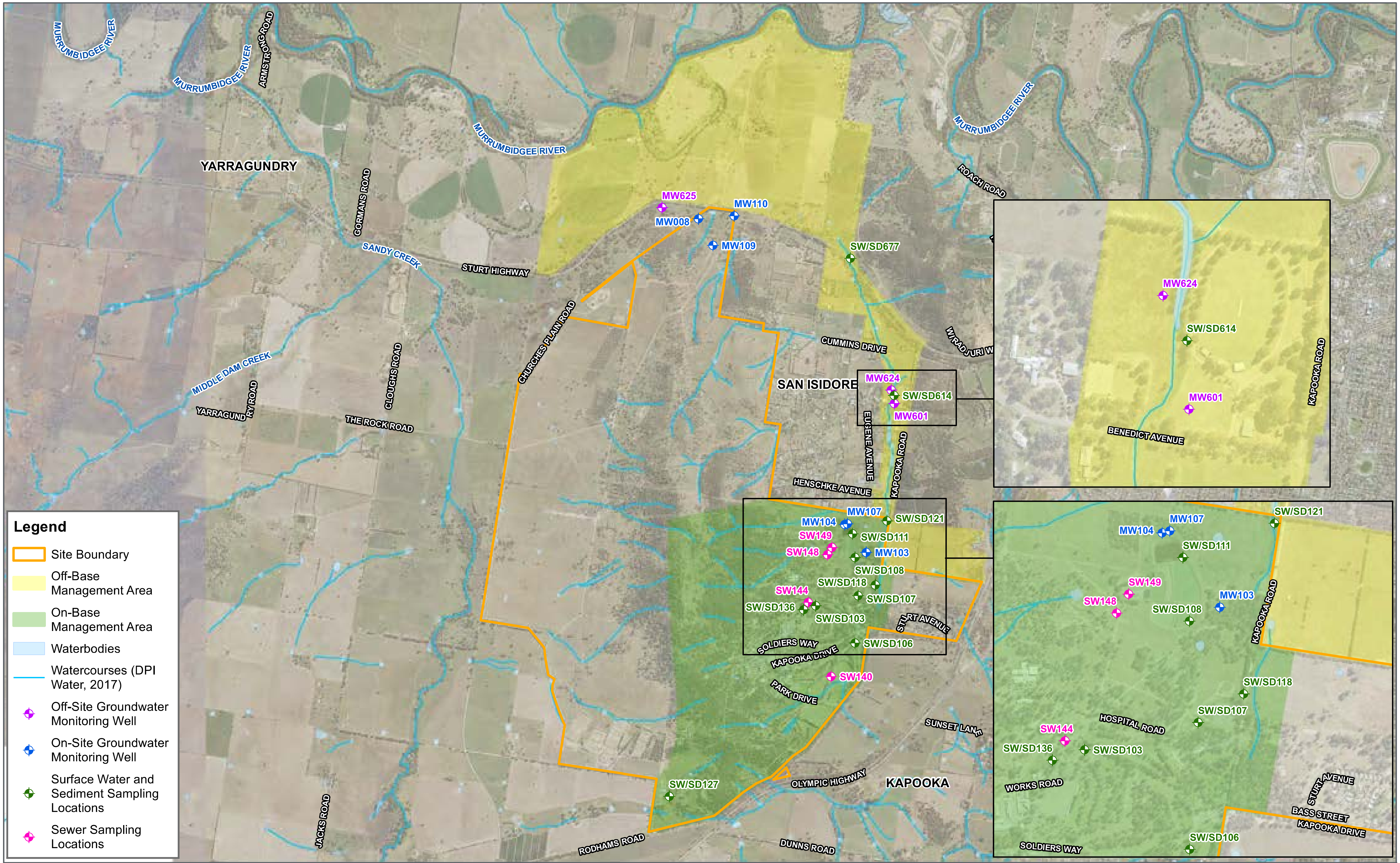

FIGURE 3

1:40,000 Scale at A3

Metres

0 1,000 2,000

Sampling Locations

SAMPLING ANALYSIS AND QUALITY PLAN
BLAMEY BARRACKS KAPOOKA
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno
Date: 2021-09-27 | Project: DEF19008
Coordinate System: GDA2020 MGA Zone 55
Map: DEF19008-GS-0166-SampleLocationsN_K.mxd 01
Aerial Imagery Supplied by Metromap (March, 2021)

APPENDIX

B

FULL PFAS ANALYTICAL SUITE

PFAS Analytical Suite

Group	Analyte
Perfluoroalkane Carboxylates (PFCAs)	Perfluorobutanoic acid (PFBA)
	Perfluoropentanoic acid (PFPeA)
	Perfluorohexanoic acid (PFHxA)
	Perfluoroheptanoic acid (PFHpA)
	Perfluorooctanoic acid (PFOA)
	Perfluorononanoic acid (PFNA)
	Perfluorodecanoic acid (PFDA)
	Perfluoroundecanoic acid (PFUnDA)
	Perfluorododecanoic acid (PFDoDA)
	Perfluorotridecanoic acid (PFTrDA)
	Perfluorotetradecanoic acid (PFTeDA)
Fluorotelomer Sulfonates (FTSs)	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)
Perfluroalkyl sulfonates (PFSAs)	Perfluorobutane sulfonic acid (PFBS)
	Perfluoropentane sulfonic acid (PFPeS)
	Perfluorohexane sulfonic acid (PFHxS)
	Perfluoroheptane sulfonic acid (PFHpS)
	Perfluorooctane sulfonic acid (PFOS)
	Perfluorodecane sulfonic acid (PFDS)
Perfluorooctane sulfonamidoethonals and perfluorooctane sulfonamidoacetic acids	N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)
	N-ethylperfluoro-1-octane sulphonamide (N-EtFOSA)
	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)
	N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)
	2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)
	N-ethyl-perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)

APPENDIX

C

OMP WELL CONSTRUCTION DETAILS

Site_ID	Project_ID	Location_Code	TOC (mAHD)	Top_Screen_Depth (mBTOC)	Bottom_Screen_Depth (mBTOC)	Monitoring_Unit	Base_Depth (mbgl)	Casing_Description	Inner_Diameter (mm)	Screen_Description	Comments	Stickup (m)
0315	ACTNSW_Hist_202009-2	MW008				S	13				No borelogs present and no construction information in report	1
0315	NSW_0315_PFAS	MW103	225.8	49.8	52.8	S	52					0.8
0315	NSW_0315_PFAS	MW104	231.87	38.9	53.9	S	54					0.9
0315	NSW_0315_PFAS	MW107	230.54	13.2	16.2	P	15.5					0.7
0315	NSW_0315_PFAS	MW109	180.29	22.58	31.58	S	33.5	Class 18 PVC	50	Slotted PVC		0.92
0315	NSW_0315_PFAS	MW110	193.62	15.56	19.06	S	21	Class 18 PVC	50	Slotted PVC		0.94
0315	NSW_0315_PFAS	MW601	205.3	9.8	15.8	P	17				Gattic	-0.2
0315	NSW_0315_PFAS	MW624	205.92	28.03	50.03	S	53.1	Class 18 PVC	50	Slotted PVC		0.97
0315	NSW_0315_PFAS	MW625	174.572	15.5	21.5	S	22	Class 18 PVC	50	0.4 mm slotted		

Monitoring Units: P = perched water, S = shallow acquifer

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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APPENDIX

F

ABOUT AN ESA

Cardno

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About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- ❑ A factual report of the condition of a portion of the site or one aspect of an entire site.
- ❑ Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- ❑ Validation of the success of remediation of a site or a portion of a site.
- ❑ Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide “environmental sign-off” of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants’ duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the “hot spot” method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a “snapshot” of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such

unexpected occurrences, given the inherent uncertainties in the assessment process.

Cardno uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno. However, however Cardno cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno

13 August 2015