



Ongoing Monitoring Report – 2024

Bandiana Military Area

Department of Defence

JBS&G | 61395 | 165,069

9 September 2025





We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community.

We pay respect to Elders past and present and in the spirit of reconciliation, we commit to working together for our shared future.

Caring for Country The Journey of JBS&G
Artist: Patrick Caruso, Eastern Arrernte

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Abbreviations

Term	Definition
AFFF	Aqueous Film Forming Foam
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended in 2013)
BoM	Bureau of Meteorology
CSM	Conceptual Site Model
CSR	Contaminated Site Record
Defence	Department of Defence
DO	Dissolved Oxygen
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EPA	Environment Protection Authority Victoria
ERS	Environment Reference Standards
HEPA	Heads of Environmental Protection Authorities Australia and New Zealand
HHERA	Human Health and Ecological Risk Assessment
JBS&G	JBS&G Australia Pty Ltd
LOR	Limit of Reporting
NEMP	Heads of EPAs Australia and New Zealand (HEPA), PFAS National Environmental Management Plan – Version 3.0; March 2025
NSW	New South Wales
OMP	Ongoing Monitoring Plan
OMR	Ongoing Monitoring Report
ORP	Oxidation Reduction Potential
PFAS	Per- and poly-fluoroalkyl substances
pH	Potential of Hydrogen
PMAP	PFAS Management Area Plan
PFHxS	Perfluorohexane sulfonate
PFOA	Perflourooctanoic acid
PFOS	Perfluorooctane sulfonate
QA/QC	Quality Assurance / Quality Control
RAP	Remedial Action Plan
SAQP	Sampling, Analysis and Quality Plan
TDS	Total Dissolved Solids
TOC	Top of Casing

Measurements

Term	Definition
°C	Degrees Celsius
cm	Centimetres
m	Metres
mAHD	Metres Australian Height Datum
mbgl	Metres below ground level
mBTC	Metres below top of case
mg/L	Milligrams per litre
mm	Millimetres
mV	Millivolts
µg/L	Micrograms per Liter
µS/cm	Microsiemens Per Centimetre

Executive Summary

General

JBS&G Australia Pty Ltd (JBS&G) has been engaged by the Department of Defence (Defence) to complete an Ongoing Monitoring Report (OMR) for per- and poly-fluoroalkyl substances (PFAS) on and around the Bandiana Military Area (the base) and surrounding Management Area. The OMR includes the results of two sampling events that occurred during April and November/December 2024. PFAS are a group of synthetic (i.e. 'man-made') compounds widely used around the world since the 1950s to make products that resist heat, stains, grease and water.

Defence has historically stored and used PFAS containing aqueous film forming foam (AFFF) products on-base for firefighting purposes, which has resulted in PFAS contamination on and around the Defence estate. PFAS has historically left the base into the off-base areas primarily by surface water runoff in North and South Bandiana and by groundwater flow in East Bandiana.

Objective

The objective of this report is to review the monitoring data collected during 2024 and a) assess changes to PFAS concentrations in surface, groundwater and sediment and b) determine if any risk management measures are required to ensure the protection of people working and living in affected areas.

Monitoring Scope

The scope of the sampling events discussed in this report consisted of sampling of 46 groundwater wells, 54 surface water locations and 12 sediment locations across the base and surrounding area.

Results Summary

The PFAS results may be summarised as follows:

Groundwater

- Groundwater samples were collected from 46 locations both on and around the base;
- Groundwater elevations (that is the height of the groundwater relative to the ground surface) were higher during the OMR period owing to above average rainfall during the year;
- Groundwater flow directions across the base are consistent with the conceptual understanding of groundwater movement and generally follow the topography; and
- Broadly, the groundwater PFAS concentrations were relatively stable and consistent with the outcomes of both historical and recent investigations.

Surface Water

- Surface water samples were collected from 54 locations on the base and creeks and drainage lines off-base; and
- The surface water results were largely consistent with previous data collected since 2017.

Sediment

- Sediment samples were collected from drains and creeks at 12 locations on and around the base; and
- Sediment concentrations are consistent with historic results, with higher concentrations closer to known PFAS Source Areas.

Risk Summary

- PFAS concentrations were mostly consistent with previous results and there are no changes to the outcomes of the risk assessment completed in 2020; and

- As a result, it is noted that the Environment Protection Authority Victoria (EPA) precautionary advice regarding carp consumption from the Kiewa River is still in place.

Conclusions

- The sampling results demonstrated that PFAS concentrations during the 2024 period were generally consistent with 2021 through 2023 Ongoing Monitoring Plan (OMP) results, along with results from previous investigations across the base;
- As a result, there is no change in risk to on and off-base receptors and precautionary advice from the EPA should still be followed; and
- Defence has planned remedial works that will consist of remediation of soil within Source Areas across South and East Bandiana as well as groundwater remedial works within the same portions of the base. These efforts are expected to gradually reduce PFAS concentrations on-base and within the Management Area.

1. Introduction

JBS&G Australia Pty Ltd (JBS&G) has been engaged by the Department of Defence (Defence) to complete an Ongoing Monitoring Report (OMR) for the Bandiana Military Area (the base) and surrounding Management Area. This OMR includes the findings of two per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Plan (OMP) sampling events that occurred in April and November/December 2024.

PFAS are a group of synthetic (i.e. ‘man-made’) compounds widely used around the world since the 1950s to make products that resist heat, stains, grease and water. Defence has historically stored and used PFAS containing aqueous film forming foam (AFFF) products on-base for firefighting purposes, which has resulted in PFAS contamination on and in the vicinity of the Defence estate.

The base is located adjacent to the New South Wales (NSW) – Victorian State border southeast of Wodonga, Victoria. The base itself comprises three areas, the boundaries of which have been provided in **Figure 1**:

- Gaza Ridge Barracks (North Bandiana);
- Gaza Ridge Barracks (South Bandiana); and
- Wadsworth Barracks (East Bandiana).

The Management Area has also been shown in **Figure 1** and comprises the base along with off-base areas including Jack in the Box Creek, Kiewa River and their associated floodplains. The Management Area was derived based on the results of the Detailed Site Investigation (DSI) (Golder 2018)¹ and related to pathways in surface water and groundwater for potential PFAS contamination derived from the base. These pathways were further refined as part of the Detailed Site Investigation Addendum (DSI Addendum) (JBS&G 2024a)² and the Mass Flux Study (JBS&G 2024b)³.

1.1 Background

Previous investigations at the base have identified contamination as a result of the historic AFFF use that contained a number of PFAS as additives. Some PFAS are known to be persistent in the environment and humans. In this instance, investigation has focused on the different PFAS additives known to be in the different AFFF historically used on the base. These include perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

Previous investigations have demonstrated that base-derived contamination has migrated off-base and would likely continue to move away from on-base Source Areas without management controls. However, the Human Health and Ecological Risk Assessment (HHERA) (Golder 2020) confirms that the current exposure scenarios, both on and off-base, present low and acceptable risks. Notably, risks flagged in the HHERA as potentially unacceptable are tied to exposure scenarios that are not presently occurring. Defence continue to engage with the community surrounding the base and monitor PFAS concentrations to monitor these exposure scenarios. Management measures are also in place to reduce the likelihood of these scenarios occurring, including precautionary advice from the EPA.

¹ PFAS Detailed Site Investigation, Bandiana Military Area. Document Number 1777738-081-R-RevB. Golder Associates Pty Ltd. 14 September 2018. (Golder 2018).

² PFAS Management Area Plan (PMAP) Delivery at Bandiana Military Area, Detailed Site Investigation (DSI) Addendum. Document Number 61395/ 146,407 Rev 1. JBS&G Australia Pty Ltd. 14 June 2024. (JBS&G 2024a).

³ PFAS Mass Flux Study – PFAS Management Area Plan (PMAP) Delivery at Bandiana Military Area. Document Number 61395/ 153,765 – Rev 0. JBS&G Australia Pty Ltd. 1 November 2024. (JBS&G 2024b).

The PFAS Management Area Plan (PMAP) (Defence 2020)⁴ has been prepared by Defence. The PMAP sets out management actions to be implemented by Defence to manage potential risks arising from PFAS contamination associated with the base and surrounding areas. One of the management actions in the PMAP is the implementation of the OMP. The OMP sets out a program of monitoring biannually across the base and the Management Area.

The purpose of the OMP, as defined in the PMAP (Defence 2020), is to set out the requirements for collection of adequate data to identify and evaluate:

- Spatial and temporal (including seasonal) variability of PFAS in the environment;
- Changes to PFAS sources, transport pathways and/or receptors for the base and wider Management Area;
- Whether risks to human and ecological receptors require review; and
- Whether the identified changes in PFAS concentrations during the OMP trigger an action and/or review.

While this OMR is based on the OMP documented within the PMAP (Defence 2020), Defence have released a Revised OMP (Defence 2025)⁵, which will be implemented for the 2025 OMP sampling events.

The OMP, in accordance with the scope provided in the PMAP (Defence 2020) commenced at the base in November 2021. Works were initially completed by Cardno Victoria Pty Ltd (now Stantec) between 2021 and mid-2024. From its commencement, the OMP sampling events has been completed twice-yearly.

This OMR summarises sampling events completed by Stantec in April 2024 and JBS&G in November/December 2024 (known as sampling event 6 and 7 respectively). Previous sampling events from November 2021, May 2022, October 2022, May 2023 and October 2023 (referred to as sampling events 1 through 5) have been documented in the OMR – 2021, 2022 and 2023⁶ (JBS&G 2025b), further summarised in **Section 7**.

1.2 Objectives

The objective of this OMR is to assess and interpret the PFAS data and other information collected for the base to identify and evaluate the following:

- Spatial and temporal (including seasonal) variability of PFAS in the environment;
- Changes to sources, transport pathways and/or receptors;
- Whether risks to human and ecological receptors require review; and
- Whether the identified changes trigger an action and/or review.

1.3 Scope of Work

JBS&G completed the following scope of work as part of this OMR:

- Review of base and environmental setting to provide context to OMP data;
- Review monitoring data from the April 2024 and November/December 2024 OMP sampling events;
- Analysis of the trends in PFAS concentration across the monitoring period; and

⁴ Bandiana Military Area, PFAS Management Area Plan. Document Number 1777738-153-R-RevA. Department of Defence. November 2020. (Defence 2020).

⁵ Bandiana Military Area, PFAS Ongoing Monitoring Plan. Department of Defence. March 2025. (Defence 2025).

⁶ Ongoing Monitoring Report – 2021, 2022 and 2023. Document Number 61395/162,111 Rev 0. JBS&G Australia Pty Ltd. 11 March 2025. (JBS&G 2025b)

- Completion of this OMR detailing findings to the relevant objectives of the report, particularly whether any changes in risk poses an impact to the surrounding community and identified stakeholders.

2. Base and Environmental Setting

2.1 Base Identification and Setting

A summary of base identification and setting details is provided in **Table 2.1**, with the base boundary provided in **Figure 1**.

Table 2.1: Base Identification and Setting Summary

Item	Details
Site Address	Murray Valley Highway, Bandiana
Site Area	650 hectares
Military Area (Property ID)	0445
Municipality	Wodonga City Council
Current Land Use	Department of Defence base used for administration, accommodation, training, equipment maintenance and storage and warehousing/logistics associated with Defence activities.
Surrounding Land Uses	Land uses surrounding the base are as follows: • North: Huon Hill Parklands is located directly north of North Bandiana, while residential developments are located directly north of East and South Bandiana. Commercial properties are also present along Anzac Parade located to the north of South Bandiana. Beyond the parklands is the Murray River and associated floodplain. • East: Residential developments are present east of both East and North Bandiana, while commercial properties and open farmland is east of South Bandiana. Beyond this is the Kiewa River and associated floodplain, which also includes pastoral grazing land, which is broken into the Northern, Central and Southern Pastoral Areas (see Figure 9). • South: Bears Hill is used primarily for grazing and is located directly south of South Bandiana. Commercial properties, open farmland and minor rural residential development is present south of North and East Bandiana. • West: Wodonga townships is located directly west of the base and consists primarily of residential properties, with areas of commercial and/or industrial development.
Climate	Long-term climatic data collected from the closest Bureau of Meteorology (BoM) station located at Wodonga (2.7 km north west of base, base ID 082056), indicated the following between 1898 and 2025 (1954-1968 for temperature only): • Annual rainfall is approximately 715.2 mm; • Highest average monthly rainfall is approximately 80.1 mm, which occurs in July; • Lowest average monthly rainfall is approximately 37.9 mm, which occurs in February; • The highest average maximum daily temperature is 31.8 °C, which occurs in January; and • The lowest average maximum daily temperature is 12.6 °C, which occurs in July. It should be noted that rainfall data from the sampling events and from the sampling period (i.e. April and November/December 2024) has been discussed in Section 6.1.
Topography	The base is part of a relatively low-lying river and creek floodplain located between two topographically significant features (Huon Hill to the north and Bears Hill to the south, as shown on Figure 1. There is a topographic divide that runs across the base in a general north-south alignment and is shown in Figure 3. To the west of the divide, the area slopes to the northwest towards Jack in the Box Creek, while to the east of the divide, the area slopes to the east or northeast towards the Kiewa River.
Hydrology	As indicated previously, the base and Management Area is divided into two catchments, as shown in Figure 3. West of the topographic divide, surface water flows to the northwest towards Jack in the Box Creek. East of the divide, surface water flows into Middle Creek and an

	unnamed creek, both of which ultimately flow into the Kiewa River. Both Jack in the Box Creek and Kiewa River catchments drain north into the Murray River catchment. Many of the surface water channels within the base and Management Area are primarily ephemeral and only have flow during or immediately following rainfall. The Kiewa River is in a low-lying floodplain which is characterised by oxbow lakes to the east of East Bandiana and the Killara residential development. The above identified water bodies are shown in Figure 3.
Geology	Based on previous investigations, there are three main geological units present across and base and in the Management Area. From deepest to shallowest these are as follows: • Omeo-Metamorphic Complex: Ordovician aged schist with intrusions of granite and gneiss. This material forms the bedrock of the area, with both Bears Hill and Huon Hill consisting of this unit; • Shepparton Formation: Tertiary aged deposits of sand, silt and clay. Erosion and accumulation of sediments from the local hill are called the Shepparton Colluvium and can be found through the centre of the base, extending west through the Jack in the Box Creek catchment. Deposition of alluvial sediments also occurred during this period and are called the Shepparton Fluvium. These are primarily found in the northwest and southwest of the base, including through the Killara residential development and the Southern Pastoral Area; and • Coonambidgal Formation: Quaternary aged deposits of sand, silt and clay. More recent hill erosion is called the Coonambidgal Colluvium and can be found around the foot of Bears Hill and Huon Hill. Deposition around current waterways, including the Murray River, Kiewa River, Wodonga Creek and Middle Creek, is called the Coonambidgal Fluvium.
Hydrogeology	The upper aquifer below the base and Management Area is primarily located within the Shepparton Fluvium and Colluvium and to a lesser extent the Coonambidgal Fluvium. Depth to groundwater varies and can be summarised as follows: • South Bandiana: Across the flatter northern portion of South Bandiana, the depth to groundwater in ranges between 10 to 15 m below ground level (mbgl), although this increases up to approximately 40 mbgl in the sloped southern portion (depending on seasonality and weather conditions); • North Bandiana: In the north and west of North Bandiana, groundwater depth is up to 14.7 mbgl, while to the south east it is between 1.8 to 3.8 mbgl; and • East Bandiana: The depositional processes that occurred in this area of the base have resulted in a distribution of permeable sediments that is highly variable. The shallow portion (<10 mbgl) of the aquifer includes variably distributed (and discontinuous) sands and clays and has standing water levels ranging between approximately 6.6 and 8.2 m below top of case (mBTC). A more continuous sandy layer is present between 10.0 and 15.0 mbgl and has a standing water level range between approximately 6.6 and 8.1 mBTC. The sandy layer has an estimated hydraulic conductivity of approximately 10-20 m/day. Groundwater flow direction in the upper aquifer tends to be similar to surface water flow. Below South Bandiana, groundwater flow is primarily to the northwest towards Jack in the Box Creek, while below North and East Bandiana it is primarily to the east towards Kiewa River. Kiewa River, associated oxbows, Wodonga Creek and possibly the northern portion of Jack in the Box Creek are likely gaining streams (i.e. surface water bodies which receive groundwater discharge). Middle Creek and the unnamed creek are considered losing streams (surface water discharges into groundwater). The deeper portion of the aquifer below East Bandiana is likely in direct hydraulic connection with one or more off-base oxbow lakes in the Kiewa River floodplain to the northeast of the base. A review of the registered bore database on Visualising Victoria's Groundwater (VVG 2025) completed as part of this report did not identify registered groundwater bores within the Management Area, with the exception of those used for 'observation' or 'groundwater investigation' purposes.

2.2 PFAS Source Areas

Investigation completed to date has identified various sources of PFAS across the base relating to use or storage of AFFF products. Source Areas 1 through 15 (see **Figure 2** for locations) are considered the primary sources of PFAS, although varying concentrations of PFAS have been reported for affected media. The Source Areas also relate to different surface water catchments, flowing into Jack in the Box Creek or Kiewa River.

Description of the Source Areas as identified by the DSI (Golder 2018), and their respective Contaminated Site Record (CSR) ID, with PFAS concentrations above laboratory standard limits of reporting, are listed in the following **Table 2.2**.

Table 2.2: Summary of PFAS Source Areas

Source Area (SA) No.	CSR ID	Description of Contaminating Activity	Base Area
SA1	CSR_VIC_000353	Petroleum Platoon - Former Fire Training Ground	South Bandiana
SA2	CSR_VIC_000478	Base Fire Services (BFS) - Former Fire Training Ground	South Bandiana
SA5	CSR_VIC_000365	Petroleum Platoon - Fuel Handling Facility	South Bandiana
SA6	CSR_VIC_000350	Fire Training Area, Building 600 ⁷	South Bandiana
SA7	CSR_VIC_000357	Old Fire Station, Building 421	South Bandiana
SA9	CSR_VIC_000374	Petroleum, Oils and Lubricants (POL), Building 490	South Bandiana
SA10	CSR_VIC_000479	Former Unit Training Area, between Warehouse 1 and 2	North Bandiana
SA11	CSR_VIC_000480	Fire Extinguisher Disposal - Warehouse 13	North Bandiana
SA12	CSR_VIC_000483	Armoured Vehicle Maintenance Training, Building 100	North Bandiana
SA13	CSR_VIC_000383	Fire Station - Current	East Bandiana
SA14	CSR_VIC_000481	Former Unit Training, Building 592	East Bandiana
SA15	CSR_VIC_000482	Former Unit Training, Football Field	East Bandiana

It should be noted that Defence has completed significant investigation works since the DSI (Golder 2018), including the DSI Addendum (JBS&G 2024a) and the Mass Flux Study (JBS&G 2024b). This has provided further data on PFAS mass in these Source Areas and their contribution measured in surface water and groundwater. This additional work has also further characterised the PFAS plume in groundwater originating from Source Area 13, that is migrating northeast across East Bandiana into off-base areas.

Several Source Areas, including Source Area 1, 6 and 7 on South Bandiana (further discussed in this report), identified concentrations of PFAS in soil which is considered to contribute to PFAS concentrations in surface water. Based on this, these four Source Areas and pathways are the primary focus of Defence, with remediation work planned to reduce PFAS migration levels. All other Source Areas across the base continue to be monitored as part of the OMP program. This will ensure PFAS concentrations continue to present a low risk to on- and off-base users and the environment.

⁷ Source Area 6 in previous documentation, including the PMAP (Defence 2020), has been identified as the Current Fire Training Area, Building 600. A new Fire Training Area however has since been constructed and commissioned and the facility located at Source Area 6 retired from active service. This Source Area will therefore just be referred to as the Fire Training Area, Building 600 for the balance of this document.

3. OMP Scope and Sampling

3.1 Overview

This OMR reviews the groundwater, surface water and sediment sampling completed in April 2024 and November/December 2024. Both events were completed as required in the PMAP (Defence 2020) and in accordance with the respective Sample Analysis Quality Plans (SAQPs) prepared by both consultants. The Stantec SAQP⁸ (Stantec 2024a) and the JBS&G SAQP⁹ (JBS&G 2024c) have been provided in **Appendix A** and **Appendix B** respectively. Exceptions to this have been detailed in **Section 3.4**. OMP work undertaken by both consultants was completed in general accordance with the applicable industry standards for a site investigation, with these standards being as follows:

- 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 (noting that this standard has been withdrawn, however remains part of the state of knowledge);
- Department of Defence (2021), Contamination Management Manual (DCMM), March 2018, amended June 2021;
- Department of Defence (2019), Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guideline - Routine Water Quality Monitoring;
- Department of Defence (2018), Quality System Manual Schedule B15 USEPA Data Quality Objectives (DQO) Process;
- Environment Protection Authority Victoria (EPA) Victoria (2022), Groundwater Sampling Guidelines, Publication 669.1, February 2022;
- EPA Victoria (2009), Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, Publication IWRG701, June 2009;
- Heads of Environmental Protection Authorities Australia and New Zealand (HEPA) (2025), PFAS National Environmental Management Plan (NEMP) Version 3.0, March 2025;
- National Environment Protection Council (NEPC) (2013), National Environmental Protection (Assessment of Site Contamination) Measure (1999, 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 (USEPA), (2006), Guidance for the Data Quality Objectives Process (EPA QA/G-4); and
- USEPA, (2002), Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8).

⁸ PFAS OMP Sampling and Analysis Quality Plan (SAQP), Bandiana Military Area. Stantec Pty Ltd. 28 March 2024. (Stantec 2024a).

⁹ Bandiana Military Area – PFAS Ongoing Monitoring Plan (OMP) Sampling and Analysis Quality Plan (SAQP). Document number 61395/163,009 Rev 0. JBS&G Australia Pty Ltd. 22 November 2024. (JBS&G 2024c)

3.2 OMP Sampling Requirements

3.2.1 OMP Sampling Locations

The OMP sampling requirements are detailed in the PMAP (Defence 2020). The following **Table 3.1** provides a list of groundwater, surface water and sediment sampling locations which are to be completed during each sampling event, along with the reasoning for the position of each sample location in the context of the overall program and the base. In total, 44 groundwater wells, 53 surface water locations and 12 sediment locations are sampled as part of the OMP, although the number of locations and types of media sampled depends on season. Groundwater sample locations are provided in **Figure 4**, while surface water and sediment locations are provided in **Figure 5A** and **5B**.

Table 3.1: OMP Sampling Locations as per PMAP (Defence 2020)

Catchment	Surface Water (Bi-Annual)	Sediment (Annual)	Groundwater		Target Area	Justification
			Annual	Bi-annual		
On-base Locations						
Jack in the Box Creek	SW302, SW307, SW310		MW315, MW317 MW318		South Bandiana, on-base, Source Area 2	Locations targeting surface water and groundwater within and downgradient of the Source Area.
	SW311, SW313, SW316, SW321		MW304, MW307, MW311		South Bandiana, on-base, Source Area 1	Locations target surface water and groundwater within and downgradient of the Source Area. SW311 and MW304 is the point of discharge off-base into Jack in the Box Creek.
	SW322		MW312		South Bandiana, on-base	SW322 and MW312 is a point of discharge off-base into Jack in the Box Creek. The point is also at the confluence of surface water drainage from Source Areas 1, 2, 5, 6 and 7.
	SW323	SD323			South Bandiana, on-base	This point represents the confluence of drainage from Source Areas 5, 6 and 7 and depositional environment prior to discharging off-base.
	SW324, SW326, SW332, SW336		MW051 ¹ , MW326/MW416 ² , MW323		South Bandiana, on-base, Source Area 6	Locations target surface water and groundwater discharge from Source Area 6. SW336 is located within the Fire Training Area retention/recirculation pond. SW324 and SW332 target two different flow paths from the Source Area.
	SW333, SW338		MW329		South Bandiana, on-base, Source Area 5	Locations target surface water and groundwater discharge from Source Area 5. SW333 targets discharge to Jack in the Box Creek. SW338 is the large pond within the Source Area. SW340 targets discharge to the Kiewa River.
Kiewa River	SW340					
Jack in the Box Creek	SW448		MW319, MW321		South Bandiana, on-base, Source Area 7	Locations target surface water and groundwater discharge from Source Area 7.
Kiewa River	SW346, SW349, SW355	SD346, SD355	MW056 ³		South Bandiana, on-base, Source Area 9 and Stormwater Ponds (wetlands)	MW056 targets perched groundwater identified within Source Area 9. Surface water locations are targeting discharge into, within and discharging from the South Bandiana Stormwater Ponds.
	SW370, SW374, SW375	SD375	MW342	MW345, MW346	North Bandiana, on-base, Source Areas 10, 11 and 12	SW370 is within the unnamed creek, targeting contributions from Source Areas 10, 11 and 12. MW342 targets Source Area 12. MW345 is within the shallow fluvium where potential groundwater/surface water interactions may be occurring. SW375, SD375 and MW346 is the point of discharge off the base.
	SW379, SW380			MW052 ⁴ , MW403 ⁵ , MW404 ⁶ , MW350_S, MW350_D, MW009, MW016, MW042, MW043, MW035, MW034, MW046_I ⁷ , MW046_D ⁷ , MW018, MW020, MW012, MW029, MW352, MW353, MW354	East Bandiana, on-base, Source Area 13, 14 and 15	Locations are targeting surface water discharge from Source Area 13. The groundwater locations are targeting the East Bandiana groundwater plume, which is emanating from Source Area 13 and discharges off-base across the eastern site boundary.
	SW382, SW387, SW388	SD382		MW351	East-Bandiana, on-base	Locations are targeting the points of discharge from East Bandiana into the Kiewa River and floodplain. MW351 targets the downgradient boundary adjacent to the residential properties.
Off-base Locations						
Jack in the Box Creek	SW424, SW463	SD424, SD463	MW313		Upper Jack in the Box Creek	Locations are targeting publicly accessible open space land use areas where yabby trapping occurs. MW313 targets the residential estate located beyond the South Bandiana boundary. Groundwater monitoring locations represent potential human health exposure, as it targets the residential estate located beyond the South Bandiana boundary where a number of groundwater bores with unknown use were identified in the DSI (Golder 2018).
	SW427			MW360	Lower Jack in the Box Creek	SW427 is located where the creek passes near sensitive land use areas (i.e. a child care centre) where sensitive receptors such as children could be exposed. MW360 is located within the fluvium where PFAS concentrations were identified and where potential groundwater/surface water interactions may be occurring.
	SW430			MW361		MW361 is located within the fluvium where PFAS concentrations were reported. SW430 is in proximity to groundwater well (MW361) to allow assessment of groundwater/surface water interactions.

Catchment	Surface Water (Bi-Annual)	Sediment (Annual)	Groundwater		Target Area	Justification
			Annual	Bi-annual		
Kiewa River	SW431					SW431 is located where flood diversion structures are located and if used may results in the release of water into Wodonga Creek upgradient of the North East Water abstraction point.
	SW432					SW432 is located downgradient of several off-base sources identified within the DSI (Golder 2018).
	SW434				Jack in the Box and Wodonga Creek confluence	SW434 is located at the confluence of Jack in the Box Creek and Wodonga Creek and represents the downgradient point of monitoring within the Management Area within the Jack in the Box Creek catchment.
	SW409				Unnamed creek	SW409 is located where the unnamed creek passes near sensitive land use areas (i.e. Henrika Kuljurgies Reserve and surrounding Killara residential properties) where sensitive receptors such as residents may be present.
	SW403, SW405, SW412, SW462	SD412		MW357	Unnamed creek and Kiewa River oxbows	Locations SW403 and SW405 are oxbow lakes within the Central Pastoral Area and SW412 and SW462 are where the unnamed creek passes through the Northern and Central Pastoral Areas. The HHERA (Golder 2020) identified potential unacceptable human health risks associated with the consumption of carp from within the unnamed creek. SW462 and MW357 are at the point where the unnamed creek discharges into the Kiewa River. SD412 is a depositional environment within the unnamed creek on the Kiewa River floodplain.
	SW395, SW396, SW397, SW400, SW401, SW470, SW471, SW487	SD395, SD396, SD397, SD400		OTH019	Kiewa River oxbows	Locations are oxbow lakes located on the Kiewa River floodplain within the Southern Pastoral Area. Groundwater location OTH019 represents point of potential human health exposure where bore water is used for irrigation of home grown produce and drinking water for chickens. SW487 is targeting seepage water, where groundwater seeps were identified at the Kiewa River floodplain during the HHERA (Golder 2020). MW356 targets the assessment of groundwater/surface water interactions at the Kiewa River.
	SW390				Kiewa River – main channel	SW390 is the Kiewa River background location and represents conditions upstream of the Baranduda Water Treatment Plant (WTP) and Middle Creek.
	SW393				Middle Creek	SW393 is located within Middle Creek and represents potential contributions from the Middle Creek catchment. The HHERA (Golder 2020) identified potential unacceptable human health risks associated with the consumption of carp from within the Middle Creek.
	SW398, SW404			MW356		Locations are within the Kiewa River main channel and represents conditions downgradient of the on-base discharges and where recreational activities commonly occur within the river. MW356 targets the assessment of groundwater/surface water interactions at the Kiewa River.
	SW416				Kiewa River – main channel	SW416 is located within the main Kiewa River channel at the point of confluence with the unnamed creek where recreational activities commonly occur within the river and represents the downgradient point of monitoring within the Management Area and within the Kiewa River catchment.

Notes

1. Monitoring well MW051 was previous identified as MW04 within the PMAP (Defence 2020). MW051 is the current Defence labelling for this well and will be adopted for the purposes of this report.
2. In April 2023, MW326 was replaced by a new groundwater monitoring well MW416 in the same location.
3. Monitoring well MW056 was previous identified as BH111 within the PMAP (Defence 2020). MW056 is the current Defence labelling for this well and will be adopted for the purposes of this report.
4. Monitoring well MW052 was previous identified as MW06-a within the PMAP (Defence 2020). MW052 is the current Defence labelling for this well and will be adopted for the purposes of this report.
5. Monitoring well MW403 was previous identified as BH1 within the PMAP (Defence 2020). MW403 is the current Defence labelling for this well and will be adopted for the purposes of this report.
6. Monitoring well MW404 was previous identified as BH2 within the PMAP (Defence 2020). MW404 is the current Defence labelling for this well and will be adopted for the purposes of this report.
7. Monitoring wells identified within the PMAP (Defence 2020) as MW046 and MW047, have been identified as MW046_I and MW046_D respectively during OMP sampling events, including the two documented in this OMR. MW046_I and MW046_D will be the sample locations adopted for the purposes of this report.

3.2.2 Groundwater Sample Locations

As detailed previously in **Section 3.2.1**, a total of 44 groundwater monitoring wells are sampled across the base and the Management Area as part of the OMP. As discussed in **Section 2**, multiple geological units are present across the base. In general groundwater wells within the Jack in the Box Creek catchment, on the western side of the base, are within the Shepparton Colluvium, while wells within the Kiewa River catchment, on the eastern side of the base, are within the Shepparton Fluvium and Coonambidgal Fluvium.

A review of the OMP groundwater wells has been completed, particularly in light of the further aquifer information obtained across East Bandiana as part of the DSI Addendum (JBS&G 2024a). A summary of the groundwater wells and their respective well screen and wells depths have been provided in **Appendix C**. Based on this information, the OMP wells have been divided into relevant aquifers/screened intervals, as summarised in **Table 3.2**.

It is noted that OTH019 is groundwater sampled from a private bore off-base. The well however is not directly accessed during OMP sampling events (rather a sample is collected from a tap, the water of which is extracted groundwater that is understood to be held in an above ground storage tank) and the construction details of the well are unknown. As such, this sample location has not been assigned an aquifer.

Table 3.2: OMP Sampled Wells vs. Aquifers

Geological Unit	Aquifer Interval	Aquifer Depth (mbgl)	OMP Wells
Shepparton Colluvium	Shallow 'S'	Variable, based on position on-base. Identified between approximately 5.0 and 42 mbgl	MW051, MW304, MW307, MW311, MW312, MW313, MW315, MW317, MW318, MW319, MW321, MW323, MW329, MW342, MW360, MW361, MW416
Shepparton Fluvium and Coonambidgal Fluvium	Shallow 'S'	5.0-10.0	MW012, MW016, MW018, MW020, MW029, MW034, MW035, MW043, MW052, MW345, MW346, MW350_S, MW351, MW352, MW353, MW354, MW356, MW357, MW403, MW404
	Intermediate 'I'	10.0-15.0	MW009, MW042, MW046_I
	Deep 'D'	>15.0	MW046_D, MW350_D
Perched Water	-	Approximately 3.0	MW056

The geological units and the aquifer intervals are discussed throughout the balance of this report, with key outcomes such as results and groundwater flow contours discussed in the context of their respective aquifer.

3.3 Sampling Event Summary

This OMR summarises results from the two OMP sampling events completed in 2024, key details of which are provided in the following **Table 3.3**.

Table 3.3: OMP Sampling Event Summary

Sample Event	Sampling Period	Locations Sampled As Part of Event	Deviations from OMP SAQP ¹	Sampling Event Report
E6	2 to 5 April 2024 and 31 May 2024	33 groundwater sample, 29 surface water sample locations and 12 sediment samples	Yes	Provided in Appendix D
E7	25 November to 4 December 2024	43 groundwater sample and 53 surface water sample locations	Yes	Provided in Appendix E

Note:

1. Deviations from the OMP SAQP have been summarised and discussed in the following section.

3.4 Deviations from OMP SAQP

Deviations are not uncommon for reasons of weather conditions, access and safety concerns that inhibit the ability to collect some samples at particular locations. The following **Table 3.4** provides a summary of deviations relating to missed samples, along with other deviations relating to the overall work methodology during the reporting period. Commentary has also been provided on the deviations and their influence on the program (if any). Full detail of deviations for each event, as outlined in each of the Sampling Event Reports (SER), has been provided in **Appendix F**.

Table 3.4: Deviations from OMP SAQP Summary

Sample Event	Number of Samples Not Collected	Deviations	Summary of Deviations and Impact on Program
E6	Groundwater – 0 Surface Water – 14 Sediment – 0	Groundwater – 7 Surface water – 10	Samples not collected deviations relate to: - Location being dry or unable to be accessed. For the locations that could not be sampled, results were available from sample locations further downgradient. Work methodology deviations relate to: - locations were resampled at a later date owing to dry conditions; - sampling of non-OMP locations; and - a single well not being gauged. The deviations from the SAQP are considered to have a low impact on the overall program.
E7	Groundwater – 1 Surface water – 0	Groundwater – 7 Surface water – 2	Samples not collected deviations relate to: - Location being dry. For the location that could not be sampled, results were available further downgradient. Work methodology deviations relate to: - slight changes to the specified sampling method; - missing field equipment calibration paperwork; - select well analysed at a lower detection limit; - missing field parameters owing to equipment issues; and - a single consolidated gauging event not being completed. The deviations from the SAQP are considered to have a low impact on the overall program.

Overall, the deviations from the SAQPs (Stantec 2024a and JBS&G 2024c) do not influence the findings of the overall program. The data set generated as part of the OMP E6 and E7 has assisted in monitoring changes in PFAS concentrations at the base and across the PFAS Management Area. Alongside other PFAS investigations completed at the base such as the DSI Addendum (JBS&G 2024a) and the Mass Flux Study (JBS&G 2024b), a comprehensive Conceptual Site Model (CSM) has been developed which informs the implementation and revision of the PMAP (Defence 2020) risk management actions.

3.5 Sample Analysis

All water and sediment samples were submitted to a National Association of Testing Authorities (NATA) accredited laboratories for PFAS analysis, in accordance with the requirements identified in Defence Guidance Document E, Standard PFAS Analytical Suite (Revision 4, 1 October 2021).

All samples were analysed at a standard reporting limit, with the exception of three samples during the November/December 2024, which were analysed at a lower (i.e. trace) reporting limit. Locations that trace analysis occurred include OTH019, MW351 and MW352.

Trace level analysis was adopted for three groundwater locations following consultation and agreement with Defence. The three locations represent groundwater conditions which are either leaving the base into residential areas where groundwater bores are a possibility or from 'point of use' groundwater bores. The lower analysis was adopted for this sampling event in response to National Health and Medical Research Council (NHRMC) releasing draft health-based drinking water guideline values which propose lower PFAS criteria than is currently adopted (see **Section 5**).

4. Quality Assurance and Quality Control

The OMP SAQPs (Stantec 2024a and JBS&G 2024c) details Quality Assurance and Quality Control (QA/QC) procedures which were implemented across the two sampling rounds in 2024 to ensure validation of precision and accuracy. The sampling events were planned, undertaken and reported based on the seven step DQO process outlined in the ASC NEPM. This included data quality indicators and quality assurance and quality control processes that were applied to the conduct of field works undertaken to obtain relevant samples and the data returned from the analytical laboratories for the different media analysed.

An overall data quality review has been completed by the sampling events respective consultants and has been detailed in the SER provided in **Appendix D** and **Appendix E**.

Based on the review completed, the analytical results are considered representative of the concentrations and parameter readings within the sample media. Overall, the data collected during the two 2024 sampling events is deemed to be suitable for the purposes of the program.

5. Assessment Screening Criteria

As per the SAQPs provided in **Appendix A** and **Appendix B**, the analytical data was screened against relevant tier 1 screening criteria as outlined in the ASC NEPM (2013) and PFAS NEMP (HEPA 2025) to identify if the base risk profile has changed compared to the current risk profile.

The adopted tier 1 screening criteria for the relevant environmental values, as defined in the Environment Reference Standard (Victorian Government 2021) (ERS) are provided in the following **Table 5.1**. Further discussion of the ERS (Victorian Government 2021) and the environmental values has been provided in the SAQPs.

It should be noted that surface water interacts with groundwater throughout the base and in the immediately surrounding area. As such, from a screening perspective, the applicable groundwater criteria will also be applied to surface water for the purposes of this assessment.

Table 5.1: Adopted PFAS Screening Criteria for OMP – Water

Adopted Tier 1 Screening Criteria	Relevant Environmental Value	Sum PFOS+ PFHxS	PFOA
Freshwater: High conservation/ecological value systems (99% species protection)	Water Dependent Ecosystems and Species	0.00023 µg/L	19 µg/L
Freshwater: Slightly to moderately disturbed systems (95% species protection)		0.13 µg/L	220 µg/L
Drinking water	Potable Water Supply (Desirable), Traditional Owner Cultural Values, Agriculture and Irrigation (Irrigation and Stock Watering)	0.07 µg/L	0.56 µg/L
Recreational water	Water-based Recreation (Primary Contact Recreation, Secondary Contact, Aesthetic Enjoyment)	2 µg/L	10 µg/L

HEPA (2025) has adopted screening criteria or species protection levels for toxicants, which provide guidance for assessment of aquatic ecosystems. Percent species protection levels range from 80% (highly disturbed systems) to 99% (largely unmodified systems). The water bodies on and surrounding the base range in ecosystem disturbance and modification, as such different protection levels apply. The following is a general guide for adopting species protection based on water feature:

- **On-base constructed stormwater channels, swales or pipework:** No species protection, as protection of environmental values in artificial stormwater drains is not a requirement;
- **On-base stormwater pond, dam or depression:** 95% species protection adopted as vegetation is present in and around the moderately to highly modified feature which supports a freshwater ecosystem; and
- **On and off-base water bodies (i.e. rivers, creeks, lakes and wetlands):** 99% species protection adopted.

For the purposes of this report and as advised in HEPA (2025), the 99% species protection level has been adopted to be protective of bioaccumulation and biomagnification in wildlife (i.e. indirect toxicity), whilst the 95% species protection level is still relevant to direct toxicity for slightly to moderately disturbed ecosystems. It is noted that the laboratory detection limit adopted for the investigation is above the 99% species protection level, in which case a less than detection limit result will be considered an exceedance, and the potential risk assessed in the context of the HHERA (Golder 2020).

In the absence of a published screening criteria for stock watering, the drinking water criteria have been considered as an initial screening criteria, as is consistent with the HHERA (Golder 2020).

No screening criteria have been adopted for the environmental values Potable Mineral Water Supply, Industrial and Commercial, Aquaculture, or Geothermal Properties, as these uses are identified as unlikely to be present within the Management Area. Additionally, no criteria have been adopted for the environmental value Buildings and Structures, as no PFAS criteria have been developed for this scenario.

No ecological or human health guidelines have currently been developed for PFAS in sediments by any Australian Regulatory body and as such, sediment results have not been assessed against screening criteria during this program.

It is acknowledged that in November 2024, the National Health and Medical Research Council (NHMRC) released draft health based drinking water guidelines values for public consultation. These guidelines were subsequently finalised in June 2025. As the sampling events discussed in this 2024 OMR were completed prior to the release of these new guidelines, the revised PFAS guideline values have not been adopted for this work. The new guidelines will however be considered by Defence from 2025, including as part of the OMP program.

6. Monitoring Data Summary

The following sections detail the rainfall, groundwater, surface water and sediment monitoring data collected during the two 2024 OMP sampling events.

All data has been extracted from the SERs, full copies of which have been provided in **Appendix D** and **Appendix E**.

6.1 Rainfall

6.1.1 Rainfall During OMR Period (2024)

As noted in **Table 2.1**, the average annual rainfall at Wodonga (weather station 082056, approximately 2.7 km to the northwest) is approximately 715 mm. The total annual rainfalls experienced during 2024 was 568.5 mm. **Plate 1** plots the monthly rainfall in 2024 against the long-term monthly averages (available data from 1898 to 2025).

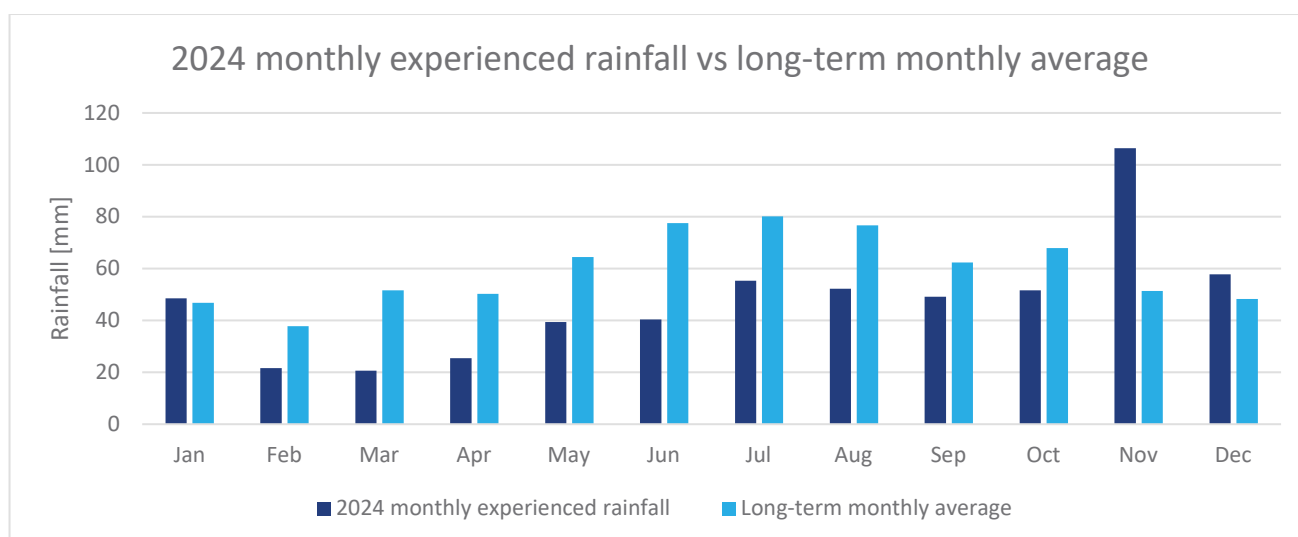


Plate 1: Monthly rainfall experienced vs long term monthly averages

As shown above, the year 2024 recorded below-average rainfall. The sampling event completed in April 2024 took place during below-average rainfall conditions, whereas the November/December 2024 took place during above average rainfall conditions. Further details are provided in the following **Section 6.1.2**.

For context, yearly total rainfalls from previous OMP sampling periods are as follows: 2021 – 832.9 mm, 2022 – 1,140.9 mm and 2023 – 779.6 mm. Further information can be found in the OMR – 2021, 2022 and 2023 (JBS&G 2025b), which has also been summarised in **Section 7.4**. Furthermore, the average rainfall for the years that OMP sampling events have occurred is 830 mm, which is slightly above the average long-term yearly average. Previous yearly averages and the long-term average are important to reference to provide context to long-term (i.e. across the OMP program) and short-term (i.e. individual sampling events) observations and analytical result trends.

6.1.2 Rainfall During Individual Sampling Events

The PMAP (Defence 2020) recommends that OMP surface water sampling is completed after a reasonable rain event if possible (defined as 35 mm of rain over a 4-day period), as many of the water bodies targeted by the OMP are ephemeral. **Table 6.1** below details rainfall occurrence in the region immediately prior to and during the OMP sampling events.

Table 6.1: Rainfall During Sampling Events

Sample Event	Surface Water Sampling	Rainfall Measurements from Closest Weather Station during Sample Event ¹
E6	2 to 5 April 2024 (main sampling event) 31 May 2024 (surface water resampling)	No rain was recorded in the seven days prior to the April 2024 sampling event; 9.0 mm was recorded between 2 and 5 April, and 39 mm was recorded on 31 May.
E7	25 November to 4 December 2024.	23 mm of rain was recorded in the seven days prior to the Nov/Dec 2024 sampling event while 98.8 mm was recorded during the monitoring period. It is also noted that 44.4 mm was recorded on 26 and 27 November 2024, which is during, or just before, the majority of the surface water samples were collected as part of the OMP.

Notes:

1. Rainfall measurements were recorded at the Wodonga weather station (ID: 082056), the closest BoM station to the base (approximately 2.7 km to the north west).

The April 2024 sampling event was completed during a period of low rainfall, with efforts made to return to base in May 2024 following a rain event to complete additional sampling. The difficulty with predicting weather and immediate mobilisation to base for sample collection has contributed to surface water sampling locations being dry and not sampled during the April 2024 sample event.

6.2 Groundwater

6.2.1 Groundwater Elevations and Flow Direction

Groundwater elevation contour plots based on reduced groundwater levels measured during the two sampling events are presented in **Figure 6A** and **6B**. Groundwater flow direction remains relatively consistent across the monitoring period and is also consistent with the expected directions as described in **Table 2.1**. Groundwater elevations by aquifer interval for each monitoring round have been summarised in the following **Table 6.2** and **Table 6.3**. Overall, the following observations are made in relation to the groundwater contours derived from the monitoring undertaken:

- Shepparton Colluvium – Shallow Wells (South Bandiana and North Bandiana): Flow to the west and northwest towards Jack in the Box Creek;
- Shepparton and Coonambidgal Fluvium – Shallow Wells (North Bandiana and East Bandiana): Flow to the east and northeast towards the Kiewa River; and
- Shepparton and Coonambidgal Fluvium – Intermediate and Deep Wells (North Bandiana and East Bandiana): insufficient wells, or insufficiently spaced wells to prepare flow contours based on OMP data. Groundwater flow direction is known to be to the northeast towards the Kiewa River based on information from the DSI Addendum (JBS&G 2024a) and Mass Flux Study (JBS&G 2024b).

Table 6.2: Summary of Groundwater Elevation – Shepparton Colluvium

Event	Groundwater Elevation Range (m AHD)	
	Perched	Shallow
E6	181.335 (MW056)	151.516 (MW361) to 167.333 (MW342)
E7	181.300 (MW056)	151.426 (MW361) to 167.115 (MW342)

Table 6.3: Summary of Groundwater Elevation – Shepparton and Coonambidgal Fluvium

Event	Groundwater Elevation Range (m AHD)		
	Shallow	Intermediate	Deep
E6	152.928 ¹ (MW357) to 163.515 (MW346)	158.530 (MW046_I) to 158.817 (MW009)	157.745 (MW046_D) to 159.834 (MW350_D)
E7	155.142 (MW404) to 163.469 (MW346)	158.501 (MW046_I) to 158.800 (MW009)	157.876 (MW046_D) to 159.744 (MW350_D)

Note:

1. Top of Case (TOC) was unable to be calculated at the time of initial reporting due to well damage. Groundwater elevation was initially reported as 'not measured' (Stantec 2024b). Elevation was calculated after re-surveying the well in January 2025 as part of the OMR.

Groundwater elevation measured in the shallow, intermediate and deep wells installed in the Shepparton and Coonambidgal Fluvium aquifer in East Bandiana had comparable groundwater elevations. This demonstrates interconnectivity between the different well intervals. This confirms the observations from groundwater gauging undertaken as part of the DSI Addendum investigation (JBS&G 2024a) and the OMR – 2021, 2022 and 2023 (JBS&G 2025b).

As detailed in **Section 6.1**, 2024 was a below-average rainfall period, with November and December being two of the three months during the year that recorded rainfall above the long-term average. The majority of wells gauged as part of the OMP showed similar standing water levels between the two events, consistent with the long-term dry conditions. This is also consistent with the conceptual understanding of the aquifers within the Management Area (i.e. not influenced over the short term by rainfall or other factors).

It is noted that based on the current monitoring program, the groundwater flow direction in the shallow Shepparton Colluvium aquifer in North Bandiana is difficult to accurately calculate as there is only one well (MW342) monitored in this part of the base. It would be beneficial to include additional North Bandiana wells screened within this geology as part of the OMP program to ensure accurate groundwater flow contours are calculated. The above recommendations were identified in the previous OMR report and have subsequently been included in the Revised OMP (Defence 2025), which was released by Defence in March 2025.

6.2.2 Groundwater Physiochemical Field Parameters

An overview of field parameters recorded in groundwater as part of the 2024 monitoring is summarised in **Table 6.4**. Parameter ranges have been provided in detail in **Appendix G**, while parameter tables for each sampling event are provided in **Appendix D** and **Appendix E**.

Table 6.4: Overview of Recorded Groundwater Field Parameters

Aquifer	On-base	Off-base
Shepparton Colluvium Perched	pH: Slightly acidic to neutral. DO: Hypoxic to poor aerobic conditions. EC: Freshwater. ORP: Anaerobic to moderately reducing conditions.	Not monitored off-base.

Aquifer	On-base	Off-base
Shepparton Colluvium Shallow	pH: Slightly acidic to moderately alkaline. DO: Hypoxic to good aerobic conditions. EC: Freshwater to saline water. ORP: Anaerobic to moderately reducing conditions.	pH: Slightly acidic to neutral. DO: Hypoxic to poor aerobic conditions. EC: Freshwater. ORP: Anaerobic to moderately reducing conditions.
Shepparton and Coonambidgal Fluvium Shallow	pH: Slightly acidic to neutral. DO: Hypoxic to excellent aerobic conditions. EC: Freshwater to saline water. ORP: Anaerobic to moderately reducing conditions.	pH: Slightly acidic to neutral. DO: Hypoxic to poor aerobic conditions. EC: Freshwater. ORP: Anaerobic conditions.
Shepparton and Coonambidgal Fluvium Intermediate	pH: Slightly acidic. DO: Hypoxic to good aerobic conditions. EC: Freshwater. ORP: Anaerobic to moderately reducing conditions.	Not monitored off-base.
Shepparton and Coonambidgal Fluvium Deep	pH: Slightly acidic to neutral. DO: Hypoxic conditions. EC: Freshwater. ORP: Anaerobic to moderately reducing conditions.	Not monitored off-base.

Notes:

1. pH = potential of hydrogen, DO = dissolved oxygen, EC = electrical conductivity, ORP = oxidating reduction potential

6.2.3 Laboratory Results

Groundwater results from both monitoring rounds have been compared to relevant criteria tabulated and summarised in T1: OMP Groundwater Analytical Summary Table (2024). A summary of criteria exceedances is provided in the following **Table 6.5**. A more detailed discussion of the results in the context of the overall program is provided in **Section 8**.

Table 6.5: Summary of Groundwater Analytical Results Exceedances

Analyte	Conc. Range (µg/L)	Summary of Groundwater Analytical Results
Shepparton Colluvium – Perched – On-base (1 well)		
PFOS	0.53 to 1.40	Concentrations at MW056 were reported above the PFAS NEMP 2025 Freshwater (99% and 95% Protection) criteria in both sampling events.
PFOA	0.10 to 0.12	No criteria exceedances were identified for PFOA.
Sum of PFOS and PFHxS	1.14 to 1.86	Concentrations at MW056 were reported above the PFAS NEMP 2025 Drinking Water criterion in all sampling events.
Shepparton Colluvium – Shallow – On-base (14 wells)		
PFOS	Limit of Reporting (LOR) to 1,100	• Concentration at all locations in all sampling events were reported above the PFAS NEMP 2025 Freshwater (99% Protection) criterion, although it is acknowledged that concentrations at MW313, MW315 and MW323 in one sampling event each were below the LOR; and • Concentration at MW051, MW304, MW307, MW319, MW321, MW342 and MW416 in one or both sampling events were reported above the PFAS NEMP 2025 Freshwater (95% Protection) criterion.

Analyte	Conc. Range (µg/L)	Summary of Groundwater Analytical Results
PFOA	LOR to 55	- Concentrations at MW307 were reported above the PFAS NEMP 2025 Freshwater (99% Protection) criterion in both sampling events; - Concentrations at MW307 during both sampling events and MW321 in November/December 2024 were reported above the PFAS NEMP 2025 Recreational Water criterion and Drinking Water criterion.
Sum of PFOS and PFHxS	LOR to 1,350	- Concentrations at MW051, MW307, MW321 and MW342 were reported above the PFAS NEMP 2025 Recreational Water criterion in one or both sampling events; and - Concentrations at MW051, MW304, MW307, MW312, MW319, MW321, MW329, MW342 and MW416 were reported above the PFAS NEMP 2025 Drinking Water criterion in one or both sampling events.
Shepparton and Coonambidgal Fluvium – Shallow – On-base (18 wells)		
PFOS	LOR to 91	- Concentration at all locations were reported above the PFAS NEMP 2025 Freshwater (99% Protection) criterion in both sampling events, although it is acknowledged that concentrations in MW346 was below the LOR during the November/December 2024 event; and - Concentrations at most locations were reported above the PFAS NEMP 2025 Freshwater (95% Protection) criterion in one or both sampling events. The exceptions were MW012, MW345, MW346, MW351, MW352 and MW354.
PFOA	LOR to 8.66	Concentrations at MW035, MW052, MW350_S, MW353, MW403 and MW404 were reported above the PFAS NEMP 2025 Drinking Water criterion in one or both sampling events.
Sum of PFOS and PFHxS	LOR to 178	- Concentrations at most locations were reported above the PFAS NEMP 2025 Drinking Water criterion in one or both sampling events. The exceptions were MW346 and MW352; and - Concentrations at MW016, MW020, MW035, MW042, MW052, MW350_S, MW353, MW403 and MW404 were reported above the PFAS NEMP 2025 Recreational Water criterion in one or both sampling events.
Shepparton and Coonambidgal Fluvium – Intermediate – On-base (3 wells)		
PFOS	1.97 to 7.36	Concentration at all three wells (MW009, MW042 and MW046_I) were reported above the PFAS NEMP 2025 Freshwater (99% and 95% Protection) criteria in both sampling events.
PFOA	0.07 to 0.56	No criteria exceedances were identified for PFOA.
Sum of PFOS and PFHxS	3.60 to 15.60	Concentration in all three wells were reported above the PFAS NEMP 2025 Drinking Water and PFAS NEMP 2020 Recreational Water criteria.
Shepparton and Coonambidgal Fluvium – Deep – On-base (2 wells)		
PFOS	0.35 to 2.80	Concentrations at both locations (MW046_D, MW350_D) were reported above the PFAS NEMP 2025 Freshwater (99% and 95% Protection) criteria in both sampling events.
PFOA	0.02 to 0.09	No criteria exceedances were identified for PFOA.
Sum of PFOS and PFHxS	0.55 to 4.80	- Concentrations at both locations were reported above the PFAS NEMP 2025 Drinking Water criterion in both sampling events. - Concentrations at MW046_D were reported above the PFAS NEMP 2025 Recreational Water criterion in both sampling events.
Shepparton Colluvium – Shallow – Off-base (2 wells)		
PFOS	0.04 to 0.26	Concentrations at all locations in all sampling events were reported above the PFAS NEMP 2025 Freshwater (99% Protection) criterion, with both wells during the

Analyte	Conc. Range (µg/L)	Summary of Groundwater Analytical Results
November/December 2024 event also above the PFAS NEMP 2025 Freshwater (95% Protection) criterion.		
PFOA	LOR to 0.04	No criteria exceedances were identified for PFOA.
Sum of PFOS and PFHxS	0.07 to 0.39	Concentrations at both MW360 and MW361 in all sampling events were reported above the PFAS NEMP 2025 Drinking Water criterion, with the exception of MW360 during the April 2024 event, which was below.
Shepparton and Coonambidgal Fluvium – Shallow – Off-base (2 wells)		
PFOS	LOR to 0.02	Concentrations at MW357 in all sampling events were reported above the PFAS NEMP 2025 Freshwater (99% Protection) criterion, but below 95% Protection.
PFOA	LOR	No criteria exceedances were identified for PFOA.
Sum of PFOS and PFHxS	LOR to 0.06	No criteria exceedances were identified for sum of PFOS and PFHxS.

Notes:

1. It is acknowledged that the LOR adopted for this investigation exceeds the PFAS NEMP 2025 Freshwater (99% Protection) Criteria. A less than detection limit result has been considered an exceedance, as discussed in Section 5, with the potential risk from the result assessed in the context of the HHERA (Golder 2020).

6.3 Surface Water

6.3.1 Surface Water Quality Field Parameters

An overview of field parameters recorded in groundwater as part of the 2024 monitoring is summarised in **Table 6.6**. Parameter ranges have been provided in detail in **Appendix G**, while parameter tables for each sampling event are provided in **Appendix D** and **Appendix E**.

Table 6.6: Overview of Recorded Surface Water Field Parameters

Media	On-base	Off-base
Surface Water	pH: Moderately acidic to moderately alkaline. DO: Hypoxic to excellent aerobic conditions. EC: Freshwater. ORP: Anaerobic to highly oxidising conditions.	pH: Moderately acidic to neutral. DO: Hypoxic to excellent aerobic conditions. EC: Freshwater. ORP: Anaerobic to moderately reducing conditions.

Notes:

1. pH = potential of hydrogen, DO = dissolved oxygen, EC = electrical conductivity, ORP = oxidating reduction potential

6.3.2 Laboratory Results

Surface water analytical results for both 2024 sampling events have been tabulated in comparison to relevant criteria in T2: OMP Surface Water Analytical Summary Table (2024) and is summarised in **Table 6.7** on the following page.

A discussion of the results in the context of the overall program has been provided in **Section 8**.

Table 6.7: Summary of Surface Water Analytical Results Exceedances

Analyte	Conc. Range (µg/L)	Summary of Groundwater Analytical Results
On-base		
PFOS	LOR to 25.0	- All sample locations during all sampling events were reported above the PFAS NEMP 2025 Freshwater (99% Protection) criterion, although it is acknowledged that concentrations at SW382 were below the LOR; and - SW302, SW311, SW313, SW321, SW322, SW323, SW324, SW326, SW332, SW333, SW336, SW338, SW340, SW346, SW349 and SW455 in all sampling events were reported above the PFAS NEMP 2025 Freshwater (95% Protection) criterion.
PFOA	LOR to 1.20	SW313, SW332 and SW336 during the November/December 2024 sampling events exceeded PFAS NEMP 2025 Drinking Water criterion.
Sum of PFOS and PFHxS	LOR to 31.30	- SW302, SW313, SW326, SW332, SW336 and SW340 during the November/December 2024 sampling event were reported above the PFAS NEMP 2025 Recreational Water criterion; and - All sample locations during all sampling events, with the exception of SW374, SW375, SW382, SW387 and SW388 during one or both sampling events, were reported above the PFAS NEMP 2025 Drinking Water criterion.
Off-base		
PFOS	LOR to 7.70	- All sample locations during all sampling events, were reported above the PFAS NEMP 2025 Freshwater (99% Protection) criterion, although it is acknowledged that concentrations at SW390, SW393, SW398, SW404, SW416, SW424, SW434 and SW462 were below the LOR in one or more sampling event; and - SW396, SW397, SW400, SW401, SW403, SW424, SW430, SW448, SW463, SW470, SW471 and SW487 in one or both sampling events, were reported above the PFAS NEMP 2025 Freshwater (95% Protection) criterion.
PFOA	LOR to 0.37	No criteria exceedances were identified for PFOA.
Sum of PFOS and PFHxS	LOR to 12.20	- SW396, SW397, SW448, SW471 and SW487 in one or both sampling events, were reported above the PFAS NEMP 2025 Recreational Water criterion; and - SW395, SW396, SW397, SW400, SW401, SW403, SW404, SW405, SW424, SW427, SW430, SW431, SW432, SW448, SW462, SW463, SW470, SW471 and SW487 in one or more sampling event, were reported above the PFAS NEMP 2025 Drinking Water criterion.

Notes:

1. It is acknowledged that the LOR adopted for this investigation exceeds the PFAS NEMP 2025 Freshwater (99% Protection) Criteria. A less than detection limit result has been considered an exceedance, as discussed in **Section 5**, with the potential risk from the result assessed in the context of the HHERA (Golder 2020).

6.4 Sediment

6.4.1 Summary of Field Observations

The April 2024 sampling event included sediment sampling. The sediment sampled on-base was predominantly described as grey brown and dark brown silty clay or sandy clay, ranging in plasticity from low to high. Some samples contained organic matter such as roots and leaves. The sediment sampled on-base did not report any odours or staining. Based on the field notes, the on-base water bodies were a mix of dry, stagnant or low flowing water bodies, and foaming (which can be an indicator of PFAS presence) was not identified at most locations.

The sediment sampled off-base was described predominantly as light brown or grey brown to dark brown silty clay and sandy silt, with observations of organic matter such as roots and leaves. The sediment sampled off-base did not report any odours or staining. The water bodies where samples were collected were a mix of dry or stagnant water bodies, and foaming was not identified at most locations.

6.4.2 Laboratory Results

Sediment analytical results for the April 2024 monitoring round have been tabulated in T3: OMP Sediment Analytical Summary Table (2021-2023) and summarised in the **Table 6.8**. The results indicate that:

- The highest PFAS concentrations in sediment were reported for an off-base location;
- The highest concentrations off-base were identified in the oxbow lakes in the Kiewa River floodplain, directly east of East Bandiana; and
- The highest on-base concentrations were detected in South Bandiana, downgradient of Source Area 6.

A full review of the analytical results in the context of the overall program has been provided in **Section 8**.

Table 6.8: Summary of Sediment Analytical Results

Monitoring Period	PFOS Concentrations Range (mg/kg)	PFOA Concentrations Range (mg/kg)	Sum of PFOS+PFHxS Concentrations Range (mg/kg)
On-base			
E6 (April 2024)	LOR (Multiple) to 0.0203 (SD323)	LOR (Multiple) to 0.0003 (SD396)	LOR (Multiple) to 0.0217 (SD323)
Off-base			
E6 (April 2024)	0.0024 (SD412) to 0.0586 (SD397)	LOR (multiple) to 0.0005 (SD397)	0.0024 (SD412) to 0.0633 (SD397)

7. Other Aspects

In unison with the OMP program, since 2021, Defence has engaged consultants to progress other investigations as part of implementation of the PMAP. These works have been detailed in **Appendix H** and summarised in **Table 7.1** as they provide additional information and data that assists in interpretation of the OMP results. In addition to these assessments, the OMR – 2021, 2022 and 2023 (JBS&G 2025b) has also been reviewed in this section to provide context for historic results at the OMP sampling locations.

Table 7.1: Relevant Investigation Information

Work	Work Overview
DSI Addendum (JBS&G 2024a)	This investigation was conducted to gather additional data on PFAS contamination, focusing on Source Area 6 in South Bandiana and Source Area 13 in East Bandiana. The investigation aimed to better define the extent and mobility of PFAS within these areas and assess migration pathways to off-base locations. The assessment indicated that future works should focus on reducing PFAS migration from the base through remediation and/or management. It was concluded that an appropriate remedial response to address the PMAP Management Action will likely involve a combination of Source Area and remediation and/or management of affected pathways.
Mass Flux Study (JBS&G 2024b)	This investigation was conducted to quantify annual PFAS mass flux from the base into off-base areas. The Mass Flux Study confirmed the DSI Addendum (JBS&G 2024a) CSM, in that the primary off-base PFAS migration pathway for South and North Bandiana was via surface water, while the primary pathway for East Bandiana was via groundwater.
Source Area 1 and 7 Further Investigation (JBS&G 2025a)	Based on the findings of previous investigations, additional investigation work was completed within both Source Area 1 and 7 to assess the potential effect on soils and infrastructure from PFAS-based AFFF training and use. The further assessment was used to assess the influence of PFAS in soil on measured concentrations in groundwater and surface water runoff. It was identified that while the contamination identified in both Source Areas did not pose a current risk to human health, the investigation did confirm that the Source Areas will require remediation and/or management action in order to assist in achieving PMAP Risks Management Actions.
OMR – 2021, 2022 and 2023 (JBS&G 2025b)	The OMR – 2021, 2021 and 2023 presented and evaluated the OMP data from five sampling events (November 2021, May 2022, October 2022, May 2023 and October 2023) completed by Stantec.

In addition to the further investigation undertaken, review of other aspects which could influence the CSM and the Management Area risk profile is also undertaken as part of this OMR. This has been summarised in **Table 7.2**.

Table 7.2: Other Aspects Considered

Aspects	Consideration for OMR
Development works or changes in on-base land use	No significant development works or changes have been identified across the base during the OMR monitoring period. Minor localised works have been identified that could influence individual sampling locations, and these have been commented on in Appendix I where identified.
Development works or changes in off-base land use	No significant development works or changes have been identified in off-base portions of the Management Area.
Significant weather events	No significant weather events were identified during the OMR period, noting that climate trends and rainfall events, along with their influence on the data have been discussed throughout this report.

Aspects	Consideration for OMR
Water use surveys	During 2024, Defence undertook a Water Use Survey for parts of Killara and is in the process of reviewing the results. Once completed, Defence will be able to confirm the currency of our understanding of risk and suitability of risk management actions. This will form part of a future OMR.
Changes in EPA Victoria Precautionary Advice	The Environment Protection Authority Victoria (EPA) precautionary advice regarding carp consumption from the Kiewa River is still in force and has not changed since the previous OMR. The carp advisory area is provided in Figure 11 .
Changes in nationally endorsed PFAS screening criteria	During the period that this OMR was produced, the PFAS NEMP (HEPA 2025) has been released. This document, including the PFAS screening criteria, has been adopted as part of this OMR.

8. Discussion

The following section provides a discussion on the results of the two 2024 OMP sampling events in the context of the observed field and analytical trends and their setting in the broader PMAP program.

A detailed summary of the OMP results in the context of the revised CSM, is set out in **Appendix I, Table I.1**. Sampling results from the April sampling event have been provided in **Figure 7A** through **7D**, while results from the November/December sampling event have been provided in **Figure 8A** through **8C**.

The short-term PFAS trends observed are consistent with the current CSM for the base and Management Area, and therefore statistical trend analysis of the data has not been completed. While statistical trend analysis can provide a robust assessment of long-term trends, they are not suited to assessing short-term fluctuating trends, nor do they consider other factors relevant to the CSM, such as climatic conditions and groundwater level fluctuations.

8.1 Groundwater

8.1.1 Groundwater - CSM and Consideration of Analytical Results

Based on the current CSM, groundwater is the primary PFAS pathway for migration across East Bandiana. Groundwater from the base is also connected and therefore contributes to identified surface water PFAS concentrations in the oxbow lakes located on the Kiewa River floodplain. In North and South Bandiana, primarily due to the clayey nature of the Shepparton Colluvium, this limits vertical and lateral PFAS migration in groundwater and surface water transport of PFAS dominates.

In East Bandiana PFAS migration in groundwater from Source Area 13, continues to migrate northeast into off-base areas. The extent of the identified PFAS plume is similar to previous findings, and remediation will be implemented to manage further migration. The lower laboratory detection limits conducted for the analysis at OTH019, MW351 and MW352 identified similar results as was recorded during previous OMP sampling events. In South and North Bandiana, groundwater migration is slow owing to the clayey geology resulting in PFAS concentrations in Source Areas remaining stable (exceptions discussed below).

The understanding of the CSM and risk to human and environmental receptors has been updated with additional information and data through the completion of the DSI Addendum (JSB&G 2024a), the Mass Flux Study (JBS&G 2024b) and the Source Area 1 and Source Area 7 Further Investigation (JBS&G 2025a)). Overall, despite refinement of the CSM, risk associated with realised exposure scenarios identified in the HHERA (Golder 2020) remains low and acceptable.

Over the last three years, Defence have engaged consultants to complete additional investigations across the base along with regular OMP monitoring. As shown above, this has significantly increased the conceptual understanding of the groundwater migratory pathways across the base along with potential receptors that may be exposed to groundwater. Based on this increased understanding and the stable nature of PFAS concentrations in groundwater across the Management Area, it is considered appropriate that Defence could reduce the frequency of sampling on-base wells from bi-annually to annually as part of the OMP program. The sampling of off-base groundwater locations should however be maintained as bi-annual as these areas are where un-realised risks relating to groundwater occur and regular monitoring is required to ensure groundwater exposure risks remain low and acceptable.

Exceptions in South Bandiana

High PFAS concentrations (i.e. >1,000 µg/L sum of PFAS) identified in groundwater sampled from MW307 (Source Area 1) and MW321 (Source Area 7) have remained stable during 2024 OMP sampling, consistent with previous monitoring. Investigations suggest localised PFAS migration into groundwater occurs due to clay shrinkage and cracking, although it is noted that groundwater in the clay-dominated Shepparton Colluvium aquifer moves slowly.

It should be noted that PFAS identified in groundwater from MW307 and MW321 have not been identified in downgradient wells. It has been four decades since the firefighting/fire training activities that resulted in PFAS contamination commenced and approximately two decades since they ceased. Therefore, the lack of detected PFAS in wells downgradient of these Source Areas and historic activity suggests that the natural geology/hydrogeology effectively restricts lateral movement of groundwater. Additional downgradient wells (MW302, MW303, MW305) will be monitored near MW307 to confirm plume delineation if migration occurs.

PFAS concentrations in groundwater sampled from MW051 and MW416 (Source Area 6) increased tenfold in 2024 with no known cause; MW323 downgradient has not shown the same trend. Future monitoring will track changes, and remediation activities across South Bandiana, including the proposed facility demolition and soil stabilisation in Source Area 6, will assist in stabilising or reducing PFAS concentrations in groundwater across this portion of the base.

Exceptions in East Bandiana

PFAS concentrations identified in MW353, located in East Bandiana doubled in 2024 but are consistent with other East Bandiana PFAS plume areas. It is noted that East Bandiana is planned to undergo remediation in 2025, including groundwater extraction and treatment along the northern base boundary to occur to prevent off-base PFAS migration. The groundwater which flows through the location of MW353 will be captured by the system currently planned.

8.1.2 OMP Program Changes

As indicated throughout **Appendix I, Table I.1** in, the following changes to the OMP program would assist with the program objective:

- Off-base sampling of existing well (MW411 through MW415) to the east of East Bandiana to characterise the known PFAS plume in off-base areas. With this improved monitoring between the base and the receptor, the sampling frequency of all on-base wells across East Bandiana can be reduced from biannual to annual. It will also provide better coverage to assess changes in PFAS concentration in groundwater once the East Bandiana aquifer remediation system is installed;
- Off-base monitoring within the Killara residential development through the newly installed monitoring well MW447; and
- Monitor additional wells in North Bandiana (MW343 and MW344) to provide data with which to better calculate groundwater flow contours in this portion of the base. This will also help better delineate identified PFAS in groundwater in MW342.

The above recommendations were identified in the previous OMR report and have subsequently been included in the Revised OMP (Defence 2025), which was released by Defence in March 2025.

Minor PFAS concentration increases and decreases (i.e. less than an order of magnitude) have been identified in multiple wells and require ongoing monitoring to determine if there are consistent trends and if further action is warranted.

8.1.3 Analytical Results Based on Weather Conditions

As noted in **Section 6.1**, above average rainfall occurred during the previous OMR period (2021 through 2023), while the current OMR period (2024) was below-average. Groundwater levels increased across the base during 2022, although many wells had returned to a similar level as the November 2021 sampling event by the May or October 2023 sampling events. In general, standing water levels continued to drop during 2024. This has been shown in **Table 8.1**, where average standing water levels recorded during the sampling events have been compared to the sampling event prior to show level changes.

Table 8.1: Average Standing Water Level Changes by Aquifer – 2024 OMP Sampling Events

Aquifer	E6	E7
Shepparton Colluvium – Shallow	Decrease of 0.130 m	Increase of 0.092 m
Shepparton Colluvium – Perched	No change	Decrease of 0.035 m
Shepparton and Coonambidgal Fluvium – Shallow	Decrease of 0.625 m	Decrease of 0.001 m
Shepparton and Coonambidgal Fluvium – Intermediate	Decrease of 0.487 m	Decrease of 0.028 m
Shepparton and Coonambidgal Fluvium – Deep	Decrease of 0.692 m	Increase of 0.020 m

Note:

1. SWL changes are based on the current sampling event compared to the event prior.

Previous OMP results and decreasing groundwater levels depict a correlation between rainfall and standing water levels in the Management Area, although the relationship occurs over long periods (i.e. months) rather than being influenced over the short term by rainfall events or other factors.

With the Management Area transitioning from an above-average rainfall period (2021 through 2023) through to a below-average period (2024), decreasing standing water levels dominate. During the previous 2021-2023 monitoring period increasing groundwater levels has saturated previously dry soils affected by PFAS resulting in increases in dissolved PFAS concentrations within the groundwater.

During the 2024 below-average rainfall period, there were no material changes in groundwater concentrations (i.e. increase or decrease), with the exception of outliers identified in **Section 8.1.1**. This relationship is likely caused by the groundwater interacting with the overlying PFAS affected soils during the above-average rainfall period. This is thought to have maintained the same dissolved PFAS concentrations, despite the water table dropping during the below-average period. It is noted that some concentration changes in groundwater may not be identifiable over a period as short as 12 months, and that the data set as a whole should continue to be reviewed as a whole for potential trends.

Groundwater quality parameters collected during the OMP sampling events were also reviewed to assess the influence of changing rainfall conditions. A review of the parameter data presented in **Appendix G** along with the data in the OMR – 2021, 2022 and 2023 (JBS&G 2025b). No clear trends have been identified during periods of below-average rainfall; however, further monitoring may be required for these trends to become clearer. As indicated previously, aquifers in the Management Area are not influenced by short-term changes.

Further monitoring undertaken as part of the OMP will include comparison of rainfall, standing water levels and PFAS concentrations to assess these influences in future.

8.2 Surface Water

8.2.1 Surface Water - CSM and Consideration of Analytical Results

Surface water has been identified as the primary PFAS migration pathway for North and South Bandiana and the groundwater from East Bandiana is known to daylight off-base as springs, seeps and in oxbows in the Kiewa River floodplain. As such, surface water sampling as part of the OMP is critical to monitoring PFAS movement across the base and into the Jack in the Box Creek and Kiewa River catchments.

A discussion of the OMP surface water concentrations with respect to the overall program including the CSM developed by the DSI Addendum (JBS&G 2024a) and Mass Flux Study (JBS&G 2024b) are discussed in **Table I.2** in **Appendix I**.

The surface water results obtained during the 2024 OMP sampling events are considered consistent with the findings of the DSI Addendum (JBS&G 2024a), Mass Flux Study (JBS&G 2024b) and the Source Area 1 and Source Area 7 Further Investigation (JBS&G 2025a). As identified in **Table I.2** in **Appendix I**, there were several minor anomalous results identified during 2024 OMP sampling events, including SW302, SW313, SW326 and SW332. The result from SW313 is due to soil disturbance works at the surface water sampling location from

recent environmental investigation works. The cause of the remaining anomalous results remains unclear. These areas should continue to be monitored to confirm results.

8.2.2 Analytical Results Based on Weather Conditions

The OMP program, along with previous investigations including the Mass Flux Study (JBS&G 2024b), have clearly shown that all but the key waterways and drainage channels across the base and Management Area are ephemeral and only have flows immediately following rainfall events. This occurs due to the close proximity of the base to the top of the watershed, with little to no flow passing through. There is, however, a risk of missing surface water sampling locations in OMP sampling events undertaken outside of reasonable rainfall events. This is apparent in the results of OMP sampling events E2, E4 and E6.

The missing data from potential sampling locations makes it difficult to ascertain trends and relationships between analytical results and weather conditions when assessing the OMP program data set as a whole. The fact that many of waterbodies and drainage channels dry completely during periods of the year also make the relationship difficult to assess as other factors influence the results (i.e. soil and sediment conditions, type of water body, etc.). A review of water bodies with close to complete data sets indicate that periods of below-average rainfall tend to have slightly higher PFAS concentrations in surface water, although the relationship does not apply to all locations. This relationship is likely caused by a concentration of PFAS in a lesser volume of water available during drier periods. Trends and relationships between weather conditions and analytical results have been further assessed as part of the Mass Flux Study (JBS&G 2024b).

8.2.3 Analytical Results Based on Water Flow

The intention of surface water monitoring is to collect surface water samples during or immediately following rain events. This will allow collection of flowing water from water courses, rather than stagnant water which may record higher PFAS concentrations owing to prolonged contact with soils/sediments containing PFAS. Due to weather conditions or the quick draining nature of some portions of the base, this is not always achievable. It is also noted that many of the water bodies sampled are oxbows or ponds in which the water is naturally stagnant, rather than flowing. Therefore the influences are taken into account when reviewing and analysing the data set.

During field work, the flow rate is recorded at each surface water sample location and included in the appendix of each SER (see **Appendix D** and **Appendix E**). A review of the data from 2024 identified the flow in the waterways outside the major creeks and rivers was stagnant to low during the E6 sampling event, although slightly higher during the E7 sampling event. This is consistent with the rainfall experienced during both sampling events. A comparison of the analytical results between no-flow and low-flow sampling rounds did not indicate a clear correlation or pattern between flow rates and increased PFAS concentrations.

8.3 Sediment

Sediment sampling locations were included in the OMP to monitor PFAS concentrations in this media at key surface water flow locations. This assists in the understanding of potential erosion, migration and deposition of materials from the base. The 12 sediment locations, shown in **Figure 5A** and **5B**, were divided into the following key surface water pathways:

- Jack in the Box Creek catchment (on and downgradient from South Bandiana) – SD463, SD323 and SD424;
- Kiewa River catchment (on and downgradient from South Bandiana and North Bandiana) – SD346, SD355, SD375 and SD412; and
- Kiewa River catchment (on and downgradient (i.e. Kiewa River floodplain) from East Bandiana) – SD382, SD400, SD397, SD396, SD395.

The results obtained as part of the OMP works, with respect to the overall program including the CSM developed by the DSI Addendum (JBS&G 2024a) and Mass Flux Study (JBS&G 2024b), are discussed in **Table I.3** in **Appendix I**.

Sediment PFAS concentrations within the surface water drainage pathways are representative of their position relative to Source Areas, with higher concentrations identified in areas immediately adjacent Source Areas, or in areas receiving PFAS in surface water attributed to Source Areas.

Three sampling rounds for sediment have been undertaken as part of the overall OMP program. Results have been within the same order of magnitude, although 2024 tends to be slightly higher compared to the previous results. Results from the DSI (Golder 2018) and those available for the HHERA (Golder 2020) are also provided, which were also slightly higher than those obtained during the OMP program. The years of the DSI and HHERA, along with 2024, recorded below-average rainfall (with 610.9 mm for 2017, 338.1 mm for 2019 and 568.5 mm for 2024). This indicates there may be some correlation between rainfall and sediment concentrations (i.e. lower rainfalls produce slightly higher PFAS in sediment concentrations).

As highlighted during the review of the surface water data, similarly PFAS concentrations in sediment tend to decrease with the distance from the Source Area.

Investigation undertaken as part of the DSI Addendum (JBS&G 2024b) and Mass Flux Study (JBS&G 2024a) refined the understanding and contribution of surface water and sediment to PFAS mass and transport at the base. Future monitoring will continue to focus on sampling of surface water to assess PFAS along these pathways, as it is considered to be a better, more defined indicator of PFAS mass and transport from the Source Areas. The continued monitoring of sediment will therefore be discontinued.

9. OMR Conclusions and Implications for PMAP

The following section provides a discussion of potential implications of the 2024 OMR results reported in this OMR on the overall PMAP program, including refinement to the CSM and the risk profile.

9.1 CSM

The current CSM has been developed based on multiple investigations, with the latest refinement undertaken as part of the DSI Addendum (JBS&G 2024a), Mass Flux Study (JBS&G 2024b) and the Source Area 1 and Source Area 7 Further Investigation (JBS&G 2025a). The CSM takes into consideration sources, pathways and receptors, each of which have been discussed in the following sections.

9.1.1 Source Areas

The results of the groundwater, surface water and sediment monitoring undertaken and summarised in this OMR did not identify additional Source Areas as listed in **Section 2.2**.

With the completion of the Source Area 1 and Source Area 7 Further Investigation (JBS&G 2025a) during 2024, further data has been obtained to provide context to the OMR surface water and groundwater concentrations from these Source Areas. As discussed in previous sections of this report, targeted soil and groundwater remediation is planned for South Bandiana and East Bandiana, including both Source Area 1 and Source Area 7.

During 2024 it was identified that several areas of the base have shown increased PFAS concentrations in both surface water and groundwater. Other increases identified during the OMR – 2021, 2022 and 2023 (JBS&G 2025b) have stabilised or decreased. Statistical analysis of these trends has not been undertaken due to the size of the available OMR dataset (the ideal number of data points to complete Mann-Kendall analysis is at least 8-10 results (ITRC 2013)¹⁰). Moreover, there are variances (i.e. climate and weather, and other factors) within the data set which have meant that there is not one clear temporal trend being observed at monitoring locations. In general, it has been possible to rationalise changes in individual sample location concentrations based on consideration of activities in historic Source Areas. In addition, concentration increases are no greater than an order of magnitude over the 2024 period. In the isolated instances where this has not been found to be the case (such as MW321) they have been identified for remediation or ongoing management.

Excluding the areas already identified as requiring remediation throughout this OMR, monitoring will continue across the base to understand any potential changes in PFAS risk, with the need for any investigation or additional management actions continually assessed.

9.1.2 Pathways

A primary objective the DSI Addendum (JBS&G 2024a), Mass Flux Study (JBS&G 2024b) and the Source Area 1 and Source Area 7 Further Investigation (JBS&G 2025a) was to further investigate PFAS migration pathways. These investigations demonstrated that the primary PFAS migration pathways for North and South Bandiana are surface water, and groundwater for East Bandiana. The OMR results discussed as part of this OMR have assisted in confirming the pathways identified under these two assessments. Collectively, this corroborates the pathways identified in the CSM.

9.1.3 Receptors

No new receptors have been identified as part of preparation of this OMR.

¹⁰ Interstate Technology Council (ITRC), 2013. Groundwater Statistics for Monitoring and Compliance. URL: <https://projects.itrcweb.org/gsmc1/Default.htm#GW%20Stats/5%20Methods%20in%20indiv%20Topics/5%205%20Trend%20Tests.htm>. Accessed on 26 May 2025.

It is acknowledged that Defence completed a Water Use Survey program within parts of Killara at the end of 2024 to gain an updated understanding of water use, and associated receptors, within the area. This information, while in the process of being reviewed, has been taken into account as part of remedial planning for the base and will be incorporated into a Revised PMAP document which will be released by Defence during 2025.

9.1.4 CSM Revision

In light of the data reviewed as part of this report, the CSM does not require any changes/updates.

9.2 Risk Profile

The OMP analytical results discussed as part of this OMR were within ranges identified and considered in previous PFAS investigations undertaken at the base since 2018. As such, the risk profile (i.e. the exposure of human or ecological receptors to PFAS effected media resulting in unacceptable health impacts) of the identified contamination remains unchanged.

A review has been completed of the source-pathway-receptor linkage to identify if there has been a change in risk to on and off-base receptors where PFAS increases have been identified during the OMP program. No changes have been identified, including the lower laboratory detection limit analysis conducted at OTH019, MW351 and MW352. Based on the OMP results and no changes to the on-base and surrounding land uses, there is no change in risk.

During 2024, Defence undertook a Water Use Survey for parts of Killara and is in the process of reviewing the results. Once the review has been finalised, the results, including a review of risk, will be presented in a future OMR.

In light of the DSI Addendum (JBS&G 2024a), Mass Flux Study (JBS&G 2024b), Source Area 1 and Source Area 7 Further Investigation (JBS&G 2025a) and results from this OMR, further monitoring should be completed to assess groundwater immediately off-base to the north of East Bandiana and to the east of North Bandiana, as consistent with the recommendations made throughout this report, and summarised in **Section 10**. Otherwise, based on the results of the OMP monitoring outlined and analysed in this OMR, it is considered that the existing monitoring network is sufficient to continue monitoring of PFAS identified within Source Areas and migration pathways. It is understood Defence is currently in the process of reviewing the base PMAP and associated OMP, into which the recommendations from this OMR will be incorporated.

For the community surrounding the base and other identified stakeholders, the results from the OMP program which have been reviewed as part of this OMR, show that PFAS concentrations on and surrounding the base are stable, and as identified above, present a low and acceptable risk for current human health exposure scenarios. The ongoing monitoring within the Management Area continues to assist Defence achieve and work towards closing out the current management actions identified in the PMAP (Defence 2020). Furthermore, the OMP monitoring allows Defence to continue to monitor and implement plans to reduce potential risk of harm posed by PFAS. Based on the current OMP results, there are no additional changes or requirements considered necessary for the overall PMAP program, other than following:

- The current remedial planning, scheduled to commence in 2025; and
- Minor amendments to the OMP sampling program, as identified throughout this report, and summarised in **Section 10.5**.

10. Conclusions

JBS&G completed a review of the 2024 OMP sampling events. Results from these events have been assessed against adopted criteria and reviewed in the context of existing investigations and historical data in order to identify and evaluate:

- Spatial and temporal (including seasonal) variability of PFAS in the environment;
- Changes to PFAS sources, transport pathways and/or receptors for the base and wider Management Area;
- Whether risks to human and ecological receptors require review; and
- Whether the identified changes in PFAS concentrations during the OMP trigger an action and/or review.

Based on the review completed, the overall objectives of the OMP have been achieved, with minor deviations from the SAQP not identified as material to the program outcomes. The conclusions reached, in accordance with the limitations provided in **Section 11**, have been provided below.

10.1 Groundwater

Above-average annual rainfall occurred during the previous OMR period (2021 through 2023) while below-average rainfall occurred during the 2024 OMP sampling events. While the rise in groundwater levels during the previous OMR period was considered contributory to minor increasing PFAS concentration trends during 2021 to 2023, groundwater PFAS concentrations remained relatively consistent in 2024. This comes despite standing water levels falling during this period. This relationship is likely caused by groundwater previously interacting with overlying PFAS affected soils (during high rainfall periods) and may take some time for monitoring to identify a reduction in PFAS concentrations.

Groundwater flow directions within the Management Area have remained consistent in 2024 to previous OMP sampling periods and supports the conceptual understanding of the area, which comprises topographically high areas to topographically low areas. The Shepparton and Coonambidgal Fluvium shallow aquifer at East Bandiana flows in an easterly and north easterly direction towards the Kiewa River, while the Shepparton Colluvium shallow aquifer (South Bandiana and North Bandiana) flows in a west and northwest direction towards Jack in the Box Creek.

The groundwater analytical results from the 2024 OMP sampling events have remained relatively stable and comparable with previous OMP sampling events and previous environmental investigations. PFAS concentrations within the Shepparton Colluvium shallow aquifer, in North and South Bandiana, are stable with the exception of several wells in specific Source Areas, all of which are earmarked for remediation during 2025. PFAS concentrations within the Shepparton and Coonambidgal Fluvium aquifers at East Bandiana are also relatively stable. Several wells within the PFAS plume from Source Area 13 across to the northeastern base boundary have increased, although this pathway is also to be remediated during 2025 through the installation of a groundwater extraction and treatment system on the northern boundary of East Bandiana.

10.2 Surface Water

The surface water analytical results from the 2024 OMP sampling events have remained relatively stable and comparable with previous OMP sampling events and previous environmental investigations. The results confirm the current CSM that surface water is the primary pathway for PFAS migration from South and North Bandiana, while the primary migration pathway from East Bandiana is through groundwater. Furthermore, the results confirm that select Source Areas (1, 6 and 7) in South Bandiana produce PFAS concentrations, which will be targeted as part of remedial works to reduce PFAS migration through the surface water pathway.

Anomalous results were identified during the OMR period, including SW302, SW313, SW326 and SW332. The result from SW313 is due to soil disturbance works at the surface water sampling location from recent environmental investigation works. The cause of the remaining results is not yet fully understood, and ongoing monitoring will help to identify trends and provide further clarity.

Based on the surface water data from all OMP sampling events available, periods of below-average rainfall tend to lead to slightly higher PFAS concentrations in surface water, although the relationship does not apply to all locations.

10.3 Sediment

Sediment PFAS concentrations within the surface water drainage pathways are representative of their position relative to Source Areas. Higher concentrations have been identified in areas immediately adjacent Source Areas, or in areas receiving PFAS affected surface water from Source Areas. Sediment PFAS concentrations tend to decrease with distance from a Source Area.

Given the increase in knowledge with regard to PFAS pathway migration from the base from recent environmental investigations, it has been ascertained that the relationship between PFAS concentrations in media and its position relative to Source Area is better understood and defined primarily by surface water. As such, the continued monitoring of sediment is not considered to bring significant value to the OMP.

10.4 CSM and Risk Profile Update

The 2024 OMP results did not identify any additional Source Areas which had not been previously assessed and no additional transport/exposure pathways or changes to existing pathways have been identified.

The OMP analytical results discussed as part of this OMR were within ranges identified and considered in previous investigation reports. Where PFAS increases have been identified during an OMP event, a review has been completed of the source-receptor pathway to identify if there has been a change in risk to on and off-base receptors – none were identified for current human health exposure scenarios.

10.5 Program Triggers or Actions

Based on the assessment completed as part of this OMR it was concluded that the objectives of the OMP have been achieved by the program. The assessment has identified that PFAS concentrations during the 2024 period were consistent with 2021 through 2023 OMP results, along with previous investigation and historic data. As a result, there has been no change in risk to on and off-base receptors.

For the community surrounding the base and other identified stakeholders, the results from the OMP program which have been reviewed as part of this OMR, show that PFAS concentrations on and surrounding the base are stable. The ongoing monitoring within the Management Area continues to assist Defence achieve and work towards closing out the current management actions identified in the PMAP (Defence 2020). Furthermore, the OMP monitoring allows Defence to continue to monitor and implement plans to reduce potential risk of harm posed by PFAS. Based on the current OMP results, there are no additional changes or requirements considered necessary for the overall PMAP program, other than minor amendments to the OMP sampling program, and currently planned remedial works, as summarised below.

While the existing monitoring network is sufficient to continue monitoring of PFAS identified within Source Areas and migration pathways, there are several recommended alterations to the OMP, which is detailed below. It is noted that these are the same recommendations which appeared in the OMR – 2021, 2022 and 2023 (JBS&G 2025b), and have been incorporated into the Revised OMP (Defence 2025) which was released by Defence in March 2025. They are in the process of being incorporated into updated PMAP and OMP documents.

- Continual monitoring of groundwater is recommended immediately off-base to the north of East Bandiana to delineate the known East Bandiana PFAS plume to the oxbow lake closest to the base boundary;
- Owing to the proximity of Source Area 1 to the base boundary and increases in MW307, it is recommended that additional down hydraulic gradient samples be collected to ensure the monitoring of the potential migration of the PFAS plume;
- The addition of wells in North Bandiana to the program to ensure adequate data is available to calculate groundwater flow contours in this portion of the base, and to delineate identified groundwater PFAS concentrations;
- Off-base monitoring through the newly installed well MW447 to the east of North Bandiana, to characterise the PFAS plume prior to potentially entering the Killara residential development; and
- Discontinuation of sediment sampling as part of the OMP program as there are no obvious trends in the data and they do not present a risk to people off-base.

Defence has planned remedial works that will consist of remediation of Source Areas across South and East Bandiana as well as groundwater remedial works within the same portions of the base. These efforts are expected to gradually reduce PFAS concentrations within the Management Area. While the scale of the affected area means this process will take time, ongoing measures are being implemented to ensure steady progress. In the meantime, monitoring will continue, and above all else, the community will be kept up-to-date with advice to ensure transparency is upheld and risks presented by PFAS remain low and acceptable.

11. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based in part on information obtained from the client and other parties. The report has been prepared specifically for the client for the purposes of the commission and no warranties, express or implied, are offered to any third parties and no liability will be accepted for use or interpretation of this report by any third party.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose. This report should not be amended in any way without prior approval by JBS&G, or reproduced other than in full including all attachments as originally provided to the client by JBS&G.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements or agreed scope of work.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Conditions between sampling locations and media may vary and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

12. References

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- PFAS OMP Factual Report, Biannual Sampling Event April 2024, Bandiana Military Area. Stantec Pty Ltd. 24 July 2024. (Stantec 2024b).
- Environment Protection Act 2017, Environment Reference Standard. Victorian Government. 26 May 2021. (Victorian Government 2021).
- Visualising Victoria's Groundwater database accessed via <https://www.vvg.org.au> during March 2025. Federation University Australia. (VVG 2025).

Figures



Figures provided include:

- Figure 1: Site Location Plan
- Figure 2: Source Areas
- Figure 3: Surface Water Divide and Pathways
- Figure 4: OMP Groundwater Sample Locations
- Figure 5A/B: OMP Surface Water and Sediment Sample Locations
- Figure 6A: Groundwater Contours (April 2024)
- Figure 6B: Groundwater Contours (Nov/Dec 2024)
- Figure 7A: Groundwater Sum of PFOS+PFHxS Concentrations (April 2024)
- Figure 7B/C: Surface Water Sum of PFOS+PFHxS Concentrations (April 2024)
- Figure 7D: Sediment Sum of PFOS+PFHxS Concentrations (Nov/Dec 2024)
- Figure 8A: Groundwater Sum of PFOS+PFHxS Results Summary (Nov/Dec 2024)
- Figure 8B/C: Surface Water Sum of PFOS+PFHxS Results Summary (Nov/Dec 2024)
- Figure 9: Pastoral Areas
- Figure 10A: Proposed Amended Jack in the Box Creek Catchment OMP Groundwater Monitoring Locations
- Figure 10B: Proposed Amended Kiewa River Catchment OMP Groundwater Monitoring Locations
- Figure 11: Carp Advisory Area



Legend

- Management Area
- Bandiana Military Area
- Watercourse

Job No: 61395

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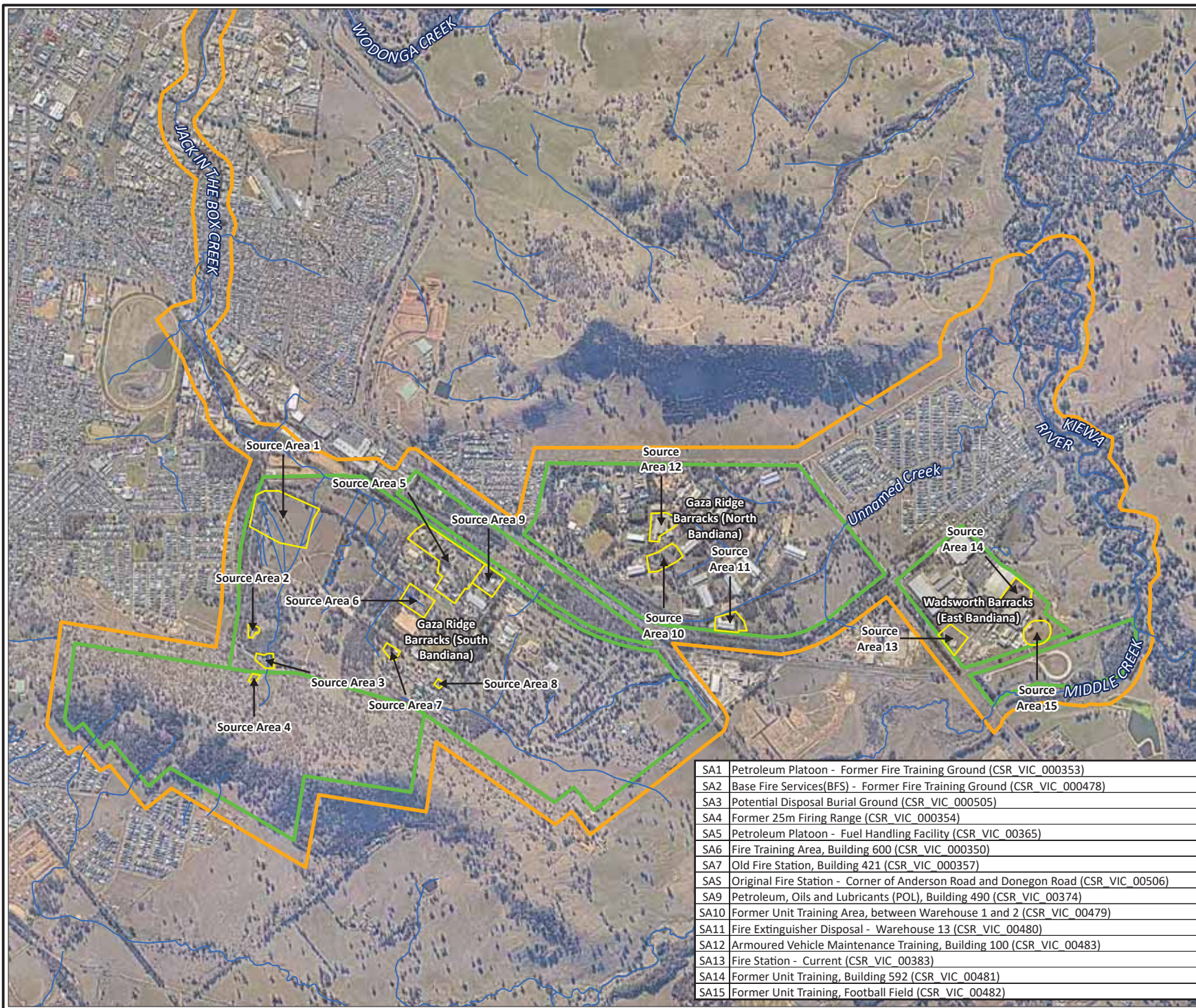
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Bandiana Military Area

SITE LOCATION PLAN

FIGURE 1



- Legend**
- Management Area
 - Bandiana Military Area
 - Source Areas
 - Watercourse



Job No: 61395

Client: Department of Defence

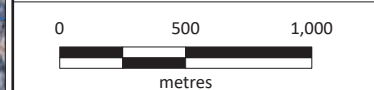
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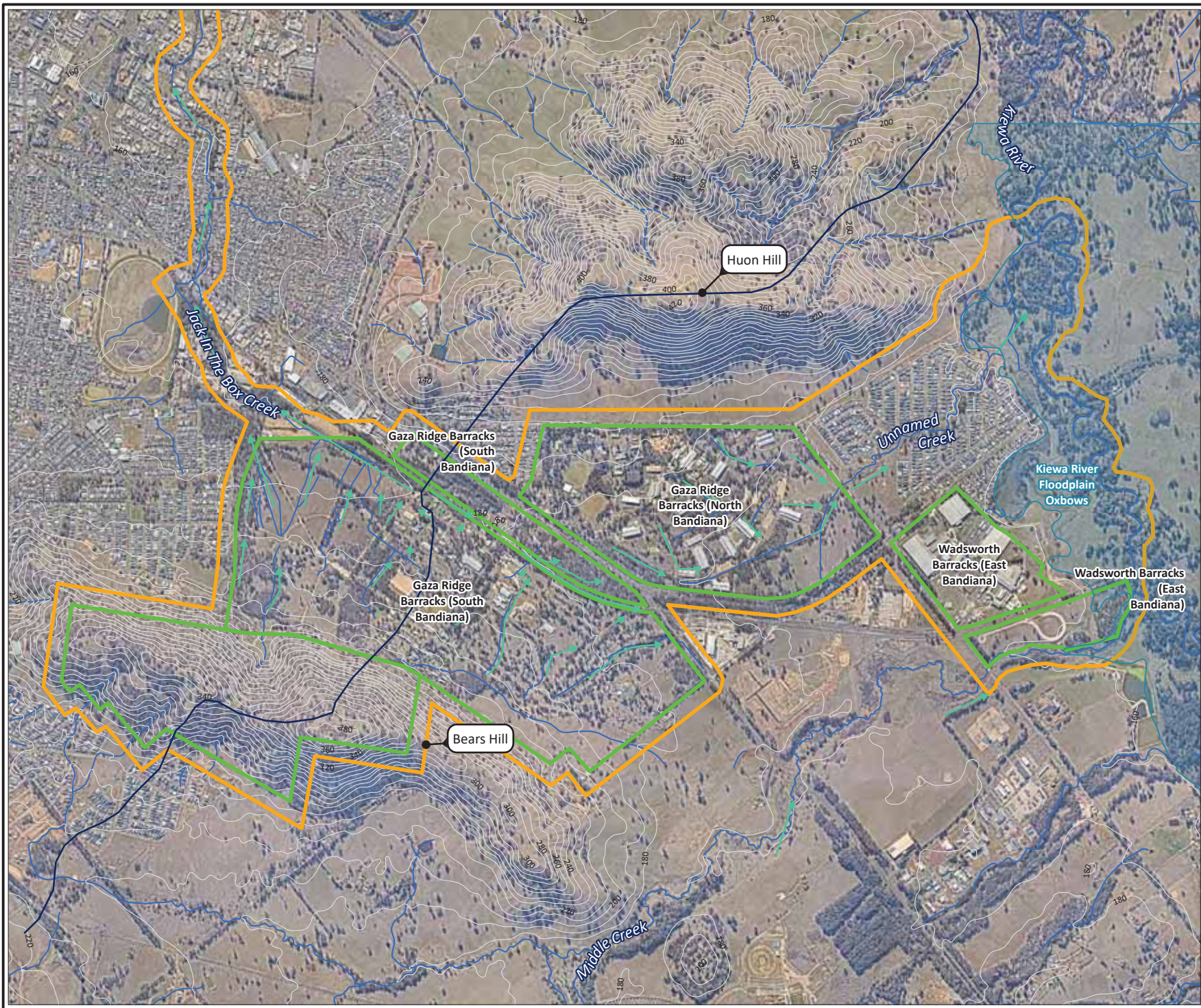
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Bandiana Military Area

SOURCE AREAS AND CONTAMINATED SITES RECORD (CSR) IDs

SA1	Petroleum Platoon - Former Fire Training Ground (CSR VIC 000353)
SA2	Base Fire Services(BFS) - Former Fire Training Ground (CSR VIC 000478)
SA3	Potential Disposal Burial Ground (CSR VIC 000505)
SA4	Former 25m Firing Range (CSR VIC 000354)
SA5	Petroleum Platoon - Fuel Handling Facility (CSR VIC 00365)
SA6	Fire Training Area, Building 600 (CSR VIC 000350)
SA7	Old Fire Station, Building 421 (CSR VIC 000357)
SAS	Original Fire Station - Corner of Anderson Road and Donegon Road (CSR VIC 00506)
SA9	Petroleum, Oils and Lubricants (POL), Building 490 (CSR VIC 00374)
SA10	Former Unit Training Area, between Warehouse 1 and 2 (CSR VIC 00479)
SA11	Fire Extinguisher Disposal - Warehouse 13 (CSR VIC 00480)
SA12	Armoured Vehicle Maintenance Training, Building 100 (CSR VIC 00483)
SA13	Fire Station - Current (CSR VIC 00383)
SA14	Former Unit Training, Building 592 (CSR VIC 00481)
SA15	Former Unit Training, Football Field (CSR VIC 00482)

FIGURE 2



- Legend**
- Management Area
 - Bandiana Military Area
 - Kiewa River Floodplain
 - 10m Contours
 - Stormwater Divide
 - Watercourse
 - Drainage Flow Direction



Job No: 61395

Client: Department of Defence

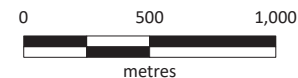
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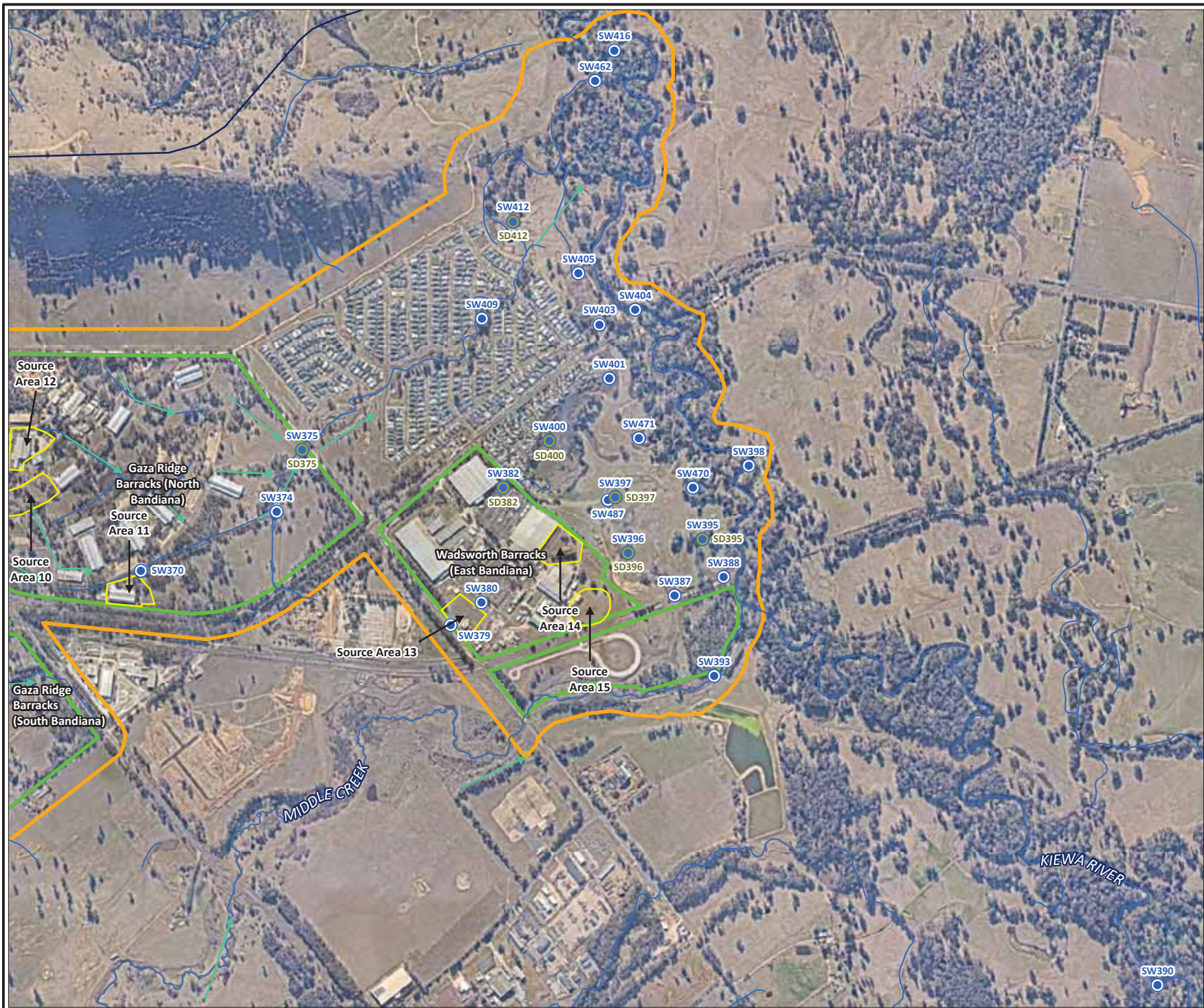


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Bandiana Military Area

SURFACE WATER DIVIDE AND PATHWAYS

FIGURE 3



- Legend**
- Management Area
 - Bandiana Military Area
 - Source Areas
 - Stormwater Divide
 - Watercourse
 - Drainage Flow Direction
 - Surface Water Location
 - Surface Water and Sediment Location



Job No: 61395

Client: Department of Defence

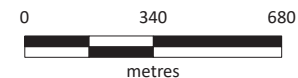
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Bandiana Military Area

**OMP SURFACE WATER AND
SEDIMENT SAMPLE LOCATIONS**

FIGURE 5B



Legend

- Management Area
- Bandiana Military Area
- Roads
- Watercourse
- Inferred Shepparton Colluvium - Shallow Aquifer On Base Contour
- Inferred Shepparton Colluvium - Shallow Aquifer Off Base Contour
- Inferred Shepparton and Coonambidgal Fluvium - Shallow Aquifer On Base Contour
- Inferred Shepparton and Coonambidgal Fluvium - Shallow Aquifer Off Base Contour
- Inferred Shepparton Colluvium - Shallow Aquifer Flow Direction
- Inferred Shepparton and Coonambidgal Fluvium - Shallow Aquifer Flow Direction
- Shepparton Colluvium - Shallow Aquifer
- Shepparton and Coonambidgal Fluvium - Shallow Aquifer
- Shepparton and Coonambidgal Fluvium - Intermediate Aquifer
- Shepparton and Coonambidgal Fluvium - Deep Aquifer
- Shepparton Colluvium - Perched Aquifer
- 159.143 Standing Water Level (mASL)



Job No: 61395	
Client: Department of Defence	
Version: Final	Date: 09-Sep-2025
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Bandiana Military Area

GROUNDWATER CONTOURS (APRIL 2024)

FIGURE 6A



Legend

- Management Area
- Bandiana Military Area
- Roads
- Watercourse
- Inferred Shepparton Colluvium - Shallow Aquifer On Base Contour
- Inferred Shepparton Colluvium - Shallow Aquifer Off Base Contour
- Inferred Shepparton and Coonambidgal Fluvium - Shallow Aquifer On Base Contour
- Inferred Shepparton and Coonambidgal Fluvium - Shallow Aquifer Off Base Contour
- Inferred Shepparton Colluvium - Shallow Aquifer Flow Direction
- Inferred Shepparton and Coonambidgal Fluvium - Shallow Aquifer Flow Direction
- Shepparton Colluvium - Shallow Aquifer
- Shepparton and Coonambidgal Fluvium - Shallow Aquifer
- Shepparton and Coonambidgal Fluvium - Intermediate Aquifer
- Shepparton and Coonambidgal Fluvium - Deep Aquifer
- Shepparton Colluvium - Perched Aquifer
- 159.143 Standing Water Level (mAHD)



Job No: 61395

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Bandiana Military Area

OMP DECEMBER 2024 GROUNDWATER CONTOURS

FIGURE 6B



- Legend**
- Management Area
 - Bandiana Military Area
 - Source Areas
 - Stormwater Divide
 - Watercourse
 - Drainage Flow Direction
- Sum of PFOS+PFHxS Concentrations**
- LOR to 0.07 µg/L
 - 0.07 to 0.7µg/L
 - 0.7 to 7 µg/L
 - 7 to 70 µg/L
 - >70 µg/L



Job No: 61395

Client: Department of Defence

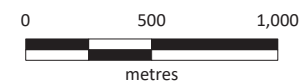
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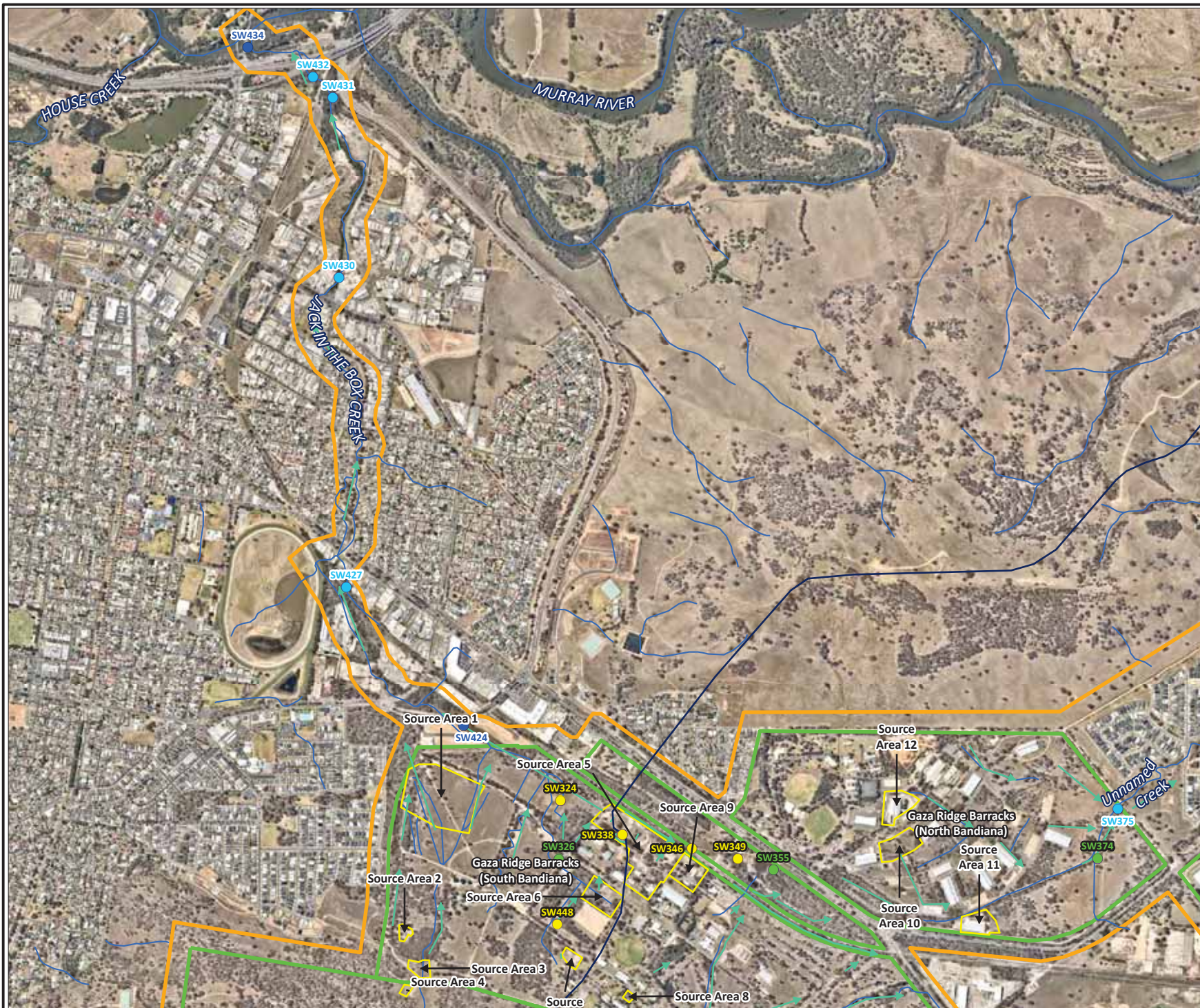


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Bandiana Military Area

GROUNDWATER SUM OF PFOS+PFHxS CONCENTRATIONS (APRIL 2024)

FIGURE 7A



Legend

- Management Area
- Bandiana Military Area
- Source Areas
- Stormwater Divide
- Watercourse
- Drainage Flow Direction
- Sum of PFOS+PFHxS Concentrations
 - Below LOR
 - LOR to 0.07 µg/L
 - 0.07 to 0.7 µg/L
 - 0.7 to 7 µg/L



Job No: 61395

Client: Department of Defence

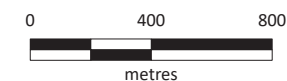
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Bandiana Military Area

**SURFACE WATER SUM OF PFOS+PFHxS
CONCENTRATIONS (APRIL 2024)
- JACK IN THE BOX CREEK**

FIGURE 7B



Legend

- Management Area
- Bandiana Military Area
- Source Areas
- Stormwater Divide
- Watercourse
- Drainage Flow Direction

Sum of PFOS+PFHxS Concentrations

- Below LOR
- LOR to 0.07µg/L
- 0.07 to 0.7µg/L
- 0.7 to 7µg/L
- 7 to 70µg/L

Job No: 61395

Client: Department of Defence

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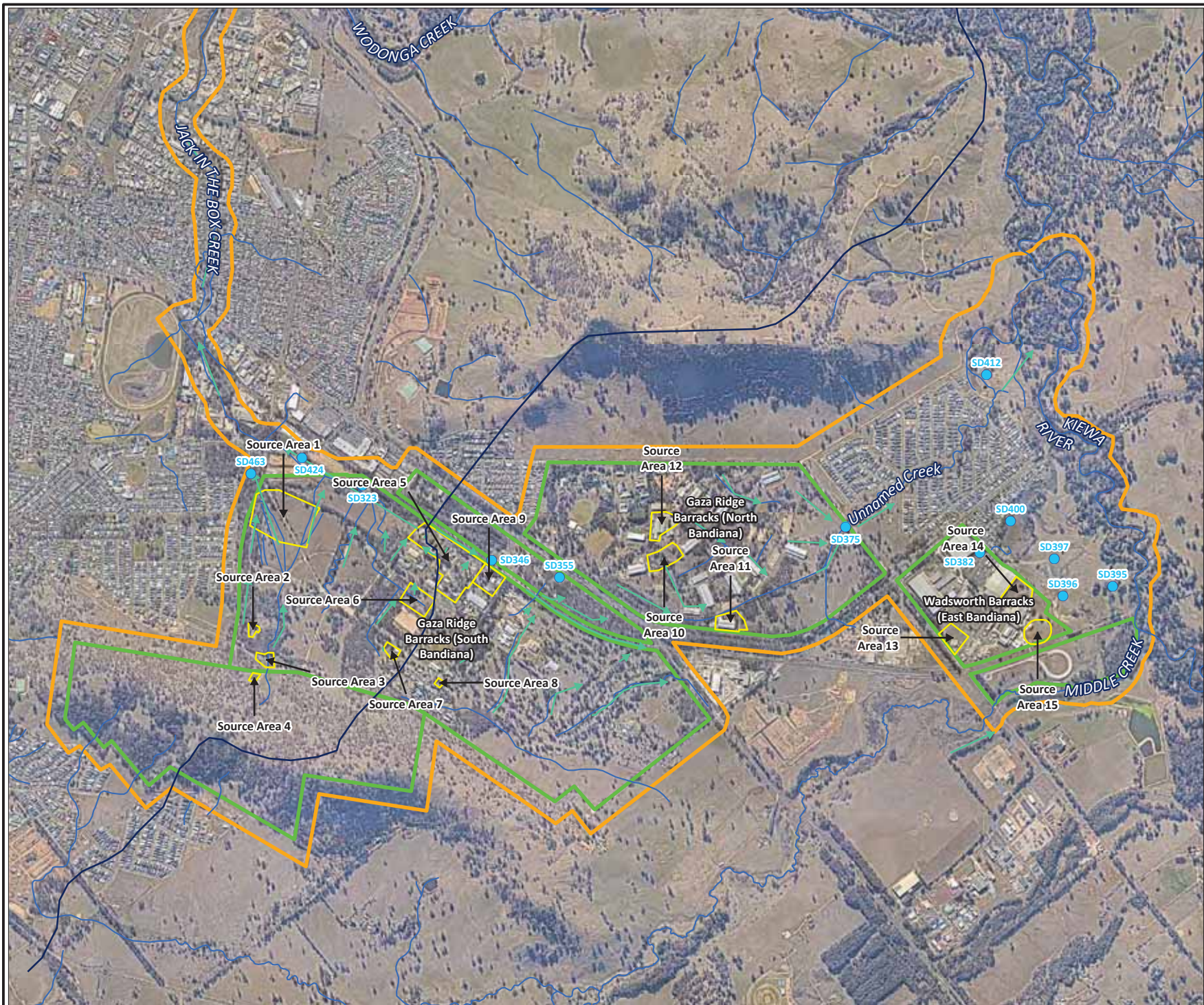
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Bandiana Military Area

SURFACE WATER SUM OF PFOS+PFHxS CONCENTRATIONS (APRIL 2024)
- KIEWA RIVER

FIGURE 7C



Legend

- Management Area
- Bandiana Military Area
- Source Areas
- Stormwater Divide
- Watercourse
- Drainage Flow Direction
- Sum of PFOS+PFHxS Concentrations
 - LOR to 0.07µg/L

Job No: 61395

Client: Department of Defence

Version: Final	Date: 09-Sep-2025
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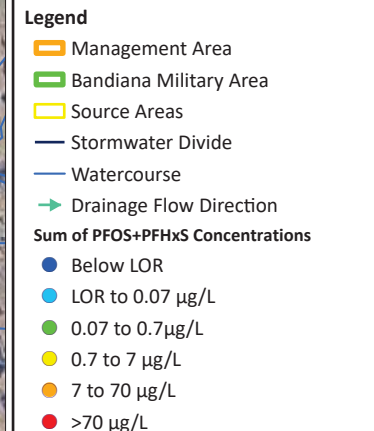
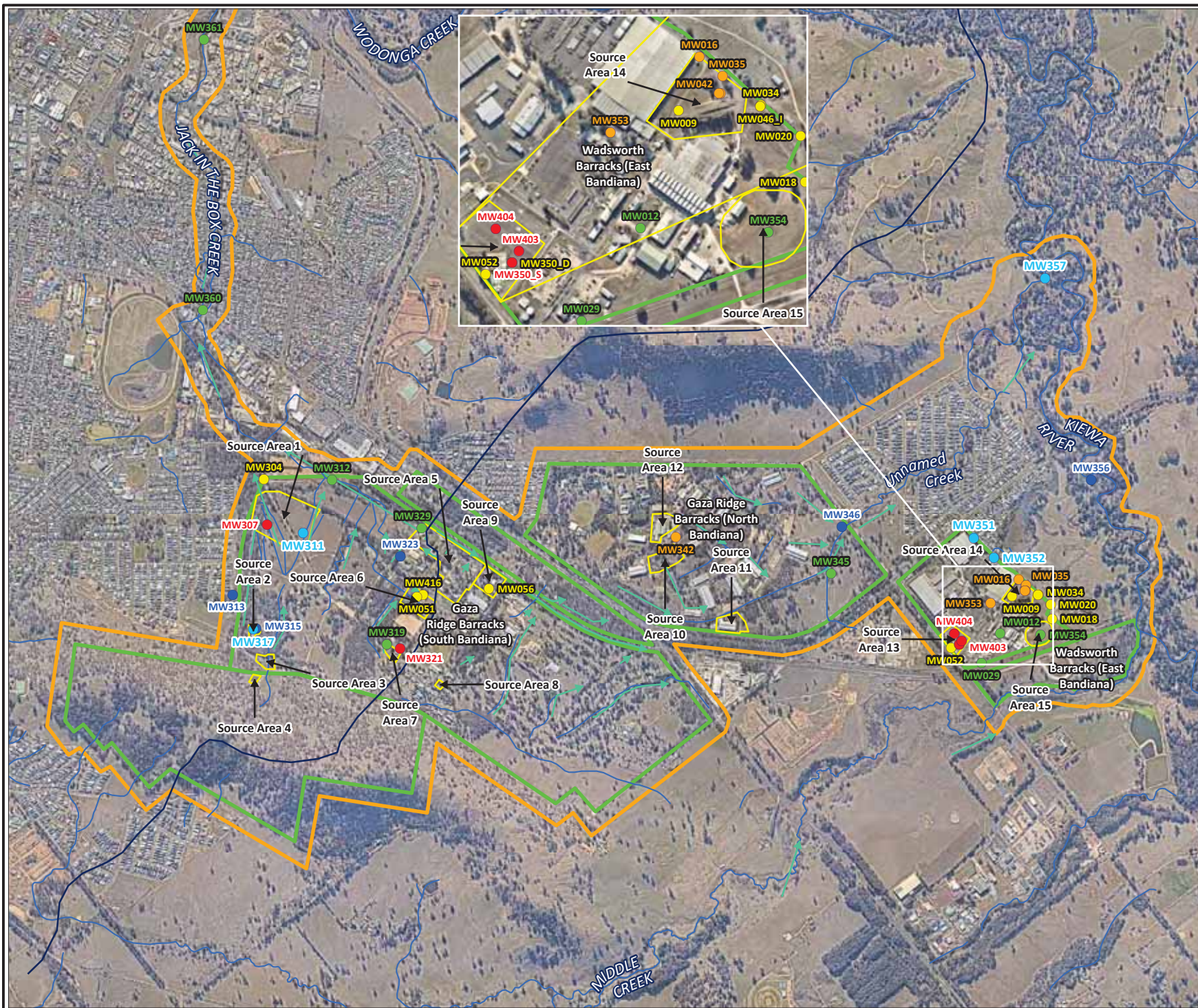
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Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

SEDIMENT SUM OF PFOS+PFHxS CONCENTRATIONS (APRIL 2024)

FIGURE 7D



Job No: 61395

Client: Department of Defence

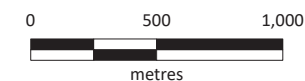
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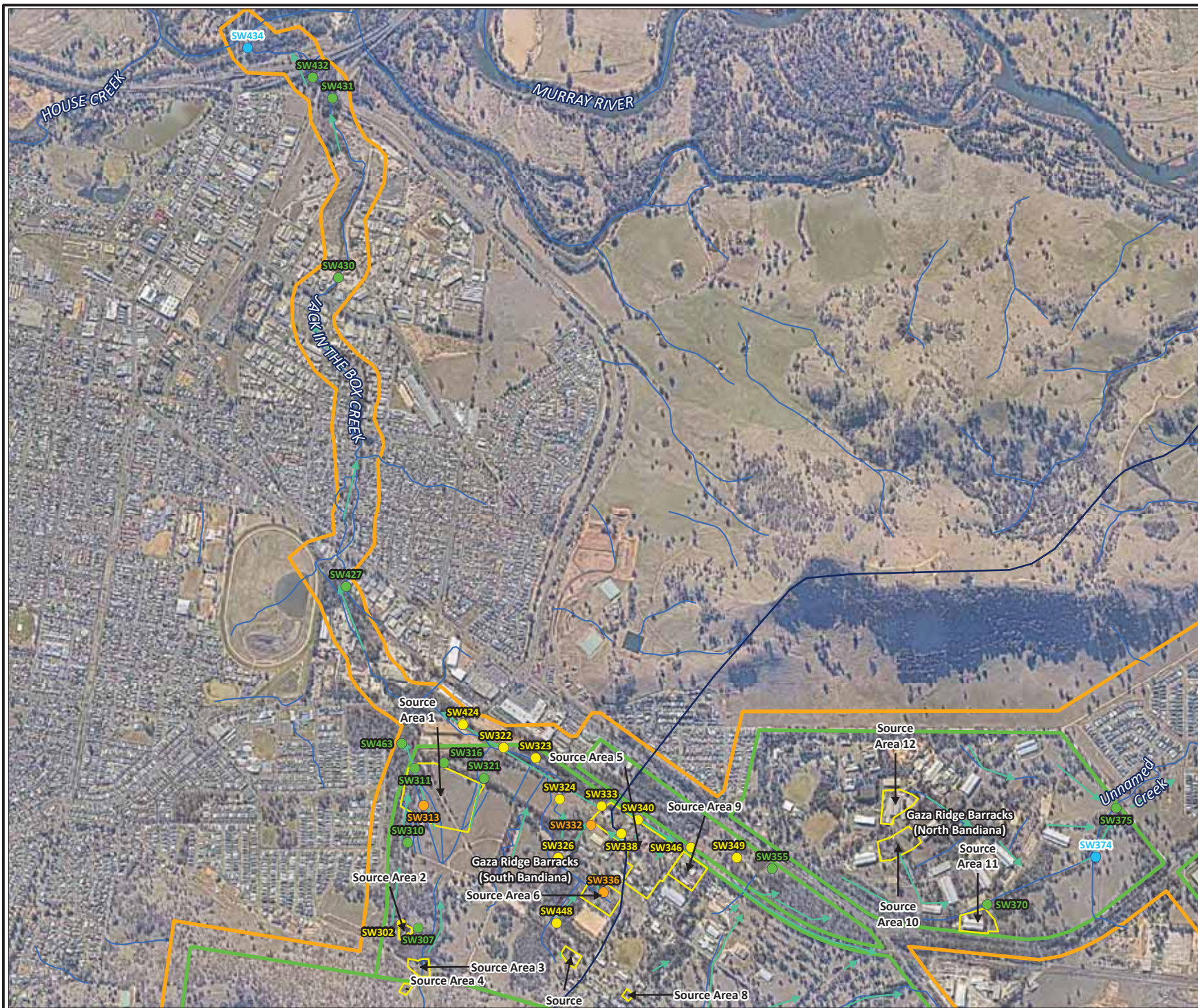


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Bandiana Military Area

**GROUNDWATER SUM OF PFOS
+PFHxS RESULTS SUMMARY (NOV/
DEC 2024)**

FIGURE 8A



Legend

- Management Area
 - Bandiana Military Area
 - Source Areas
 - Stormwater Divide
 - Watercourse
 - Drainage Flow Direction
- Sum of PFOS+PFHxS Concentrations**
- LOR to 0.07µg/L
 - 0.07 to 0.7µg/L
 - 0.7 to 7µg/L
 - 7 to 70µg/L



Job No: 61395

Client: Department of Defence

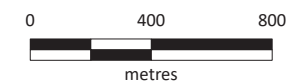
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Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

SURFACE WATER SUM OF PFOS+PFHxS RESULTS SUMMARY (NOV/DEC 2024)

FIGURE 8B



- Legend**
- Management Area
 - Bandiana Military Area
 - Source Areas
 - Stormwater Divide
 - Watercourse
 - Drainage Flow Direction
- Sum of PFOS+PFHxS Concentrations**
- Below LOR
 - LOR to 0.07µg/L
 - 0.07 to 0.7µg/L
 - 0.7 to 7µg/L
 - 7 to 70µg/L



Job No: 61395

Client: Department of Defence

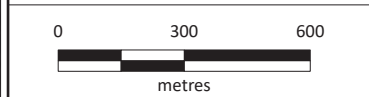
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Bandiana Military Area

**SURFACE WATER SUM OF PFOS+PFHxS
RESULTS SUMMARY (NOV/DEC 2024)**

FIGURE 8C



Legend

-  Management Area
-  Bandiana Military Area
-  Northern Pastoral Area
-  Central Pastoral Area
-  Southern Pastoral Area
-  Watercourse



Job No: 61395

Client: Department of Defence

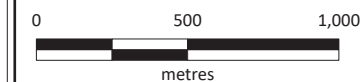
Version: Final

Date: 09-Sep-2025

Drawn By: 

Checked By: 

Scale 1:25,000



Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

PASTORAL AREAS

FIGURE 9



Legend

- ▬ Management Area
- ▬ Bandiana Military Area
- ➔ Drainage Channel
- Stormwater Divide
- Watercourse
- + Shepparton Colluvium - Shallow Aquifer



Job No: 61395

Client: Department of Defence

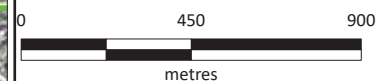
Version: Final

Date: 09-Sep-2025

Drawn By: [Redacted]

Checked By: [Redacted]

Scale 1:20,000



Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

PROPOSED AMENDED JACK IN THE BOX CREEK CATCHMENT OMP GROUNDWATER MONITORING LOCATIONS

FIGURE 10A



Legend

- Management Area
- Bandiana Military Area
- Drainage Channel
- Stormwater Divide
- Watercourse
- Perched Water
- Shepparton Colluvium - Shallow Aquifer
- Shepparton and Coonambidgal Fluvium -Intermediate Aquifer
- Shepparton and Coonambidgal Fluvium -Shallow Aquifer
- Shepparton and Coonambidgal Fluvium -Deep Aquifer

Job No: 61395

Client: Department of Defence

Version: Final	Date: 09-Sep-2025
Drawn By: [redacted]	Checked By: [redacted]

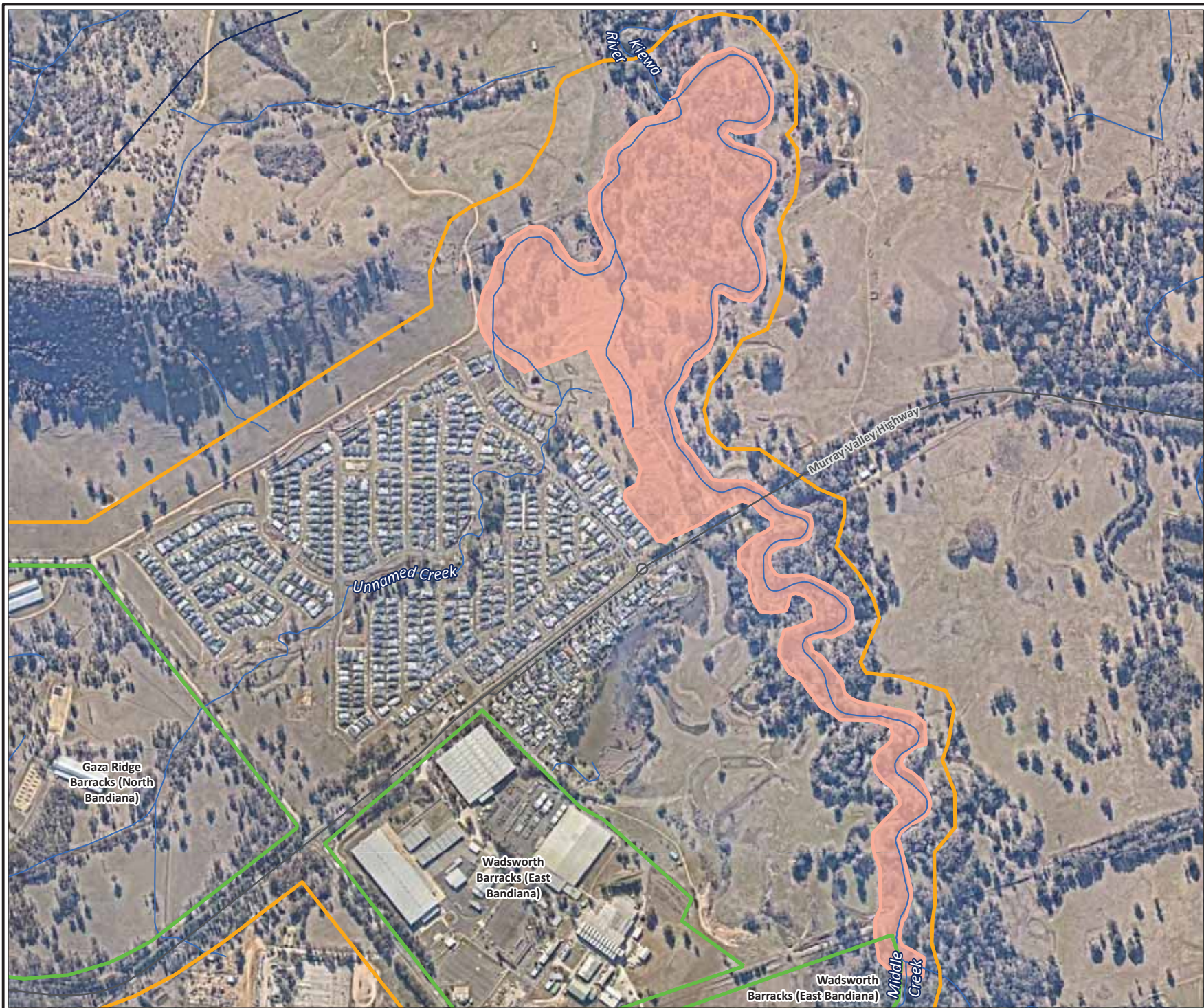
Scale 1:17,000

Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

PROPOSED AMENDED KIEWA RIVER CATCHMENT OMP GROUNDWATER MONITORING LOCATIONS

FIGURE 10B



Legend

- Management Area
- Bandiana Military Area
- Carp Advisory Area
- Stormwater Divide
- Watercourse
- Road

Job No: 61395

Client: Department of Defence

Version: Final	Date: 09-Sep-2025
Drawn By: [redacted]	Checked By: [redacted]

Scale 1:12,500

Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

EPA PRECAUTIONARY ADVICE AREA

FIGURE 11

Tables



Tables provided include:

- T1 – OMP Groundwater Analytical Summary Table (2024)
- T2 – OMP Surface Water Analytical Summary Table (2024)
- T3 – OMP Sediment Analytical Summary Table (2024)
- T4 – OMP Water Analytical Summary Table (2021-2024)
- T5 – OMP Sediment Analytical Summary Table (2021-2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Car					
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07														0.56	
PFAS NEMP 2020 Freshwater 95%								0.13							220	
PFAS NEMP 2020 Freshwater 99%								0.00023							19	
PFAS NEMP 2020 Recreational Water	2														10	

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																
MW009	0445_MW009_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	15.6	20.6	22.7	1.11	1.53	8.71	0.62	6.84	-	<0.02	0.3	0.50	2.06	0.31	0.56	<0.02
MW009	0445E_MW009_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	5.2	6.4	7.16	0.27	0.44	2.0	0.18	3.2	<0.01	<0.01	0.08	0.12	0.53	0.07	0.13	<0.01
MW009	0445_QC201_241203	03 Dec 2024	E7 - Nov/Dec 2024	MFL0268	Interlab_D	-	-	-	0.37	0.30	2.2	0.18	2.5	-	<0.010	<0.050	0.11	0.56	0.10	0.16	<0.010
MW012	0445_MW012_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.32	0.32	0.32	<0.02	<0.02	0.24	<0.02	0.08	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02
MW012	0445E_MW012_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	0.12	0.13	0.13	0.01	<0.01	0.09	<0.01	0.03	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01
MW016	0445_MW016_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	7.70	9.48	10.2	0.42	0.51	3.27	0.24	4.43	-	<0.02	<0.1	0.17	0.75	0.15	0.29	<0.02
MW016	0445E_MW016_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	10.4	12.88	14.05	0.51	0.67	3.9	0.29	6.5	<0.01	<0.01	0.11	0.20	1.1	0.17	0.39	<0.01
MW016	0445_QC101_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Field_D	8.3	10.53	11.55	0.48	0.60	3.3	0.23	5.0	<0.01	<0.01	0.10	0.18	0.97	0.16	0.34	<0.01
MW018	0445_MW018_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.98	1.06	1.14	0.07	0.08	0.52	<0.02	0.46	-	<0.02	<0.1	<0.02	<0.02	<0.02	0.01	<0.02
MW018	0445E_MW018_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.16	1.24	1.36	0.07	0.07	0.53	0.02	0.63	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	0.01	<0.01
MW020	0445_MW020_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	2.67	3.02	3.18	0.08	0.10	1.36	0.06	1.31	-	<0.02	<0.1	0.03	0.17	0.02	0.05	<0.02
MW020	0445E_MW020_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	3.3	3.7	3.93	0.07	0.12	1.7	0.08	1.6	<0.01	<0.01	<0.05	0.04	0.20	0.02	0.07	<0.01
MW029	0445_MW029_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.69	0.98	1.05	0.06	0.07	0.45	<0.02	0.24	-	<0.02	<0.1	0.05	0.12	0.04	0.02	<0.02
MW029	0445E_MW029_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	0.59	1.12	1.22	0.07	0.08	0.38	<0.01	0.21	<0.01	<0.01	<0.05	0.12	0.26	0.05	0.03	<0.01
MW034	0445_MW034_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	1.58	1.76	1.85	0.05	0.05	0.54	0.04	1.04	-	<0.02	<0.1	0.02	0.08	<0.02	0.03	<0.02
MW034	0445E_MW034_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.76	1.96	2.08	0.05	0.06	0.56	0.04	1.2	<0.01	<0.01	<0.05	0.02	0.09	0.01	0.03	<0.01
MW035	0445_MW035_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	15.5	20.1	21.9	1.03	1.28	7.32	0.57	8.22	-	<0.02	0.3	0.44	1.73	0.29	0.50	<0.02
MW035	0445E_MW035_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	13.8	18.79	20.91	1.1	0.98	6.6	0.63	7.2	<0.01	<0.01	0.30	0.54	1.8	0.32	0.73	<0.01
MW042	0445_MW042_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	13.6	17.4	18.9	0.83	1.03	6.23	0.49	7.36	-	<0.02	0.2	0.38	1.52	0.24	0.43	<0.02
MW042	0445E_MW042_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	11.6	15.27	16.86	0.69	0.90	4.9	0.40	6.7	<0.01	<0.01	0.19	0.34	1.6	0.21	0.47	<0.01
MW043	0445_MW043_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	11.5	14.6	15.9	0.66	0.84	5.07	0.42	6.44	-	<0.02	0.2	0.32	1.19	0.20	0.36	<0.02
MW043	0445E_MW043_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	14	18.48	20.41	0.84	1.1	5.8	0.46	8.2	<0.01	<0.01	0.23	0.44	1.9	0.26	0.56	<0.01
MW046	0445_MW046_D_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	4.18	4.78	5.07	0.15	0.18	1.83	0.11	2.35	-	<0.02	<0.1	0.06	0.28	0.03	0.08	<0.02
MW046	0445_MW046_I_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	4.08	4.64	4.93	0.13	0.18	1.78	0.11	2.30	-	<0.02	<0.1	0.06	0.26	0.03	0.08	<0.02
MW046	0445_QC108_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	3.92	4.47	4.73	0.12	0.19	1.95	0.07	1.97	-	<0.02	<0.1	0.06	0.27	0.03	0.07	<0.02
MW046	0445_QC208_240404	04 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	3.6	4.15	4.45	0.14	0.16	1.5	0.08	2.1	<0.01	<0.01	<0.05	0.06	0.24	0.03	0.08	<0.01
MW046	0445E_MW046D_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	4.2	4.77	5.09	0.12	0.18	1.6	0.09	2.6	<0.01	<0.01	<0.05	0.06	0.29	0.02	0.08	<0.01
MW046	0445_QC101_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	4.8	5.42	5.75	0.13	0.18	2.0	0.09	2.8	<0.01	<0.01	<0.05	0.06	0.31	0.03	0.09	<0.01
MW046	0445_QC201_241128	28 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	-	-	-	0.14	0.17	1.8	0.096	2.3	-	<0.010	<0.050	0.045	0.26	0.025	0.078	<0.010
MW046	0445E_MW046I_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	5	5.59	5.91	0.12	0.18	1.8	0.09	3.2	<0.01	<0.01	<0.05	0.06	0.30	0.03	0.08	<0.01
MW051	0445S_MW051_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	3.71	5.32	5.7	0.24	0.13	0.71	0.06	3.0	0.01	<0.01	0.25	0.30	0.60	0.07	0.15	0.03
MW052	0445_MW052_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	20.1	30.2	33.7	2.76	3.13	14.1	0.40	6.04	-	<0.02	0.5	0.79	4.29	0.82	0.88	<0.02
MW052	0445E_MW052_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	6	8.28	9.15	0.48	0.52	2.5	0.13	3.5	<0.01	<0.01	0.10	0.16	1.1	0.21	0.23	<0.01
MW056	0445_MW056_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	1.23	1.69	1.89	0.13	0.16	0.70	0.04	0.53	-	<0.02	<0.1	0.03	0.14	0.06	0.10	<0.02
MW056	0445_QC109_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	1.25	1.72	1.91	0.14	0.16	0.72	0.03	0.53	-	<0.02	<0.1	0.03	0.14	0.06	0.10	<0.02
MW056	0445_QC209_240404	04 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	1.14	1.63	1.82	0.15	0.14	0.55	0.03	0.59	<0.01	<0.01	<0.05	0.03	0.13	0.06	0.12	<0.01
MW056	0445S_MW056_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	1.86	2.16	2.28	0.06	0.09	0.46	0.03	1.4	<0.01	<0.01	<0.05	0.02	0.09	0.03	0.10	<0.01
MW304	0445_MW304_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.51	0.78	0.86	0.03	0.04	0.32	0.04	0.19	-	<0.02	<0.1	0.03	0.08	<0.02	0.03	<0.02
MW304	0445S_MW304_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.74	1.76	1.76	<0.01	<0.01	0.14	<0.01	1.6	<0.01	<0.01	<0.05	<0.01	0.02	<0.01	<0.01	<0.01
MW307	0445_MW307_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	172	313	346	22.5	21.9	143	9.86	29.1	-	<0.02	5.2	19.4	45.2	7.48	11.7	0.19
MW307	0445S_MW307_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	780	1,412.03	1,646.9	110	110	610	44	170	<0.125	<0.125	21	84	200	32	55	0.93
MW311	0445S_MW311_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.04	<0.05	<0.1	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.05	<0.01	<0.01	<0.		

T1: OMP Groundwater Analytical Summary Table (2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Carboxylic Acids					
	Sum of PFHxS and PFOS	Sum of PFAS (WADA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07														0.56	
PFAS NEMP 2020 Freshwater 95%								0.13							220	
PFAS NEMP 2020 Freshwater 99%								0.00023							19	
PFAS NEMP 2020 Recreational Water	2														10	

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type															
MW351	0445_QC202_241128	28 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	-	-	-	<0.010	<0.010	0.026	<0.010	0.017	-	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010
MW352	0445_MW352_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.02	0.02	0.02	<0.02	<0.02	<0.01	<0.02	0.02	-	<0.02	<0.1	<0.02	<0.02	<0.01	<0.02
MW352	0445E_MW352_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.024	0.028	0.03	0.002	0.002	0.008	<0.001	0.016	<0.001	<0.001	<0.005	<0.001	<0.001	0.002	<0.001
MW353	0445_MW353_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	4.93	9.65	10.8	1.61	1.10	4.64	0.10	0.29	-	<0.02	0.3	0.47	1.85	0.26	0.23
MW353	0445E_MW353_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	43	58.3	68.4	5.5	6.0	31	1.1	12	<0.01	<0.01	1.1	1.1	5.1	1.1	1.4
MW354	0445_MW354_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.05	0.05	0.05	<0.02	<0.02	0.02	<0.02	0.03	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
MW354	0445_QC107_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	0.08	0.08	0.08	<0.02	<0.02	0.03	<0.02	0.05	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
MW354	0445_QC207_240404	04 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	0.05	0.05	<0.1	<0.01	<0.01	0.02	<0.01	0.03	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
MW354	0445E_MW354_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.26	0.3	0.31	0.02	0.01	0.09	<0.01	0.17	<0.01	<0.01	<0.05	0.09	0.02	<0.01	<0.01
MW356	0445_MW356_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.01	0.01	0.01	<0.02	<0.02	0.01	<0.02	<0.01	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
MW356	0445_MW356_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.05	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
MW357	0445_MW357_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.04	0.04	0.04	<0.02	<0.02	0.02	<0.02	0.02	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
MW357	0445_MW357_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.06	0.06	<0.1	<0.01	<0.01	0.04	<0.01	0.02	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
MW360	0445_MW360_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.07	0.07	0.07	<0.02	<0.02	0.03	<0.02	0.04	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
MW360	0445_MW360_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.31	0.31	0.33	<0.01	0.01	0.15	0.01	0.16	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
MW361	0445_MW361_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.30	0.44	0.46	<0.02	0.02	0.20	<0.02	0.10	-	<0.02	<0.1	0.04	0.05	0.02	0.03
MW361	0445_MW361_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.39	0.49	0.5	0.01	<0.01	0.13	0.01	0.26	<0.01	<0.01	<0.05	0.02	0.02	0.01	0.04
MW403	0445_MW403_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	83.7	115	124	6.70	7.40	53.2	1.87	30.5	-	<0.02	1.9	3.36	14.2	1.68	2.78
MW403	0445E_MW403_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	73	94.64	102.99	4.5	4.7	31	1.5	42	<0.1	<0.01	1.4	2.2	9.5	1.1	2.3
MW404	0445_MW404_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	178	239	259	13.0	14.7	95.9	4.97	82.4	-	<0.02	2.8	5.71	25.6	5.12	8.66
MW404	0445E_MW404_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	164	209.3	226.84	9.7	10	73	3.9	91	<0.2	<0.01	2.1	3.7	18	3.5	8.2
MW416	04455_MW416_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.18	1.62	1.65	<0.01	<0.01	0.18	0.03	1.0	<0.01	<0.01	<0.05	0.01	0.05	<0.01	0.01
MW416	0445_QC102_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	0.05	0.09	<0.1	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.05	0.04	<0.01	<0.01	<0.01
MW416	0445_QC202_241129	29 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	-	-	-	<0.010	<0.010	0.081	0.015	0.40	-	<0.010	<0.050	<0.010	0.023	<0.010	<0.010
OTH019	0445_OTH019_240403	03 Apr 2024	E6 - Apr 2024	EM2405436	Normal	0.17	0.17	0.17	<0.02	<0.02	0.13	<0.02	0.04	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
OTH019	0445_OTH019_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.313	0.359	0.399	0.015	0.026	0.22	0.009	0.093	<0.001	<0.001	0.006	0.002	0.014	0.002	0.007

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%
HEPA, January 2020, PFAS NEMP 2020 Freshwater 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

[illegible]

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																
MW009	0445_MW009_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.16	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW009	0445E_MW009_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW009	0445_QC201_241203	03 Dec 2024	E7 - Nov/Dec 2024	MFL0268	Interlab_D	<0.010	<0.010	<0.010	<0.010	<0.050	<0.010	<0.050	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.10	<0.050	<0.50
MW012	0445_MW012_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW012	0445E_MW012_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW016	0445_MW016_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW016	0445E_MW016_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW016	0445_QC101_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Field_D	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW018	0445_MW018_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW018	0445E_MW018_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW020	0445_MW020_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW020	0445E_MW020_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW029	0445_MW029_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW029	0445E_MW029_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW034	0445_MW034_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW034	0445E_MW034_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW034	0445_MW035_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.25	<0.05	<0.01	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW035	0445E_MW035_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.20	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW042	0445_MW042_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.20	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW042	0445E_MW042_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.17	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW043	0445_MW043_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.18	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW043	0445E_MW043_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.25	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW046	0445_MW046_D_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW046	0445_MW046_I_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW046	0445_QC108_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW046	0445_QC208_240404	04 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW046	0445E_MW046D_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW046	0445_QC101_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW046	0445_QC201_241128	28 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	<0.010	<0.010	<0.010	<0.010	<0.050	<0.010	<0.050	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.10	<0.050	<0.50
MW046	0445E_MW046I_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW051	0445S_MW051_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW052	0445_MW052_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW052	0445E_MW052_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW056	0445_MW056_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW056	0445_QC109_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW056	0445_QC209_240404	04 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW056	0445S_MW056_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW304	0445_MW304_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.10	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW304	0445S_MW304_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW307	0445_MW307_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	0.23	29.8	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW307	0445S_MW307_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	0.94	130	0.03	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW311	0445S_MW311_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW312	0445_MW312_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW312	0445S_MW312_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW313	0445_MW313_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW315	0445S_MW315_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW317	0445S_MW317_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW319	0445S_MW319_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05		

T1: OMP Groundwater Analytical Summary Table (2024)

	oxylic Acids					PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides						
	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005
PFAS NEMP 2020 Drinking Water																
PFAS NEMP 2020 Freshwater 95%																
PFAS NEMP 2020 Freshwater 99%																
PFAS NEMP 2020 Recreational Water																

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type															
MW351	0445_QC202_241128	28 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	<0.010	<0.010	<0.010	<0.010	<0.050	<0.010	<0.050	<0.010	<0.010	<0.050	<0.050	<0.050	<0.10	<0.050	<0.50
MW352	0445_MW352_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW352	0445E_MW352_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW353	0445_MW353_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW353	0445E_MW353_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW354	0445_MW354_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW354	0445_QC107_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW354	0445_QC207_240404	04 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW354	0445E_MW354_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW356	0445_MW356_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW356	0445_MW356_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW357	0445_MW357_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW357	0445_MW357_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW360	0445_MW360_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW360	0445_MW360_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW361	0445_MW361_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW361	0445_MW361_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW403	0445_MW403_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.54	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW403	0445E_MW403_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.58	0.06	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW404	0445_MW404_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.10	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
MW404	0445E_MW404_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.10	<0.01	<0.01	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05
MW416	04455_MW416_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.37	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW416	0445_QC102_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW416	0445_QC202_241129	29 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	<0.010	<0.010	<0.010	<0.010	<0.050	<0.010	0.20	<0.010	<0.010	<0.050	<0.050	<0.050	<0.10	<0.050	<0.50
OTH019	0445_OTH019_240403	03 Apr 2024	E6 - Apr 2024	EM2405436	Normal	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05
OTH019	0445_OTH019_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%
HEPA, January 2020, PFAS NEMP 2020 Freshwater 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Carboxylic Acids					
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07														0.56	
PFAS NEMP 2020 Freshwater 95%								0.13							220	
PFAS NEMP 2020 Freshwater 99%								0.00023							19	
PFAS NEMP 2020 Recreational Water	2														10	

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																	
SW302	0445S_SW302_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	3.42	4.88	5.74	0.53	0.10	0.42	0.03	3.0	<0.01	<0.01	0.35	0.30	0.24	0.01	0.03	<0.01	
SW307	0445S_SW307_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.15	0.17	0.19	0.02	<0.01	0.04	<0.01	0.11	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	
SW310	0445S_SW310_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.12	0.12	0.13	<0.01	<0.01	0.03	<0.01	0.09	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	
SW311	0445S_SW311_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.33	0.37	0.39	0.01	<0.01	0.02	<0.01	0.31	<0.01	<0.01	<0.05	0.02	0.01	<0.01	<0.01	<0.01	
SW313	0445S_SW313_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	31.3	38.18	40.12	0.33	0.45	6.3	0.52	25	0.20	0.06	0.67	1.5	2.6	0.58	1.2	0.53	
SW316	0445S_SW316_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.3	0.33	0.35	0.02	<0.01	0.05	<0.01	0.25	<0.01	<0.01	<0.05	<0.01	0.01	<0.01	<0.01	<0.01	
SW321	0445S_SW321_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.53	0.53	0.53	<0.01	<0.01	0.03	<0.01	0.50	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	
SW322	0445S_SW322_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.2	1.37	1.41	0.02	0.02	0.20	0.01	1.0	<0.01	<0.01	<0.05	0.06	0.06	0.01	0.02	<0.01	
SW323	0445S_SW323_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.3	1.52	1.57	0.02	0.02	0.20	0.01	1.1	<0.01	<0.01	<0.05	0.11	0.06	0.01	0.02	<0.01	
SW324	0445_SW324_240403	03 Apr 2024	E6 - Apr 2024	EM2405446	Normal	1.87	2.33	2.37	0.06	0.04	0.66	<0.02	1.21	-	<0.02	<0.1	0.13	0.14	0.07	0.06	<0.02	
SW324	0445_QC104_240403	03 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	1.83	2.29	2.34	0.06	0.05	0.65	<0.02	1.18	-	<0.02	<0.1	0.12	0.15	0.06	0.07	<0.02	
SW324	0445_QC204_240403	03 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	1.67	2.21	2.32	0.06	0.04	0.57	0.02	1.1	<0.01	<0.01	0.06	0.14	0.14	0.07	0.07	0.02	
SW324	0445S_SW324_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.19	1.58	1.68	0.05	0.03	0.28	0.01	0.91	<0.01	<0.01	0.06	0.13	0.10	0.02	0.03	<0.01	
SW326	0445_SW326_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.45	0.62	0.62	0.05	<0.02	0.19	<0.02	0.26	-	<0.02	<0.1	0.06	0.05	<0.02	0.01	<0.02	
SW326	0445_QC100_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	0.45	0.62	0.62	0.05	<0.02	0.18	<0.02	0.27	-	<0.02	<0.1	0.05	0.06	<0.02	0.01	<0.02	
SW326	0445_QC200_240402	02 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	0.43	0.61	0.67	0.04	0.01	0.16	<0.01	0.27	<0.01	<0.01	<0.05	0.06	0.05	0.01	0.02	<0.01	
SW326	0445S_SW326_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	3.14	3.57	3.72	0.05	0.06	0.64	0.04	2.5	0.01	<0.01	<0.05	0.11	0.14	0.05	0.08	0.01	
SW332	0445S_SW332_241124	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	22.6	29.02	31.95	1.4	1.5	9.6	0.89	13	0.02	<0.01	0.29	0.60	3.1	0.31	0.72	<0.01	
SW333	0445S_SW333_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.77	2.07	2.19	0.06	0.06	0.47	0.04	1.3	<0.01	<0.01	<0.05	0.05	0.14	0.01	0.04	<0.01	
SW336	0445S_SW336_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	16.8	24.24	26.63	0.27	0.42	2.8	0.21	14	0.42	0.09	0.30	0.69	2.0	0.48	1.2	0.36	
SW338	0445_SW338_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.81	1.06	1.09	0.02	0.03	0.21	<0.02	0.60	-	<0.02	<0.1	0.04	0.13	0.02	0.04	<0.02	
SW338	0445S_SW338_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.13	1.41	1.56	0.04	0.03	0.23	0.11	0.90	<0.01	<0.01	<0.05	0.04	0.14	0.02	0.04	<0.01	
SW340	0445S_SW340_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	4.47	5.84	6.77	0.07	0.08	0.77	0.50	3.7	0.02	<0.01	0.08	0.25	0.35	0.23	0.32	0.14	
SW346	0445_SW346_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	1.03	1.34	1.38	0.05	0.04	0.27	<0.02	0.76	-	<0.02	<0.1	0.08	0.10	0.03	0.05	<0.02	
SW346	0445S_SW346_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.31	1.59	1.67	0.04	0.03	0.21	0.01	1.1	<0.01	<0.01	<0.05	0.07	0.09	0.03	0.05	0.01	
SW349	0445_SW349_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	1.10	1.42	1.46	0.05	0.04	0.27	<0.02	0.83	-	<0.02	<0.1	0.08	0.10	0.04	0.05	<0.02	
SW349	0445_QC101_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	1.09	1.41	1.44	0.05	0.03	0.27	<0.02	0.82	-	<0.02	<0.1	0.08	0.10	0.04	0.05	<0.02	
SW349	0445_QC201_240402	02 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	1.21	1.56	1.66	0.05	0.03	0.22	0.02	0.99	<0.01	<0.01	<0.05	0.09	0.11	0.04	0.06	0.02	
SW349	0445S_SW349_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.56	1.88	2	0.05	0.04	0.26	0.02	1.3	<0.01	<0.01	<0.05	0.08	0.11	0.03	0.05	0.02	
SW355	0445_SW355_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.28	0.30	0.30	<0.02	<0.02	0.06	<0.02	0.22	-	<0.02	<0.1	<0.02	0.02	<0.02	<0.01	<0.02	
SW355	0445S_SW355_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.44	0.54	0.55	0.02	0.01	0.08	<0.01	0.36	<0.01	<0.01	<0.05	0.02	0.03	0.01	0.02	<0.01	
SW370	0445N_SW370_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.16	0.18	0.18	<0.01	<0.01	0.05	<0.01	0.11	<0.01	<0.01	<0.05	0.01	0.01	<0.01	<0.01	<0.01	
SW374	0445_SW374_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.09	0.09	0.09	<0.02	<0.02	0.03	<0.02	0.06	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	
SW374	0445N_SW374_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.06	0.06	<0.1	<0.01	<0.01	0.01	<0.01	0.05	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	
SW375	0445_SW375_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.07	0.07	0.07	<0.02	<0.02	0.02	<0.02	0.05	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	
SW375	0445_QC110_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	0.08	0.08	0.08	<0.02	<0.02	0.03	<0.02	0.05	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	
SW375	0445_QC210_240404	04 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	0.09	0.09	<0.1	<0.01	<0.01	0.02	<0.01	0.07	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	
SW375	0445N_SW375_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.08	0.08	<0.1	<0.01	<0.01	0.02	<0.01	0.06	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	
SW379	0445E_SW379_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.92	1.32	1.52	0.14	0.05	0.18	<0.01	0.74	0.02	0.02	0.12	0.06	0.06	<0.01	0.02	<0.01	
SW380	0445E_SW380_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.09	0.13	0.13	<0.01	<0.01	0.02	<0.01	0.07	<0.01	<0.01	<0.05	0.02	0.02	<0.01	<0.01	<0.01	
SW382	0445_SW382_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.01	0.02	0.02	<0.02	<0.02	<0.01	<0.02	<0.01	-	<0.02	<0.1	<0.02	0.				

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Cart					
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07														0.56	
PFAS NEMP 2020 Freshwater 95%								0.13							220	
PFAS NEMP 2020 Freshwater 99%								0.00023							19	
PFAS NEMP 2020 Recreational Water	2														10	

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type															
SW404	0445_QC103_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	<0.01	<0.05	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
SW404	0445_QC203_241126	26 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010
SW405	0445_SW405_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.2	0.2	0.21	<0.01	0.01	0.08	<0.01	0.12	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
SW409	0445_SW409_240403	03 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.02	0.02	0.02	<0.02	<0.02	<0.01	<0.02	0.02	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW409	0445_SW409_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.02	<0.05	<0.1	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
SW409	0445_QC102_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	0.03	0.12	0.12	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.05	0.09	<0.01	<0.01	<0.01
SW409	0445_QC202_241126	26 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	-	-	-	<0.010	<0.010	<0.010	<0.010	0.018	-	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010
SW412	0445_SW412_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.02	0.02	0.02	<0.02	<0.02	<0.01	<0.02	0.02	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW412	0445_SW412_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.04	0.05	<0.1	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.05	0.01	<0.01	<0.01	<0.01
SW416	0445_SW416_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.01	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW416	0445_SW416_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
SW424	0445_SW424_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.01	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW424	0445_SW424_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.93	2.14	2.18	0.01	0.02	0.23	0.01	1.7	0.01	<0.01	<0.05	0.09	0.07	0.01	0.03
SW427	0445_SW427_240402	02 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.05	0.05	0.05	<0.02	<0.02	0.01	<0.02	0.04	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW427	0445_SW427_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.14	0.16	0.16	<0.01	<0.01	0.03	<0.01	0.11	<0.01	<0.01	<0.05	0.01	0.01	<0.01	<0.01
SW430	0445_SW430_240403	03 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.02	0.02	0.02	<0.02	<0.02	<0.01	<0.02	0.02	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW430	0445_SW430_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.17	0.19	0.19	<0.01	<0.01	0.02	<0.01	0.15	<0.01	<0.01	<0.05	0.01	0.01	<0.01	<0.01
SW431	0445_SW431_240403	03 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.04	0.04	0.04	<0.02	<0.02	<0.01	<0.02	0.04	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW431	0445_SW431_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.08	0.1	0.12	<0.01	<0.01	0.02	<0.01	0.06	<0.01	<0.01	<0.05	0.01	0.01	<0.01	<0.01
SW432	0445_SW432_240403	03 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.03	0.03	0.03	<0.02	<0.02	<0.01	<0.02	0.03	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW432	0445_SW432_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.12	0.14	0.14	<0.01	<0.01	0.02	<0.01	0.10	<0.01	<0.01	<0.05	<0.01	0.02	<0.01	<0.01
SW434	0445_SW434_240403	03 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.01	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW434	0445_SW434_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.01	<0.05	<0.1	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
SW448	0445_SW448_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	4.37	6.51	6.76	0.44	0.19	1.81	0.06	2.56	-	<0.02	0.2	0.72	0.63	0.05	0.10
SW448	04455_SW448_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	1.61	2.01	2.14	0.07	0.03	0.61	0.02	1.0	<0.01	<0.01	0.09	0.07	0.12	0.02	0.03
SW448	0445_QC101_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	1.97	2.48	2.65	0.06	0.04	0.67	0.03	1.3	<0.01	<0.01	0.11	0.18	0.11	0.02	0.03
SW448	0445_QC201_241126	26 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	-	-	-	0.065	0.026	0.66	0.025	1.1	-	0.019	0.082	0.075	0.092	0.015	0.031
SW462	0445_SW462_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.08	0.08	<0.1	<0.01	<0.01	0.02	<0.01	0.06	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
SW463	0445_SW463_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.32	0.37	0.37	<0.01	<0.01	0.02	<0.01	0.30	<0.01	<0.01	<0.05	0.05	<0.01	<0.01	<0.01
SW470	0445_SW470_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.50	0.54	0.57	0.04	0.03	0.27	<0.02	0.23	-	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01
SW470	0445_SW470_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	0.42	0.45	0.48	0.02	0.02	0.19	<0.01	0.23	<0.01	<0.01	<0.05	<0.01	0.01	<0.01	<0.01
SW471	0445_SW471_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	5.2	7.32	8.37	0.66	0.66	3.2	0.13	2.0	<0.01	<0.01	0.12	0.19	0.83	0.11	0.21
SW487	0445_SW487_240405	05 Apr 2024	E6 - Apr 2024	EM2405437	Normal	9.10	11.7	12.7	0.64	0.67	4.42	0.30	4.68	-	<0.02	0.1	0.26	1.09	0.19	0.34
SW487	0445_SW487_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	12.2	14.81	16.17	0.60	0.76	4.5	0.34	7.7	<0.01	<0.01	0.15	0.22	1.1	0.17	<0.01

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%
HEPA, January 2020, PFAS NEMP 2020 Freshwater 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

[illegible][illegible]

T3: OMP Sediment Analytical Summary Table (2024)

						PFAS		Sample Preparation	PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Carboxylic Acids					
						Sum of PFHxS and PFOS	Sum of PFAS	Moisture Content	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)		Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)
						µg/L	µg/L	%	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						0.01	0.01	0.1	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002		0.001	0.0002	0.0002	0.0002	0.0002	0.0002

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																
SD323	0445_SD323_240405	05 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.0217	0.0140	16.1	<0.0002	<0.0002	0.0014	<0.0002	0.0203	0.0004	<0.001	<0.0002	0.0003	<0.0002	0.0002	<0.0002	
SD346	0445_QC102_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	0.0056	0.0056	20.6	<0.0002	<0.0002	<0.0002	<0.0002	0.0056	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD346	0445_QC202_240402	02 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	0.0078	<0.05	27	<0.005	<0.005	<0.005	<0.005	0.0078	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
SD346	0445_SD346_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.0037	0.0037	21.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0037	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD355	0445_QC103_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	0.0012	0.0012	22.5	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD355	0445_QC203_240402	02 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	<0.005	<0.05	21	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
SD355	0445_SD355_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.0010	0.0010	23.2	<0.0002	<0.0002	<0.0002	<0.0002	0.0010	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD375	0445_SD375_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.0032	0.0035	30.3	<0.0002	<0.0002	<0.0002	<0.0002	0.0035	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD382	0445_SD382_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.0002	<0.0002	21.6	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD395	0445_SD395_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.0044	0.0046	46.9	<0.0002	<0.0002	0.0004	<0.0002	0.0040	0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD396	0445_SD396_240405	05 Apr 2024	E6 - Apr 2024	EM2405437	Normal	0.0408	0.0438	34.9	0.0005	0.0006	0.0104	0.0007	0.0304	<0.0002	<0.001	<0.0002	0.0006	<0.0002	0.0003	<0.0002	
SD397	0445_SD397_240405	05 Apr 2024	E6 - Apr 2024	EM2405437	Normal	0.0633	0.0662	34.1	0.0003	0.0004	0.0047	0.0008	0.0586	<0.0002	<0.001	<0.0002	0.0009	<0.0002	0.0005	<0.0002	
SD400	0445_SD400_240405	05 Apr 2024	E6 - Apr 2024	EM2405437	Normal	0.0210	0.0220	5.5	0.0002	0.0003	0.0040	0.0005	0.0170	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD412	0445_SD412_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.0024	0.0024	46.3	<0.0002	<0.0002	<0.0002	<0.0002	0.0024	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD424	0445_SD424_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.0150	0.0150	33.2	<0.0002	<0.0002	0.0005	<0.0002	0.0145	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
SD463	0445_SD463_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.0097	0.0097	8.8	<0.0002	<0.0002	0.0006	<0.0002	0.0091	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	

T3: OMP Sediment Analytical Summary Table (2024)

						Pfcboxylic Acids						PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							
						Sum of PFHxS and PFOS	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	
							µg/L	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						0.01	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																	
SD323	0445_SD323_240405	05 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.0217	<0.0002	<0.0002	<0.0002	0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD346	0445_QC102_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	0.0056	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD346	0445_QC202_240402	02 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	0.0078	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005
SD346	0445_SD346_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.0037	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD355	0445_QC103_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	0.0012	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD355	0445_QC203_240402	02 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005
SD355	0445_SD355_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD375	0445_SD375_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	0.0032	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD382	0445_SD382_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD395	0445_SD395_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.0044	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD396	0445_SD396_240405	05 Apr 2024	E6 - Apr 2024	EM2405437	Normal	0.0408	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD397	0445_SD397_240405	05 Apr 2024	E6 - Apr 2024	EM2405437	Normal	0.0633	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD400	0445_SD400_240405	05 Apr 2024	E6 - Apr 2024	EM2405437	Normal	0.0210	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD412	0445_SD412_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.0024	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD424	0445_SD424_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.0150	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005
SD463	0445_SD463_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	0.0097	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005

T4: OMP Water Analytical Summary Table (2021-2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids									
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07							0.13							0.56						
PFAS NEMP 2020 Freshwater 95%															220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												</
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T4: OMP Water Analytical Summary Table (2021-2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids									
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07							0.13							0.56						
PFAS NEMP 2020 Freshwater 95%															220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Carboxylic Acids										
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07														0.56						
PFAS NEMP 2020 Freshwater 95%								0.13							220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

[illegible]

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids									
	Sum of PFHxS and PFOS	Sum of PFAS (WADER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07														0.56						
PFAS NEMP 2020 Freshwater 95%								0.13							220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

Auction Code	Field ID	Date	Sample Event	L Report Number	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											</
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	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Carboxylic Acids										
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07														0.56						
PFAS NEMP 2020 Freshwater 95%								0.13							220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

[illegible]

T4: OMP Water Analytical Summary Table (2021-2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids									
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07							0.13							0.56						
PFAS NEMP 2020 Freshwater 95%															220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

SW Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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T4: OMP Water Analytical Summary Table (2021-2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Carboxylic Acids											
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	
PFAS NEMP 2020 Drinking Water	0.07														0.56							
PFAS NEMP 2020 Freshwater 95%								0.13							220							
PFAS NEMP 2020 Freshwater 99%								0.00023							19							
PFAS NEMP 2020 Recreational Water	2														10							

Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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T4: OMP Water Analytical Summary Table (2021-2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids									
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07							0.13							0.56						
PFAS NEMP 2020 Freshwater 95%															220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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T4: OMP Water Analytical Summary Table (2021-2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids									
	Sum of PFHxS and PFOS µg/L	Sum of PFAS (WA DER List) µg/L	Sum of PFAS µg/L	Perfluorobutane sulfonic acid (PFBS) µg/L	Perfluoropentane sulfonic acid (PFPeS) µg/L	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluoroheptane sulfonic acid (PFHpS) µg/L	Perfluorooctane sulfonic acid (PFOS) µg/L	Perfluorononanesulfonic acid (PFNS) µg/L	Perfluorodecane sulfonic acid (PFDS) µg/L	Perfluorobutanoic acid (PFBA) µg/L	Perfluoropentanoic acid (PFPeA) µg/L	Perfluorohexanoic acid (PFHxA) µg/L	Perfluoroheptanoic acid (PFHpA) µg/L	Perfluorooctanoic acid (PFOA) µg/L	Perfluorononanoic acid (PFNA) µg/L	Perfluorodecanoic acid (PFDA) µg/L	Perfluoroundecanoic acid (PFUnDA) µg/L	Perfluorododecanoic acid (PFDDA) µg/L	Perfluorotridecanoic acid (PFTrDA) µg/L	Perfluorotetradecanoic acid (PFTeDA) µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07														0.56						
PFAS NEMP 2020 Freshwater 95%								0.13							220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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T4: OMP Water Analytical Summary Table (2021-2024)

	PFAS			PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids									
	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Drinking Water	0.07							0.13							0.56						
PFAS NEMP 2020 Freshwater 95%								0.13							220						
PFAS NEMP 2020 Freshwater 99%								0.00023							19						
PFAS NEMP 2020 Recreational Water	2														10						

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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	PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.001	0.005	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
PFAS NEMP 2020 Drinking Water												
PFAS NEMP 2020 Freshwater 95%												
PFAS NEMP 2020 Freshwater 99%												
PFAS NEMP 2020 Recreational Water												

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type										
MW312	0445_MW312_21110	10 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW312	0445_MW312_220504	04 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW312	0445_MW312_221010	10 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW312	0445_MW312_230504	04 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW312	0445_MW312_231026	26 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW312	0445_MW312_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW312	04455_MW312_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW313	0445_MW313_211111	11 Nov 2021	E1 - Nov 2021	EM2122519	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW313	0445_MW313_221015	15 Oct 2022	E3 - Oct 2022	EM2220271	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW313	0445_MW313_231027	27 Oct 2023	E5 - Oct 2023	EM2319354	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW313	0445_MW313_241204	04 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW315	0445_MW315_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW315	04455_MW315_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW317	04455_MW317_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW319	0445_MW319_211110	10 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW319	QC201_211110	10 Nov 2021	E1 - Nov 2021	841785	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW319	0445_QC101_211110	12 Nov 2021	E1 - Nov 2021	EM2122518	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW319	0445_MW319_221012	12 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW319	0445_QC103_20221012	12 Oct 2022	E3 - Oct 2022	EM2220286	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW319	0445_QC203_221012	12 Oct 2022	E3 - Oct 2022	932350	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW319	0445_MW319_231025	25 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW319	0445_QC106_231025	25 Oct 2023	E5 - Oct 2023	EM2319356	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW319	0445_QC206_231025	25 Oct 2023	E5 - Oct 2023	1039507	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW319	0445_QC101_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW319	0445_QC201_241129	29 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	<0.010	<0.050	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.10	<0.050
MW319	04455_MW319_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW321	0445_MW321_211110	10 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW321	0445_MW321_221210	12 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW321	0445_QC102_20221012	12 Oct 2022	E3 - Oct 2022	EM2220286	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW321	0445_QC202_221012	12 Oct 2022	E3 - Oct 2022	932350	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW321	0445_MW321_231025	25 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	1.72	1.85	<0.05	<0.04	<0.09	<0.04	<0.09	<0.09	<0.04
MW321	0445_MW321_231127	27 Nov 2023	E5 - Oct 2023	EM2321318	Normal	<0.05	1.14	0.62	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW321	0445_MW321_231128	28 Nov 2023	E5 - Oct 2023	EM2321318	Normal	<0.05	1.68	1.46	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW321	0445_QC101_231128	28 Nov 2023	E5 - Oct 2023	EM2321318	Field_D	<0.05	1.06	0.59	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW321	0445_QC201_231128	28 Nov 2023	E5 - Oct 2023	1049115	Interlab_D	<0.01	1.0	0.33	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW321	04455_MW321_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	1.2	0.64	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW323	0445_MW323_211110	10 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW323	0445_MW323_221210	12 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW323	0445_MW323_231025	25 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW323	04455_MW323_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW325	0445_MW325_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW326	0445_MW326_211110	10 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW328	0445_MW328_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW328	0445_MW328_221014_D	14 Nov 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW329	0445_MW329_21110	10 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW329	0445_QC102_211110	10 Nov 2021	E1 - Nov 2021	EM2122518	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW329	QC202_211110	10 Nov 2021	E1 - Nov 2021	841785	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW329	0445_MW329_221012	12 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW329	0445_MW329_231025	25 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW329	04455_MW329_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW342	0445_MW342_211111	11 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW342	0445_MW342_211222	22 Dec 2021	E1 - Nov 2021	EM2125903	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW342	0445_QC100_211222	22 Dec 2021	E1 - Nov 2021	EM2125903	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW342	0445_QC200_211222	22 Dec 2021	E1 - Nov 2021	852797	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.	

	PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.001	0.005	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
PFAS NEMP 2020 Drinking Water												
PFAS NEMP 2020 Freshwater 95%												
PFAS NEMP 2020 Freshwater 99%												
PFAS NEMP 2020 Recreational Water												

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type										
MW361	0445_MW361_220506	06 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW361	0445_MW361_221015	15 Oct 2022	E3 - Oct 2022	EM2220271	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW361	0445_MW361_230504	04 May 2023	E4 - May 2023	EM2308009	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW361	0445_MW361_231025	25 Oct 2023	E5 - Oct 2023	EM2319354	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW361	0445_MW361_240404	04 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW361	0445_MW361_241128	28 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW403	0445_MW403_211111	12 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	1.41	<0.05	<0.05	<0.04	<0.10	<0.04	<0.10	<0.10	<0.10
MW403	0445_MW403_220505	05 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	0.95	<0.05	<0.05	<0.04	<0.09	<0.04	<0.09	<0.09	<0.04
MW403	0445_MW403_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	0.50	0.05	<0.05	<0.03	<0.08	<0.03	<0.08	<0.08	<0.03
MW403	0445_MW403_230505	05 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	0.53	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW403	0445_MW403_231026	26 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	0.68	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW403	0445_MW403_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.05	0.54	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW403	0445E_MW403_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	0.58	0.06	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW404	0445_MW404_211111	11 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	0.06	<0.05	<0.05	<0.04	<0.10	<0.04	<0.10	<0.10	<0.10
MW404	0445_QC103_211111	11 Nov 2021	E1 - Nov 2021	EM2122518	Field_D	<0.05	0.06	<0.05	<0.05	<0.04	<0.11	<0.04	<0.11	<0.11	<0.11
MW404	QC203_211111	11 Nov 2021	E1 - Nov 2021	841785	Interlab_D	<0.01	0.08	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW404	0445_MW404_220505	05 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	<0.05	<0.05	<0.05	<0.04	<0.09	<0.04	<0.09	<0.09	<0.04
MW404	0445_MW404_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	0.07	<0.05	<0.05	<0.03	<0.08	<0.03	<0.08	<0.08	<0.03
MW404	0445_MW404_230505	06 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	0.12	<0.05	<0.05	<0.03	<0.09	<0.03	<0.09	<0.09	<0.03
MW404	0445_MW404_231026	26 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	0.10	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW404	0445_MW404_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.05	0.10	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW404	0445E_MW404_241203	03 Dec 2024	E7 - Nov/Dec 2024	1169993	Normal	<0.01	0.10	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW416	0445_MW416_230506	06 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW416	0445_MW416_231025	25 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW416	0445_QC105_231025	25 Oct 2023	E5 - Oct 2023	EM2319356	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW416	0445_QC205_231025	25 Oct 2023	E5 - Oct 2023	1039507	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW416	0445_QC102_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW416	0445_QC202_241129	29 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	<0.010	0.20	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.10	<0.050
MW416	04455_MW416_241129	29 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	0.37	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
OTH019	0445_OTH019_211115	15 Nov 2021	E1 - Nov 2021	EM2122969	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH019	0445_OTH019_220505	05 May 2022	E2 - May 2022	EM2208348	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH019	0445_OTH019_221110	10 Nov 2022	E3 - Oct 2022	EM2222364	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH019	0445_QC110_221110	10 Nov 2022	E3 - Oct 2022	EM2222364	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH019	0445_QC210_221110	10 Nov 2022	E3 - Oct 2022	941104	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
OTH019	0445_OTH019_230502	02 May 2023	E4 - May 2023	EM2308003	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH019	0445_OTH019_231023	23 Oct 2023	E5 - Oct 2023	EM2319355	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH019	0445_OTH019_240403	03 Apr 2024	E6 - Apr 2024	EM2405436	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH019	0445_OTH019_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SW302	04455_SW302_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW307	0445_SW307_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW307	0445_SW307_221013	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW307	04455_SW307_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW310	0445_SW310_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW310	0445_SW310_221010	10 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW310	0445_SW310_230503	03 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW310	04455_SW310_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW311	0445_SW311_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW311	0445_QC100_20221010	10 Oct 2022	E3 - Oct 2022	EM2220286	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW311	0445_QC200_221010	10 Oct 2022	E3 - Oct 2022	932350	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW311	0445_SW311_221010	10 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW311	0445_SW311_230506	06 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW311	04455_SW311_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW313	0445_QC111_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW313	0445_QC211_211117	17 Nov 2021	E1 - Nov 2021	842787	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0

	PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.001	0.005	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
PFAS NEMP 2020 Drinking Water												
PFAS NEMP 2020 Freshwater 95%												
PFAS NEMP 2020 Freshwater 99%												
PFAS NEMP 2020 Recreational Water												

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type										
SW322	0445_SW322_221010	10 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW322	0445_SW322_230504	04 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW322	0445_SW322_231023	23 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW322	04455_SW322_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW323	0445_SW323_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW323	0445_SW323_220504	04 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW323	0445_SW323_221010	10 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW323	0445_SW323_230504	04 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW323	0445_QC103_231023	23 Oct 2023	E5 - Oct 2023	EM2319356	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW323	0445_QC203_231023	23 Oct 2023	E5 - Oct 2023	1039507	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW323	0445_SW323_231023	23 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW323	04455_SW323_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW324	0445_QC110_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	0445_QC210_211117	17 Nov 2021	E1 - Nov 2021	842787	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW324	0445_SW324_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	0445_SW324_220504	04 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	0445_SW324_221010	10 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	0445_QC101_230501	01 May 2023	E4 - May 2023	EM2308015	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	0445_QC201_230501	01 May 2023	E4 - May 2023	987797	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW324	0445_SW324_230501	01 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	0445_SW324_231026	26 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	0445_QC104_240403	03 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	0445_QC204_240403	03 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW324	0445_SW324_240403	03 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW324	04455_SW324_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW326	0445_SW326_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	0.49	0.11	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW326	0445_SW326_220504	04 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW326	0445_SW326_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW326	0445_SW326_230501	01 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW326	0445_QC102_231023	23 Oct 2023	E5 - Oct 2023	EM2319356	Field_D	<0.05	0.08	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW326	0445_QC202_231023	23 Oct 2023	E5 - Oct 2023	1039507	Interlab_D	<0.01	0.07	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW326	0445_SW326_231023	23 Oct 2023	E5 - Oct 2023	EM2319356	Normal	<0.05	0.07	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW326	0445_QC100_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW326	0445_QC200_240402	02 Apr 2024	E6 - Apr 2024	1086312	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW326	0445_SW326_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW326	04455_SW326_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW332	0445_SW332_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW332	0445_SW332_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW332	0445_SW332_230503	03 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW332	0445_QC100_231128	28 Nov 2023	E5 - Oct 2023	EM2321318	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW332	0445_QC200_231128	28 Nov 2023	E5 - Oct 2023	1049115	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW332	0445_SW332_231128	28 Nov 2023	E5 - Oct 2023	EM2321318	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW332	04455_SW332_241124	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW333	0445_SW333_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW333	0445_SW333_220504	04 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW333	0445_SW333_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW333	0445_SW333_230503	03 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW333	0445_SW333_231128	28 Nov 2023	E5 - Oct 2023	EM2321318	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW333	04455_SW333_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW336	0445_SW336_211115	15 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	0.35	0.83	0.14	0.03	<0.05	<0.02	<0.05	<0.05	<0.02
SW336	0445_SW336_220504	04 May 2022	E2 - May 2022	EM2208381	Normal	<0.05	0.90	1.44	1.19	0.11	<0.09	<0.04	<0.09	<0.09	<0.04
SW336	0445_QC106_20221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Field_D	<0.05	0.25	0.47	<0.05	0.04	<0.05	<0.02	<0.05	<0.05	<0.02
SW336	0445_QC206_221014	14 Oct 2022	E3 - Oct 2022	932350	Interlab_D	<0.01	0.33	0.58	0.04	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW336	0445_SW336_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	0.27	0.53	<0.05	0.05	<0.05	<0.02	<0.05	<0.05	<0.02
SW336	0445_SW336_230504	04 May													

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Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW382	0445_SW382_240404	04 Apr 2024	E6 - Apr 2024	EM2405446	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW382	0445E_SW382_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW387	0445_SW387_211116	16 Nov 2021	E1 - Nov 2021	EM2122998	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW387	0445_QC101_220503	03 May 2022	E2 - May 2022	EM2208381	Field_D		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW387	0445_QC201_220503	03 May 2022	E2 - May 2022	886780	Interlab_D		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW387	0445_SW387_220503	03 May 2022	E2 - May 2022	EM2208381	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW387	0445_SW387_221012	12 Oct 2022	E3 - Oct 2022	EM2220286	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW387	0445_SW387_230508	08 May 2023	E4 - May 2023	EM2308015	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW387	0445_SW387_231027	27 Oct 2023	E5 - Oct 2023	EM2319356	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW387	0445_SW387_240405	05 Apr 2024	E6 - Apr 2024	EM2405446	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW387	0445E_SW387_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW388	0445_SW388_211116	16 Nov 2021	E1 - Nov 2021	EM2122998	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW388	0445_SW388_221210	12 Oct 2022	E3 - Oct 2022	EM2220286	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW388	0445E_SW388_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW390	0445_SW390_211109	09 Nov 2021	E1 - Nov 2021	EM2122518	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW390	0445_SW390_220505	05 May 2022	E2 - May 2022	EM2208383	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW390	0445_SW390_221011	11 Oct 2022	E3 - Oct 2022	EM2220271	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW390	0445_SW390_230504	04 May 2023	E4 - May 2023	EM2308009	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW390	0445_SW390_231027	27 Oct 2023	E5 - Oct 2023	EM2319354	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW390	0445_SW390_240405	05 Apr 2024	E6 - Apr 2024														

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Satiation Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW400	0445_SW4003_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW404	0445_SW404_211112	12 Nov 2021	E1 - Nov 2021	EM2122519	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW404	0445_SW404_211117	17 Nov 2021	E1 - Nov 2021	EM2122998	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW404	0445_SW404_220505	05 May 2022	E2 - May 2022	EM2208383	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW404	0445_SW404_221015	15 Oct 2022	E3 - Oct 2022	EM2220271	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW404	0445_SW404_230504	04 May 2023	E4 - May 2023	EM2308009	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW404	0445_SW404_231023	23 Oct 2023	E5 - Oct 2023	EM2319354	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW404	0445_SW404_240403	03 Apr 2024	E6 - Apr 2024	EM2405435	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW404	0445_QC103_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
SW404	0445_QC203_241126	26 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D		<0.010	<0.050	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	<0.050	<0.50
SW405	0445_SW405_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SW405	0445_SW405_211112	12 Nov 2021	E1 - Nov 2021	EM2122519	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW405	0445_SW405_220505	05 May 2022	E2 - May 2022	EM2208383	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW405	0445_SW405_221015	15 Oct 2022	E3 - Oct 2022	EM2220271	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW405	0445_SW405_230506	06 May 2023	E4 - May 2023	EM2308009	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW405	0445_SW405_231025	25 Oct 2023	E5 - Oct 2023	EM2319354	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW405	0445_SW405_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal		<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
SW409	0445_SW409_211112	12 Nov 2021	E1 - Nov 2021	EM2122519	Normal		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05
SW409	0445_SW409_220506	06 May 2022																

[illegible]

Location Code	Field ID	Date	Sample Event	Lab Report Number	Sample Type															
SW434	0445_SW434_211115	15 Nov 2021	E1 - Nov 2021	EM2122999	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW434	0445_SW434_220506	06 May 2022	E2 - May 2022	EM2208383	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW434	0445_SW434_221011	11 Oct 2022	E3 - Oct 2022	EM2220271	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW434	0445_SW434_230502	02 May 2023	E4 - May 2023	EM2308009	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW434	0445_SW434_231025	25 Oct 2023	E5 - Oct 2023	EM2319354	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW434	0445_SW434_240403	03 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW434	0445_SW434_241125	25 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
SW448	0445_SW448_211115	16 Nov 2021	E1 - Nov 2021	EM2122998	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW448	0445_SW448_221014	14 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW448	0445_QC104_230503	03 May 2023	E4 - May 2023	EM2308015	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW448	0445_QC204_230503	03 May 2023	E4 - May 2023	987797	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	
SW448	0445_SW448_230503	03 May 2023	E4 - May 2023	EM2308015	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW448	0445_SW448_240402	02 Apr 2024	E6 - Apr 2024	EM2405446	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW448	0445_QC101_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Field_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	
SW448	0445_QC201_241126	26 Nov 2024	E7 - Nov/Dec 2024	MFL0040	Interlab_D	<0.010	<0.050	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
SW448	04455_SW448_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
SW462	0445_SW462_211111	11 Nov 2021	E1 - Nov 2021	EM2122518	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW462	0445_QC105_220505	05 May 2022	E2 - May 2022	EM2208383	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW462	0445_QC205_220505	05 May 2022	E2 - May 2022	886780	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	
SW462	0445_SW462_220505	05 May 2022	E2 - May 2022	EM2208383	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW462	0445_SW462_221011	11 Oct 2022	E3 - Oct 2022	EM2220271	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW462	0445_SW462_230504	04 May 2023	E4 - May 2023	EM2308009	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW462	0445_SW462_231024	24 Oct 2023	E5 - Oct 2023	EM2319354	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW462	0445_SW462_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	
SW463	0445_SW463_211115	16 Nov 2021	E1 - Nov 2021	EM2122999	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW463	0445_SW463_220504	04 May 2022	E2 - May 2022	EM2208383	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW463	0445_QC101_221011	11 Oct 2022	E3 - Oct 2022	EM2220271	Field_D	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW463	0445_QC201_221011	11 Oct 2022	E3 - Oct 2022	932350	Interlab_D	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	
SW463	0445_SW463_221011	11 Oct 2022	E3 - Oct 2022	EM2220271	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW463	0445_SW463_230502	02 May 2023	E4 - May 2023	EM2308009	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW463	0445_SW463_231023	23 Oct 2023	E5 - Oct 2023	EM2319354	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW463	0445_SW463_241126	26 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	
SW470	0445_SW470_211116	16 Nov 2021	E1 - Nov 2021	EM2122999	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW470	0445_SW470_220503	03 May 2022	E2 - May 2022	EM2208383	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW470	0445_SW470_221012	22 Oct 2022	E3 - Oct 2022	EM2220286	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW470	0445_SW470_230506	06 May 2023	E4 - May 2023	EM2308009	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW470	0445_SW470_231027	27 Oct 2023	E5 - Oct 2023	EM2319354	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW470	0445_SW470_240405	05 Apr 2024	E6 - Apr 2024	EM2405435	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW470	0445_SW470_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	
SW471	0445_SW471_211116	16 Nov 2021	E1 - Nov 2021	EM2122968	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW471	0445_SW471_220503	03 May 2022	E2 - May 2022	EM2208382	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW471	0445_SW471_221012	12 Oct 2022	E3 - Oct 2022	EM2220270	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW471	0445_SW471_230506	06 May 2023	E4 - May 2023	EM2308004	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW471	0445_SW471_231025	25 Oct 2023	E5 - Oct 2023	EM2319357	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW471	0445_SW471_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	
SW487	0445_SW487_211116	16 Nov 2021	E1 - Nov 2021	EM2122968	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW487	0445_SW487_220503	03 May 2022	E2 - May 2022	EM2208382	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW487	0445_SW487_221012	12 Oct 2022	E3 - Oct 2022	EM2220270	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW487	0445_SW487_230506	06 May 2023	E4 - May 2023	EM2308004	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW487	0445_SW487_231025	25 Oct 2023	E5 - Oct 2023	EM2319357	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW487	0445_SW487_240405	05 Apr 2024	E6 - Apr 2024	EM2405437	Normal	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	
SW487	0445_SW487_241127	27 Nov 2024	E7 - Nov/Dec 2024	1166588	Normal	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%
HEPA, January 2020, PFAS NEMP 2020 Freshwater 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

T5: OMP Sediment Analytical Summary Table (2021-2024)

			PFAS		Sample Preparation	PFAS - Perfluoroalkyl Sulfonic Acids					PFAS - Perfluoroalkyl Carboxylic Acids												
			Sum of PHxS and PFOS	Sum of PFAS	Moisture Content	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	
			mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			0.0002	0.0002	0.1	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005

Location Code	Field ID	Location	Date	Sample Event	Lab Report Number																				
SD323	0445_QC109_220504	South Bandiana	04 May 2022	E2 - May 2022	EM2208381	0.0158	0.0171	45.9	<0.0002	<0.0002	0.0006	<0.0002	0.0152	0.0004	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	0.0005	<0.0005
SD323	0445_QC209_220504	South Bandiana	04 May 2022	E2 - May 2022	886780	0.016	<0.05	44	<0.005	<0.005	<0.005	<0.005	0.016	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SD323	0445_SD323_220504	South Bandiana	04 May 2022	E2 - May 2022	EM2208381	0.0173	0.0184	43.8	<0.0002	<0.0002	0.0006	<0.0002	0.0167	0.0004	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0004	<0.0005
SD323	0445_SD323_230504	South Bandiana	04 May 2023	E4 - May 2023	EM2308015	0.0137	0.014	28	<0.0002	<0.0002	0.0008	<0.0002	0.0129	0.0003	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD323	0445_SD323_240405	South Bandana	05 Apr 2024	E6 - Apr 2024	EM2405446	0.0217	0.0140	16.1	<0.0002	<0.0002	0.0014	<0.0002	0.0203	0.0004	<0.001	<0.0002	0.0003	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0005
SD346	0445_SD346_220504	South Bandiana	04 May 2022	E2 - May 2022	EM2208381	0.0041	0.0043	24.2	<0.0002	<0.0002	0.0002	<0.0002	0.0039	0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD346	0445_SD346_230505	South Bandiana	05 May 2023	E4 - May 2023	EM2308015	0.0114	0.0114	29.2	<0.0002	<0.0002	0.0005	<0.0002	0.0109	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD346	0445_QC102_240402	South Bandana	02 Apr 2024	E6 - Apr 2024	EM2405446	0.0056	0.0056	20.6	<0.0002	<0.0002	<0.0002	<0.0002	0.0056	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD346	0445_QC202_240402	South Bandana	02 Apr 2024	E6 - Apr 2024	1086312	0.0078	<0.05	27	<0.005	<0.005	<0.005	<0.005	0.0078	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SD346	0445_SD346_240402	South Bandana	02 Apr 2024	E6 - Apr 2024	EM2405446	0.0037	0.0037	21.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0037	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD355	0445_SD355_220504	South Bandiana	04 May 2022	E2 - May 2022	EM2208381	0.001	0.001	21.8	<0.0002	<0.0002	<0.0002	<0.0002	0.001	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD355	0445_SD355_230504	South Bandiana	04 May 2023	E4 - May 2023	EM2308015	0.0011	0.0011	28.4	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD355	0445_QC103_240402	South Bandana	02 Apr 2024	E6 - Apr 2024	EM2405446	0.0012	0.0012	22.5	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD355	0445_QC203_240402	South Bandana	02 Apr 2024	E6 - Apr 2024	1086312	<0.005	<0.05	21	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SD355	0445_SD355_240402	South Bandana	02 Apr 2024	E6 - Apr 2024	EM2405446	0.0010	0.0010	23.2	<0.0002	<0.0002	<0.0002	<0.0002	0.0010	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD375	0445_SD375_220506	North Bandiana	06 May 2022	E2 - May 2022	EM2208381	0.0044	0.0049	6.7	<0.0002	<0.0002	0.0002	<0.0002	0.0042	0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD375	0445_QC110_230505	North Bandiana	05 May 2023	E4 - May 2023	EM2308015	0.0021	0.0021	27.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0021	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD375	0445_QC210_230505	North Bandiana	05 May 2023	E4 - May 2023	987797	<0.005	<0.05	31	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SD375	0445_SD375_230505	North Bandiana	05 May 2023	E4 - May 2023	EM2308015	0.0032	0.0032	29.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0032	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD375	0445_SD375_240404	North Bandiana	04 Apr 2024	E6 - Apr 2024	EM2405446	0.0032	0.0035	30.3	<0.0002	<0.0002	<0.0002	<0.0002	0.0035	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD382	0445_SD382_220503	East Bandiana	03 May 2022	E2 - May 2022	EM2208381	<0.0002	<0.0002	30.9	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD382	0445_QC108_230505	East Bandiana	05 May 2023	E4 - May 2023	EM2308015	<0.0002	<0.0002	21.8	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD382	0445_QC208_230505	East Bandiana	05 May 2023	E4 - May 2023	987797	<0.005	<0.05	22	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SD382	0445_SD382_230505	East Bandiana	05 May 2023	E4 - May 2023	EM2308015	<0.0002	<0.0002	22.7	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD382	0445_SD382_240404	East Bandiana	04 Apr 2024	E6 - Apr 2024	EM2405446	<0.0002	<0.0002	21.6	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD395	0445_SD395_230506	Off-base	06 May 2023	E4 - May 2023	EM2308009	0.002	0.0022	32	<0.0002	<0.0002	<0.0002	<0.0002	0.002	0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD395	0445_SD395_240405	On-base	05 Apr 2024	E6 - Apr 2024	EM2405435	0.0044	0.0046	46.9	<0.0002	<0.0002	0.0004	<0.0002	0.0040	0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD396	0445_SD396_220503	Off-base	03 May 2022	E2 - May 2022	EM2208382	0.0373	0.0413	6.3	0.0008	0.0014	0.0193	0.0009	0.018	<0.0002	<0.001	<0.0002	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD396	0445_SD396_230506	Off-base	06 May 2023	E4 - May 2023	EM2308004	0.0223	0.0237	5.8	0.0003	0.0004	0.0061	0.0004	0.0162	<0.0002	<0.001	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD396	0445_SD396_240405	On-base	05 Apr 2024	E6 - Apr 2024	EM2405437	0.0408	0.0438	34.9	0.0005	0.0006	0.0104	0.0007	0.0304	<0.0002	<0.001	<0.0002	0.0006	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD397	0445_SD397_220503	Off-base	03 May 2022	E2 - May 2022	EM2208382	0.0442	0.0501	44.1	0.0008	0.0021	0.0246	0.0016	0.0196	<0.0002	<0.001	<0.0002	0.0008	0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD397	0445_SD397_230506	Off-base	06 May 2023	E4 - May 2023	EM2308004	0.0861	0.0983	43.8	0.0007	0.0016	0.0195	0.0041	0.0666	<0.0002	<0.001	0.0003	0.0027	0.0007	0.0021	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD397	0445_SD397_240405	Off-base	05 Apr 2024	E6 - Apr 2024	EM2405437	0.0633	0.0662	34.1	0.0003	0.0004	0.0047	0.0008	0.0586	<0.0002	<0.001	<0.0002	0.0009	<0.0002	0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.000	

Appendix A Cardno SAQP (2024a)



PFAS OMP Sampling and Analysis Quality Plan (SAQP)

Bandiana Military Area

DEF19008



Prepared for
Department of Defence

28 March 2024

Contact Information

Cardno Victoria Pty Ltd

ABN 47 106 610 913

Level 4

501 Swanston Street

Melbourne VIC 3000

Australia

www.cardno.com

Phone +61 3 8415 7777

Fax +61 3 8415 7788

Author(s):

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1 Introduction

Cardno, now Stantec (Cardno), have been engaged by the Australian Department of Defence ('Defence') to prepare a Sampling and Analysis Quality Plan (SAQP) as part of the Ongoing Monitoring Plan (OMP), the purpose of which is to monitor trends in the extent and concentrations of per- and poly-fluoroalkyl substances (PFAS) identified on and around Bandiana Military Area (BMA) (the "Site"), Victoria.

The OMP SAQP applies to BMA and surrounding areas that make up the "Management Area", outlined in Figure 1, Appendix A and defined in Section 2.1.1.

The Site 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 Site for an initial 2-year monitoring period (initial implementation period). The initial implementation period consists of biannual and annual sampling events. Findings from the monitoring over the 2-year initial implementation period 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 Scope & Objectives

The objective of the SAQP is to present the specific monitoring locations, sampling methodologies and quality assurance / quality control (QA/QC) measures for the monitoring of the concentrations and extent of PFAS in groundwater, surface water and sediment at and around the Site under the OMP. These findings will inform risk management decisions by Defence and the Victorian Government to protect human health and the environment.

The objectives of the ongoing monitoring program as set out in the OMP are to:

- > Implement a program of surface water, groundwater and sediment monitoring to continue to assess changes in risk from PFAS within the environment, focusing on where there is an identified potential risk requiring management under the PFAS Management Area Plan (PMAP); and
- > Assess the seasonal effects of PFAS concentrations in surface water, groundwater and sediment, including, during or immediately following extreme or high rainfall events.

The scope of the monitoring specified in the OMP includes:

- > Evaluating the nature and extent (spatial and temporal) of PFAS impacts in groundwater, surface water and sediment pathways associated with Site sources of PFAS derived from legacy AFFF;
- > Monitoring the migration of PFAS in groundwater and surface water from the Site;
- > Providing confirmation of the current understanding of risk; and
- > Providing supporting data for assessment of management actions, where relevant.

These objectives fulfil the recommendations outlined in the PFAS Management Area Plan (PMAP) (Golder, 2020b) to provide supporting data to inform the ongoing management requirements for impacted media on- and Off-Site contributing to a potentially elevated risk to receptors.

1.2 Previous Reports

The following key reports prepared in relation to the BMA PFAS Investigation have been used as a basis to develop this SAQP:

- > Golder (2018), PFAS Detailed Site Investigation (DSI), Bandiana Military Area, September 2018.
- > Golder (2020a), Human Health and Ecological Risk Assessment (HHERA), Bandiana Military Area, November 2020.
- > Golder (2020b), Bandiana Military Area, PFAS Management Area Plan (PMAP), November 2020.
- > Golder (2020c), Bandiana Military Area, PFAS Ongoing Monitoring Plan, November 2020.

- > GHD (2016), Defence per- and poly-fluoroalkyl Substances (PFAS), Environmental Management Preliminary Sampling Program, Albury Wodonga Military Area (Bandiana), September 2016.

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 – PFAS Investigation and Management Branch	- Implement this OMP. - Engage suitably qualified environmental consultants/contractors to carry out the works specified in the OMP.
Bandiana Military Area – 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 BMA to implement the works outlined in the OMP. - Liaise with local council or water authority to arrange sampling of Off-Site waterways, as required. - Undertake the monitoring activities outlined in this SAQP. - Produce a factual report that summarises the data and findings of each monitoring event and is consistent with the requirements of this SAQP. - Produce an ongoing monitoring report (OMR) 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-Site private property owners/relevant authorities to arrange private property access to conduct sampling.
PMAP Lead Consultant	Implement PMAP recommendations and undertake PMAP review. Undertakes 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 (2005), AS 4482.1-2005, Guide to the Investigation and Sampling of Sites With Potentially Contaminated Soils, Part 1 - Non-volatile and Semi-Volatile Compounds (withdrawn as pending revision, referred to for 'state of knowledge').
- > Department of Defence (2019), Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance – Routine Water Quality Monitoring.
- > Department of Defence (2021b), Contamination Management Manual (DCMM), Annex L – Data Management, August 2019, Amended June 2021.
- > Department of Defence, Department of Energy (2018), Quality System Manual Schedule B15 USEPA DQO Process.
- > Environment Protection Authority (EPA) Victoria (2022), Groundwater Sampling Guidelines, Publication 669.1, February 2022.
- > EPA Victoria (2009), Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, Publication 701, June 2009.
- > EPA Victoria (2020), Interim Position Statement on PFAS, Publication 1669.4, October 2020.
- > 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) (2013), National Environmental Protection (Assessment of Site Contamination) Measure (1999, 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.
- > United States Environment Protection Authority (USEPA) (2006), 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 scope presented in this SAQP report are derived only from available desk-based information and site inspection undertaken. This SAQP is not any of the following:

- > An Environmental Audit Report as defined under the Environment Protection Act 2017.
- > A Geotechnical Assessment.
- > A Detailed Site Investigation.
- > A Detailed Hydrogeological Assessment.
- > A Remediation Action Plan (RAP) report.
- > A Site Management Plan (SMP).

2 Site Setting

2.1 Site Description

BMA is located approximately 250km north-east of Melbourne, adjacent to the New South Wales (NSW) – Victoria border town of Wodonga, Victoria and covers an area of 650 hectares (ha). The Site is situated approximately 3km from Wodonga town centre. The BMA comprises the following bases:

- > Gaza Ridge Barracks (comprising and referred to in this report as North Bandiana and South Bandiana); and
- > Wadsworth Barracks (comprising and referred to in this report as East Bandiana).

BMA is used by Defence for administration, accommodation, training and warehousing / logistics. Other operations related to storage and maintenance of vehicles also occur at the Site.

The other infrastructure and supporting services on each portion of the BMA include the following:

South Bandiana

- > Several residential areas for Defence personnel.
- > Victorian State Government Primary School (Bandiana Primary School).
- > Sheep grazing along the base of Bears Hill.
- > Base Fire Services (former training ground).
- > Petroleum facilities.

North Bandiana

- > Several residential areas for Defence personnel.
- > Community facility (Bandiana Neighbourhood House), which is registered child care provider, kinder and playground.
- > Sheep grazing to the south-east of the unnamed creek.
- > Warehouses for storage of equipment.

East Bandiana

- > Current Fire Station.
- > Football field.

2.1.1 Management Area Description

The OMP includes sampling and analysis not only from the Site, but also from Off-Site locations situated on public and private land. The Site and these surrounding areas which collectively encompass the network of OMP monitoring locations, are referred to as the “Management Area”.

The “On-Site Monitoring Area” is defined as BMA and is comprised of three individual properties identified as North Bandiana (Gaza Ridge Barracks), South Bandiana (Gaza Ridge Barracks) and East Bandiana (Wadsworth Barracks).

The “Off-Site Monitoring Area” is defined as comprising Jack in the Box Creek to the north-west of South Bandiana to its confluence with Wodonga Creek, an unnamed creek to the east of North Bandiana to its confluence with the Kiewa River, and the Kiewa River and western Kiewa River floodplain from Middle Creek in the south to north of the unnamed creek.

“The Management Area” is defined as comprising the On-Site Monitoring Area and the Off-Site Monitoring Area.

2.1.2 Site Definition and Planning

For the purposes of this SAQP report, “the Site” is defined as comprising BMA. A detailed description of the Site is provided in the PMAP (Golder, 2020b). The site location is presented on Figure 1, Appendix A.

Key Site identification details are presented in Table 2-1.

Table 2-1 Site Identification Details

Details	Description
Site Address	Bandiana Military Area, VIC, 3694
Land Description	Bandiana Military Area
Owner	Department of Defence
Title Details¹	North Bandiana: - Lot 2 PS437772 South Bandiana: - Lot 1 TP849698 - Lot 2 TP849698 - Lot 2 PS420756 - Lot 3 PS420756 East Bandiana: - Lot 1 PS400773 - Lot 1 TP849660
Planning Zone / Land use	Commonwealth Land (CA)
Local Government Authority (LGA)	City of Wodonga
1- Source: VicPlan: https://mapshare.vic.gov.au/vicplan/	

2.1.3 Surrounding Land Uses and Zoning

The adjacent land surrounding the Site is a mix of:

- > General Residential (GRZ1).
- > Public Park and Recreation (PPRZ).
- > Rural Conservation Zone (RCZ).
- > Industrial Zone (IZ1) and,

> Public Conservation and Resource Zone (PCRZ).

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

Table 2-2 Current and Previous Surrounding Land Uses

Area	Direction	Historic Land Use (Golder, 2018)	Current Land Use (Golder, 2020c)
North Bandiana	North	Historical aerial imagery shows the Huon Hill area as vacant land.	Huon Hill, which is currently used for grazing and as a recreation space (walking and picnicking).
	West	Aerial imagery shows the land largely undeveloped with only one residential property visible from 1969-2003.	A residential development is located to the west (low density residential development) followed by the town of Wodonga.
	East	Aerial imagery shows the land largely undeveloped followed by the Kiewa River, floodplain and unnamed creek.	A residential development is located to the east (low density residential area) followed by the Kiewa River floodplain and Kiewa River. The unnamed creek flows east through the residential development.
	South	Aerial imagery shows South Bandiana to the south-west, the Wodonga stockyards and vacant land followed by Upper Middle Creek directly south.	South Bandiana is located to the south across Anzac parade and the Murray valley Highway. An industrial facility and the former Wodonga stockyards are located south of the northern portion of North Bandiana. Upper Middle Creek is located beyond the industrial facility and the former stockyards.
East Bandiana	North	Residential properties are located to the north as early as 1969, with the Kiewa River further north.	A residential development is located to the north, with the Kiewa River further to the north.
	West	Undeveloped land is located west across Whytes Road in aerials from 1969-1975. Historical aerials from 1987 onwards show the Wodonga Stockyard.	The former Wodonga Stockyard is located to the west across Whytes Road.
	East	Residential properties are located to the north-east as early as 1969, as well as the Kiewa River floodplain. The Kiewa River travels south to north, east of East Bandiana.	The residential suburb of Killara is located to the east, as well as pastoral grazing lands within the Kiewa River floodplain. The Kiewa River is located to the east, and continues to the north.
	South	Middle Creek flows west to east along the southern boundary in aerial imagery from as early as 1969.	Middle Creek flows in a west to east direction along the southern boundary of the Site, with Baranduda Water Treatment Plant located beyond Middle Creek.
South Bandiana	North	Aerial imagery shows Anzac Parade followed by residential properties and Huon Hill.	North Bandiana and a residential development are located to the north across Anzac Parade. A small area of commercial properties are also located to the north.
	West	Aerial imagery shows the land largely undeveloped from 1969-2003. Jack in the Box Creek flows to the north-western boundary towards Wodonga Creek	Residential development is located to the west, with the Jack Perry Reserve (recreational reserve) adjacent to the north-west boundary of BMA. Jack in the Box Creek flows to the north-western boundary towards Wodonga Creek.
	East	Aerial imagery shows the land largely undeveloped. Middle Creek flows south to east across the Kiewa Highway.	An industrial facility is located to the east, across the Kiewa Valley Highway, with rural grazing properties located to the south across Tooles Road.
	South	Historical aerial imagery shows the area south of South Bandiana as vacant land.	A rural grazing property is located adjacent to the southern boundary. A mix of rural grazing properties and new residential

Area	Direction	Historic Land Use (Golder, 2018)	Current Land Use (Golder, 2020c)
			developments are further south beyond Bears Hill.

2.1.4 Environmental Setting

Key details defining the site are summarised in Table 2-3. See Figure 1, Appendix A for key features.

Table 2-3 Key Site Details

Setting	Description
Climate	Climate indicators have been recorded at nearby Albury Airport Bureau station (072146) since 1983. Mean maximum temperatures range from 13.0°C in July to 31.9°C in January. Mean annual rainfall at this station since 1983 is 713.2mm, with rain falling more from June through October. The minimum mean monthly rainfall occurs in February with 43.0 mm, and the maximum in July with 77.7 mm. The prevailing wind direction in the morning (9am) is from the east while in the afternoon (3pm) the prevailing winds are from the south-east and, to a lesser extent, the west. The regional wind direction may be affected by the surrounding topographic features such as Bears Hill¹.
Topography	The Site is located in the Upper Murray landscape where low lying and relatively flat river and creeks floodplains are present. The dominant topographic features in the area comprise Huon Hill in the north-east and Bears Hill in the south-west, which rise 400m above the Australian Height Datum (mAHD) and 350 mAHD, respectively. The BMA is largely located in between the two hills at an elevation ranging from 180 mAHD and 200 mAHD. There is an approximate north to south topographic divide that runs through the BMA which divides the BMA into two catchments. West of the divide, the surface slopes to the north-west towards the Murray River and Wodonga Creek via Jack in the Box Creek. East of the divide, the surface slopes to the east and north-east towards the Kiewa River.
Geology	Regional Geology: As outlined in the DSI (Golder, 2018) and OMP (Golder, 2020c), the Site is underlain by three (3) main geological units, comprising: - The Omeo-Metamorphic Complex (OMC) forms the basement rock for the investigation area. It has been formed by fine sediments and muds transported during the Ordovician period from an ancient continental zone. Tectonic activity created the intrusions of magmatic rock, mainly granite. Clays and muds formed schist, while the granite transformed into gneiss. The hills of the investigation area (Bears Hill (gneiss) and Huon Hill (schist) are the remnants of this period. - The Shepparton Formation resulted from deposition and erosion of sand, silt and clay associated with the ancient Murray River system during the Tertiary period. Erosion caused by this ancient river system resulted in the carving of a deep paleovalley within the OCM. Further erosion of the hills resulted in the further accumulation of sediments at the base of the hills, which is called the Shepparton Colluvium. This unit is inferred to be mainly distributed along the central part of the investigation area between Bears Hill and Huon Hill. The Shepparton Fluvium, which is inferred to be mainly distributed in the north-west and south-east portions of the investigation area, is the result of the deposition of alluvial sediments from the ancient Murray River system within the paleovalley. - The Coonambigdal Formation also resulted from river sediment deposition and erosion, which was formed during the Quaternary period. The Coonambigdal Colluvium resulted from the recent erosion of the hills, which is reflected along the foothills of Huon and Bears Hills. Coonambigdal Fluvium is the result of sediment deposition, distributed in the lower lying zones of the investigation area, along the existing creeks and rivers surrounding the BMA. Site Specific Geology: South Bandiana: The sub-surface conditions encountered across South Bandiana are generally consistent with the unconsolidated hill-wash deposit (Quaternary and Tertiary Shepparton Colluvium comprising sands, silts, clays and gravels) inferred by the Geological Map Sheet (1979). These are also encountered in the upper portion of Jack in the Box Creek. The Shepparton Colluvium was generally observed to comprise fine grained red brown sediments (clays and silts) with some interbedded sands and gravels. OMC basement rock, in the form of granite, was identified towards the base of Bears Hill in South Bandiana. The depth to basement rock generally decreased towards Bears Hill as did the thickness of the overlying Shepparton Colluvium and Coonambigdal Colluvium (Golder, 2018). North Bandiana: The 1:50,000 Albury Geological Map Sheet (1979) indicates that North Bandiana is situated across the Quaternary and Tertiary Shepparton Colluvium, and the younger Shepparton Fluvium.

Setting	Description
	The geological profiles across the northern and western portion generally comprised fine grained red brown sediments (clays and silts) with some interbedded sands representative of the Shepparton Colluvium. An increase in coarser grained brown, orange brown and grey brown soils (sands and gravels) were observed along the unnamed creek in the southern portion of North Bandiana. These soils are representative of the Shepparton Fluvium (Golder, 2018). East Bandiana: East Bandiana is comprised of various combinations of clays, silts and sands, which is reflective of the nature of the depositional environment. The upper 3-5 m of the profile tended to be dominated by brown sandy soils, underlain by brown clay soils. These soils are representative of the Shepparton Fluvium. The soil encountered along the Kiewa River were generally coarser, predominately comprising sands and gravels, and as such were considered representative of the Coonambigdal Fluvium (Golder, 2018).
Acid Sulphate Soil	A review of the Acid Sulphate Soils (ASS) risk mapping, available on the Soil Health online database², indicates that South Bandiana and the western part of North Bandiana are classified as having an extremely low probability of ASS occurrence, whereas East Bandiana is classified as low probability of ASS occurrence.
Hydrology	Several surface water bodies including Jack in the Box Creek, Middle Creek, an unnamed creek and the Kiewa River conform the two (2) catchments at the Site as follows: ▪ Jack in the Box Creek Catchment (west of the topographic divide): this catchment is located to the western portion of South Bandiana, which drains towards Wodonga Creek (3.5 km away from the Site) via Jack in the Box Creek. This catchment is classified as an intermittent surface watercourse, with some sections being constructed before reaching Wodonga Creek. This catchment is also fed by small gullies inferred to reflect ephemeral drainages originating from Bears Hill and shallow drainage channels that run across the western-most portion of the Site. The gullies and drainage channels are typically dry but were observed to have pools of surface water during and following periods of heavy rainfall (Golder, 2020b). ▪ Middle Creek / Kiewa River Catchment (east of the topographic divide): this catchment includes North Bandiana, East Bandiana and the eastern portion of South Bandiana, which drains towards the Kiewa River via an unnamed creek running north of Middle Creek and discharges to the Kiewa River approximately 2.1 km north of the confluence with Middle Creek (Golder, 2020b). The unnamed creek is an actively modified creek, portions of which have been concreted, which originates from a number of drainage channels and stormwater ponds (wetlands) in the eastern portion of South Bandiana. The Kiewa River originates in the Bogong High Plains and flows north to its confluence with the Murray River. The Kiewa River exhibits seasonal variation in flow, with the highest flows typically observed from August to October following snow melt in the high country (Golder, 2020b).
Hydrogeology	Previous environmental investigations (Golder, 2018) identified that the primary aquifer unit of the Site are Shepparton Fluvium and Colluvium, and with a minimal presence the Coonambigdal Fluvium. The deepest standing water level (SWL) is 35 m BGL (Shepparton formation) and the shallowest 3 m BGL (Coonambigdal formation). ▪ Depth to Groundwater – Groundwater occurring from within the Shepparton Colluvium has previously been recorded beneath the Site at levels of between 12 and 35 mBGL and groundwater occurring from the Fluvium formation was recorded at levels between 4m and 8 mBGL and the Coonambigdal is less than 3 mBGL. ▪ Groundwater Flow Direction – The flow of groundwater through the Site has two (2) pathways: toward the Wodonga Creek (north-west of the Site) and towards the Kiewa River (north-east of the Site). This divide occurs through central South Bandiana, which is consistent with the local topography. The larger area draining towards the Kiewa River and the difference in groundwater levels from the central portion of South Bandiana to East Bandiana indicates that the Kiewa River is considered likely to act as a regional groundwater discharge zone (Golder, 2020b). ▪ Groundwater Use – Regional groundwater use is known to be used for domestic and agricultural purposes (primarily for irrigation of dairy pasture and stock watering). A review of VVG (Visualising Victorian Groundwater) indicated 20 Off-Site registered groundwater bores within a 1km radius of the Site³. Bores were registered for the following purposes: – Unknown: four (4) bores (inferred use associated with the water treatment plant), which is located south of East Bandiana – Non-groundwater: four (4) bores

Setting	Description
	- Domestic / stock: eight (8) bores: six (6) are located downgradient to the north-west of South Bandiana, within the catchment area of Jack in the Box Creek and, two (2) are located upgradient to the south to south-west of Bears Hill. - Irrigation: 3 bores, located downgradient to the north-west of South Bandiana, within the Jack in the Box Creek catchment area. - Investigation: one (1) bore, which is located upgradient to the south to south-west of Bears Hill. - It is noted that in the experience of Cardno, groundwater may also be used by persons with unregistered bores not appearing on the database. Surface Water and Drainage: The BMA is located across two (2) catchment areas: Jack in the Box Creek (west of the topographic divide) and Middle Creek / Kiewa River (east of the topographic divide). - West of the topographic divide includes the western portion of the South Bandiana area, and drains towards Wodonga Creek via Jack in the Box Creek, which runs in a north north-westerly direction from the north-west portion of the BMA. Jack in the Box Creek is an intermittent surface watercourse, with sections being constructed before discharging to Wodonga Creek. Upstream, the Creek receives the discharge of gullies and shallow drainage channels that run across the western-most portion of the BMA. The gullies (generally dry) are inferred to reflect ephemeral drainages originating from Bears Hill that have been modified by human activity over time (Golder, 2020c). - East of the topographic divide includes the eastern portion of South Bandiana, North Bandiana and East Bandiana. This divide drains towards Kiewa River via the unnamed creek, which runs north of Middle Creek. The unnamed creek originates in the eastern portion of South Bandiana as a number of drainage channels. This subsequently discharges to a series of stormwater ponds (wetlands) located at the entry of South Bandiana. Some portions of this Creek have been concreted within North Bandiana. It is noted that its course is actively modified as a result of further residential development downstream North Bandiana (Golder, 2020c). In the area surrounding the Site, groundwater is expected to flow north-east and north-west towards the Kiewa River and Wodonga Creek respectively. Groundwater flow contours are shown on Figure 2, Appendix A as per previous SAQP (Golder, 2018).
Environmental Sensitive Areas	Several surface water bodies flow On-Site and Off-Site. According to the two (2) identified catchments at the Site, the Kiewa River located at 2.1 km north-east and the Wodonga Creek located at 3.5 km north-west are the primary environmentally sensitive areas that receive discharge from smaller creeks, such as Jack in the Box Creek and the unnamed creek.
Wetlands	The Site includes several open drainage channels that collect surface water runoff mainly from South Bandiana and North Bandiana. These drainage channels form part of the unnamed creek and discharge to a series of stormwater ponds that are considered wetlands.
Further information can be found in the DSI report (Golder, 2018) and the PMAP (Golder, 2020b). - Bureau of Meteorology, 072146, 1983 to 2022 (BoM, 2023) http://www.bom.gov.au accessed 25 March 2024 - Soil Health Knowledgebase: https://www.ccmaknowledgebase.vic.gov.au/soilhealth - Visualising Victoria's Groundwater https://www.vvg.org.au/vvg_map.php?agreement=Agree+and+Continue#, last accessed in March 2023. - Department of Economic Development, Jobs, Transport and Resources.	

2.2 Conceptual Site Model

The Conceptual Site Model (CSM) for the Site is provided in Appendix C of the PMAP (Golder, 2022b) to identify major/minor sources, migration pathways, exposure routes and receptors (current and future).

The CSM was based on numerous PFAS investigations, including:

- > Golder (2018), PFAS Detailed Site Investigation, Bandiana Military Area, September 2018.
- > Golder (2020a), Human Health and Ecological Risk Assessment, Bandiana Military Area, November 2020.
- > Golder (2020b), Bandiana Military Area, PFAS Management Area Plan, November 2020.
- > GHD (2016), Defence per- and poly-fluoroalkyl Substances (PFAS), Environmental Management Preliminary Sampling Program, Albury Wodonga Military Area (Bandiana), September 2016.

2.2.1 Source Areas

Previous investigations identified several Source Areas where PFAS has been detected in soil, surface water or groundwater at concentrations exceeding the adopted assessment levels. These are shown in Figure 2, Appendix A, and include the following:

South Bandiana:

- > Source Area 1 (SA1) – Petroleum Platoon – Former Fire training Ground.
- > Source Area 2 (SA2) – Base Fire Services (BFS) – Former Fire Training Ground.
- > Source Area 5 (SA5) – Petroleum Platoon – Fuel Handling Facility.
- > Source Area 6 (SA6) – Current Fire Training Area, Building 600.
- > Source Area 7 (SA7) – Old Fire Station, Building 421.
- > Source Area 9 (SA9) – Petroleum, Oils and Lubricants (POL), Building 490.

North Bandiana:

- > Source Area 10 (SA10) – Former Unit Training Area, between Warehouse 1 and 2.
- > Source Area 11 (SA11) – Fire Extinguisher Disposal – Warehouse 13.
- > Source Area 12 (SA12) – Armoured Vehicle Maintenance Training, Building 100

East Bandiana:

- > Source Area 13 (SA13) – Fire Station – Current.
- > Source Area 14 (SA14) – Former Unit Training, Building 592.
- > Source Area 15 (SA15) – Former Unit Training – Football Field.

The highest On-Site concentrations of PFAS in soil, sediment, surface water and groundwater were generally identified within and adjacent to source areas, indicating the soil and sediment within source areas are continuing to act as a source of PFAS identified within the On-Site and Off-Site Jack in the Box Creek and Kiewa River catchments (Golder, 2020b).

Areas of soil contamination that exceeded residential human health screening levels were limited to identified On-Site source areas, which are not used for residential purposes. Given the reported concentrations of PFAS in soil and grass, and the nature and behaviour of PFAS in the environment, there is the potential for risk to aquatic ecosystems Off-Site.

PFAS concentrations were detected above the limit of reporting for drinking water and recreational groundwater guideline values in some On-Site groundwater monitoring wells located in the vicinity of Source Areas SA1, SA7, SA9, SA12, SA13, SA14, and SA15 (Golder, 2018). Off-Site PFAS concentrations were detected in two (2) groundwater monitoring wells (lower Jack in the Box Creek Catchment) and in one (1) groundwater monitoring well located in the floodplain on the Kiewa River Catchment. In both cases, the drinking water guidance values were exceeded. It is also noted that PFAS was found to exceed the drinking water guideline values in an extraction bore (for irrigation and chickens drinking water purposes) in a property within the Management Area.

Drainage channel sampling identified detectable concentrations of PFAS. The highest concentrations were reported close to identified source areas. Off-Site, exceedances of low PFAS concentrations were reported in most surface water samples.

The DSI (Golder, 2018) concluded that concentrations of PFAS in soil, sediment and surface water exceed the adopted ecological screening criteria On-Site and Off-Site in the Jack in the Box Creek and Kiewa River catchments (Golder, 2020b).

Following the completion of the DSI, a number of areas of uncertainty or data gaps were identified, including:

- > The nature and extent of On-Site surface water contamination;

- > Representativeness of groundwater sampling at some locations;
- > Location of the groundwater flow divide and extent of groundwater impacts;
- > Concentrations in Off-Site surface water during low flow conditions;
- > Soil, sediment, surface water and groundwater interactions; and
- > PFAS discharges in sewer.

Where possible, these areas of uncertainty will be addressed through implementation of the OMP or through additional investigations as part of the PMAP delivery (Golder, 2020b).

2.2.2 Migration Pathway

The key migration pathways of PFAS off South Bandiana and North Bandiana is via surface water which flows primarily into Jack in the Box Creek and then the Wodonga Creek. In East Bandiana the key migration pathway Off-Site is via surface water and groundwater which both flow towards the Kiewa River.

Key potential and existing exposure pathways include:

- > Ingestion of impacted water for drinking or cooking purposes;
- > Home production of food (such as livestock, fruit and vegetables, fish and eggs) using impacted water and consumption of home-produced food;
- > Direct contact with impacted soil, sediment, surface water and/or groundwater for human and ecological receptors;
- > Incidental ingestion of impacted soil, sediment, surface water/or groundwater for human and ecological receptors; and
- > Bioaccumulation in ecological receptors through ingestion of other impacted flora and fauna.

2.2.3 Receptors

Potential current and future receptors On-Site include Defence military personal, personnel residing in temporary accommodation On-Site, contractors and visitors, teachers and children at Bandiana Primary School, adults and children attending the Neighbourhood House and sheep in South Bandiana.

Off-Site potential and existing current and future receptors include residents, commercial/industrial workers, recreational users, livestock and terrestrial and aquatic ecosystems (Golder, 2020c).

3 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 DSI (Golder, 2018), and based on guidance presented in the US Environmental Protections 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 DQOs are detailed in Table 3-1.

Table 3-1 Data Quality Objectives

Data Quality Step	Description (Golder, 2020b)
State the Problem	Some protected environmental values of surface water and groundwater within some Off-Site areas have been precluded ¹ . However, the HHERA (Golder, 2020a) concluded that the human health risks to both On-Site and Off-Site receptors, under current exposure conditions are low and acceptable. The only potentially unacceptable human health risks were associated with unrealised scenarios, which were assessed as part of the HHERA to inform stakeholders of potential future risks. Ongoing monitoring is required to be undertaken as part of the BMA PMAP to assess potential changes in receptor exposure conditions. These include the assessment of changes related to precluded protected beneficial use.
Identify the Decision	The goal of the OMP is to monitor the nature and extent of PFAS impacts, and to identify trends and changes to PFAS impacts in the Management Area. This will allow decisions to be made regarding the assessment of risks to human and ecological receptors into the future (i.e. Updating the conceptual site model), and whether the OMP need to be amended e.g. increasing concentrations may require increased monitoring locations and/or frequencies or decreasing concentrations may warrant a decrease in the frequency or number of locations.
Identify the Information Inputs	The primary information inputs include observations and data obtained through the collection and analysis of representative samples of sediment, surface water and groundwater. The following additional information inputs will also apply: - Objectives and scope of works of this OMP; - Updates to national regulations and guideline documentation, particularly published assessment criteria; and - Information gathered through stakeholders regarding specific land use practices within the Management Area. Particularly, information pertinent to the exposure conditions assessed within the HHERA (Golder, 2020c).
Define the Boundaries of the Study	Ongoing monitoring will be undertaken within the Management Area as presented in Figure 1, Appendix A. This includes On-Site and Off-Site areas.
Develop the Analytical Approach	The purpose of this step is to define the parameters of interest, specify action levels and combine the outputs of the previous DQO steps to develop a series of options if certain trigger events occur. The key decision rules for the OMP are: - Has the analytical data collected met the Data Quality Indicators (DQI) required by the NEMP (HEPA, 2020) and the SAQP? - Have stable, increasing or decreasing trends in PFAS concentrations been established using appropriate statistical methods? - Do PFAS concentrations exceed the guidelines and/or the trigger values established within the HHERA? If so, does this indicate an unacceptable level of risk? If so, is a review of the PMAP required?
Specify Performance or Acceptance Criteria	The key acceptance criteria for the OMP are: - The acceptable field and laboratory DQIs will be in accordance with NEMP 2.0 (HEPA, 2020) and NEPM (2013) and must be detailed in the SAQP. A review of data quality is to be undertaken and documented to minimise the potential for decisions errors. - The adopted guideline values will be in accordance with the NEMP 2.0 (HEPA, 2020) as updated and will be used to screen analytical results obtained and to determine whether a revision of risk is required. - The laboratory limit of reporting (LOR) should be below the adopted guideline values where technically possible.
Develop the Plan for Obtaining the Data	The OMP provides a list of the proposed monitoring locations, frequencies, and analysis. This SAQP has been developed prior to beginning the monitoring program.
Notes: 1. Protection of beneficial uses has been updated to environmental values to reflect the updates to Victorian Legislation, Environmental Reference Standard (EPA, 2021)	

An assessment of the Data Quality Indicators (DQIs) relating to both field and laboratory procedures will be undertaken with appropriate documentation provided for each environmental element or media assessed. The DQIs adopted for the DSI are summarised in Table 3-2.

Table 3-2 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, 2013).
Representativeness	A qualitative measure of the confidence that data is representative of each medium present on the Site. Use of appropriate and documented sampling methods, sampling handling, preservation and transport and holding times.
Precision:	A quantitative measure of data variability or reproducibility, measured by the calculation of %RPD values for duplicate samples (i.e. measure of agreement). Precision in DQI 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 batch¹ 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 terms of matrix and test procedure, and are processed as one unit for the QC purposes" (NEPC, 2013).	

4 Sampling Location Rationale and Methodology

4.1 Monitoring Schedule

The proposed monitoring intervals for surface water, sediment and groundwater as outlined in the OMP (Golder, 2020c) are as follows:

Table 4-1 Monitoring Intervals

Media	Locations	Frequency	Rationale
Surface Water	All	Biannual - August to October - February to May	Surface water is the primary pathway for PFAS resulting in exposure to human and ecological receptors. The OMP states that consideration should be made to conduct surface water sampling after “reasonable rain events” (>35mm over 4 days). Cardno will endeavour to complete sampling following reasonable rain events if they occur during the sampling event. A review of weather forecast will be taken into consideration when planning of sampling activities. August to October time period is to target when high flows are generally exhibited (defined as water level >1.5 m and discharge >1,500 mL/day¹). February to May time period is to target when low flows are generally exhibited (defined as water levels <1.0 m and discharge <1,000 mL/day¹).
Sediment	All	Annual February to May	Timing in February to May to correspond with surface water sampling undertaken in low flow conditions.
Groundwater	OMC and Shepparton Colluvium Locations	Annual August to October	Sampling is proposed in August to October for these wells as groundwater in these units was deep (>12 m below ground) and lower hydraulic conductivities were observed.
	Shepparton Fluvium and Coonambigdal Fluvium	Biannual - August to October - February to May	Sampling is proposed biannually during February to May and August to October as groundwater in these units is shallow and higher hydraulic conductivities were observed. Additionally, biannual sampling is proposed as these well locations generally exhibited higher PFAS concentrations, are the primary pathway for PFAS from East Bandiana, and are likely to have a greater interaction with surface water (Golder, 2020c). Four annual groundwater sampling locations were altered to a biannual sampling frequency following the 2021 November/December event. This was due to significant increases in PFAS concentrations being reported at two On-Site locations compared with previous monitoring results. Two additional downgradient locations were included to monitor the potential for any PFAS migration and changes in risk profile. The appropriateness of a biannual sampling frequency for these locations will be reviewed again prior to each future monitoring event.

Notes:

1. Water levels and discharge rates from Kiewa River gauge station 402222, accessed via <https://riverdata.mdba.gov.au/bandiana>

4.2 Groundwater Monitoring

4.2.1 Monitoring Locations

The network of on- and Off-Site groundwater monitoring wells sampled as part of the OMP (Golder, 2020c) is summarised in Table 4-2 and shown in Figures 4A and 4B, Appendix A. Location codes for some locations have been updated after issue of the OMP. A table summarising location codes that have been updated is included in Appendix C. A table of available well construction details is also included in Appendix C.

Table 4-2 BMA Groundwater Monitoring Network

Catchment	Frequency	Monitoring Location	Total Number of Monitoring Locations	Target Area	Justification	
On-Site Locations						
Jack in the Box Creek	Annual (August to October)	MW315, MW317, MW318	3	South Bandiana, On-Site, Source Area 2	Locations target groundwater within and downgradient of the source area.	
		MW311	1	South Bandiana, On-Site, Source Area 1	Locations target groundwater within and downgradient of the source area.	
	Bi-Annual	MW304, MW307	2	South Bandiana, On-Site, Source Area 1	Locations target groundwater within and downgradient of the source area.	
		MW312	1	South Bandiana, On-Site	A point of discharge Off-Site into Jack in the Box Creek.	
	Annual (August to October)	MW051, MW416, MW323	3	South Bandiana, On-Site, Source Area 6	Locations target groundwater discharge from Source Area 6.	
		MW329	1	South Bandiana, On-Site, Source Area 5	Locations target groundwater discharge from Source Area 5 and 6.	
		MW319, MW321	2	South Bandiana, On-Site, Source Area 7	Locations target groundwater discharge from Source Area 7.	
		Kiewa River	MW056 ¹	1	South Bandiana, On-Site, Source Area 9 , and Stormwater Ponds (wetlands)	Location targets perched groundwater identified within Source Area 9.
			Bi-Annual	MW342, MW345, MW346	3	North Bandiana, On-Site, Source Areas 10, 11 and 12
MW052, MW403, MW404, MW350_S, MW350_D, MW009, MW016, MW042, MW043, MW035, MW034, MW046I, MW046_D MW018, MW020, MW012, MW029, MW352, MW353, MW354	20	East Bandiana, On-Site, Source Area 13, 14 and 15		Locations target the East Bandiana Groundwater plume, which is emanating from Source Area 13 and discharging Off-Site across the eastern site boundary.		
MW351	1	East-Bandiana, On-Site		Location targets the downgradient boundary adjacent to the residential properties.		
Off-Site Locations						

Jack in the Box Creek	Annual (August to October)	MW313	1	Upper Jack in the Box Creek	Location targets the residential estate located beyond the South Bandiana boundary.
	Bi-Annual	MW360	1	Lower Jack in the Box Creek	Locations target Lower Jack in the Box Creek where potential surface water/groundwater interactions may be occurring.
		MW361	1		
MW357		1	Unnamed Creek and Kiewa River ox-bows	Location targets the point where the Unnamed Channel discharges into the Kiewa River.	
Kiewa River		OTH019	1	Kiewa River ox-bows	A point of use location, where bore water is used for irrigation of home grown produce and drinking water for chickens.
		MW356	1	Kiewa River – main channel	Location targets the assessment of groundwater/surface water interactions at the Kiewa River.
1. MW056 was not sampled as scheduled in the E5 annual sampling event. It will be sampled in the upcoming E6 event and again in the E7 (normal frequency) to provide an additional data point, as it has not been sampled since October 2022.					

4.2.2 Groundwater Sampling Methodology

Groundwater monitoring will be undertaken by no purge HydraSleeve® method as detailed in Table 4-3.

Table 4-3 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 for the wells to be monitored in a particular event will be undertaken at the commencement of each monitoring event to the extent practicable. Wells which have specific or difficult access constraints, or which are not scheduled for sampling in a particular event, will not be included.
Groundwater Field Parameters	Groundwater field parameters will be recorded with a water quality meter before sample collection (with the sample in a sterilised jar) prior to deployment of the HydraSleeve™, or using extra sample water from within the HydraSleeve™ decanted into a sterilised jar if the HydraSleeve™ is already deployed. The following field parameters will be recorded using a water quality meter: - pH. - electrical conductivity (EC). - oxidation reduction potential (ORP). - Dissolved oxygen (DO). - Temperature. All field instruments (e.g. water quality meter) will be calibrated prior to field events 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 either deployed to the base of wells, or a minimum of 2.5m within the screen interval. If sufficient water column is available, the HydraSleeve™ will be positioned such that it does not sit at the base of the well where sediment may be present. 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 2.5 m in height, although depending 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

Activity	Details
	of the well and restabilisation of the well following the slight disturbance caused by sampler deployment. Available well construction details, including screen intervals, are presented in Appendix C.
Retrieval of HydraSleeves® (Sample Collection)	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 valve into the sample sleeve. Samples will be discharged immediately (to minimise changes in chemistry) via discharge tube.
Sample collection by bailer	Where insufficient water is retrieved with the HydraSleeve™, samples will be collected by bailer. Wells will be purged 3 bore volumes, or until dry, whichever is sooner, prior to sample collection.
Sample collection from tap	For wells with no direct access due to being encased or containing an in-well pump, such as private property bore OTH019, a sample will be collected from the tap or other available outlet to allow sampling of water from the bore. Where samples are collected from a tap or similar outlet, the well is to be purged by running the tap for 1 minute 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 DCMM (Defence, 2021b). Samples will be 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 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 and bump test records. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Decontamination	Used HydraSleeves™ will be replaced with a new HydraSleeve™ after sample collection at each location, thus removing the need for decontamination. All re-usable sampling equipment (such as the interface probe) will be thoroughly washed using phosphate-free detergent (Liquinox), then double rinsed with de-ionised water before the sample collection.
Waste Management	All liquid wastes generated from the OMP activities will be temporarily stored On-Site (in an agreed location as approved by Base) within either a drum or an Intermediate Bulk Container (IBC) and disposed of Off-Site to a licensed facility. Disposal of the liquid waste is anticipated to occur once the drum(s) or container(s) are full, or as required. Any general solid waste generated during the sampling event will be disposed of either Off-Site or in appropriate bins On-Site, as approved by Base Support.
Laboratory Testing	All groundwater samples will be analysed for the full PFAS analytical suite (see Appendix B). The laboratory Limit of Reporting (LOR) for groundwater, PFAS – Full Suite – 28 Analytes, is 0.01-0.1 µg/L.
Laboratory Testing – Quality Control	Groundwater QC samples will be collected at the following frequencies, in accordance with the guidance in the PFAS NEMP (HEPA, 2020): - 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 to be sent to the secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)].

Activity	Details
	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 the following NATA-accredited laboratories: - Primary analysis will be undertaken by ALS Global Laboratories. - Secondary analysis will be undertaken by Eurofins.

4.3 Surface Water Monitoring

4.3.1 Monitoring Locations

The surface water locations sampled as part of the OMP (Golder, 2020c) are presented in Figures 3A and 3B (Appendix A) and are summarised in Table 4-4.

Table 4-4 OMP Surface Water Monitoring Locations and Frequency

Catchment	Frequency	Monitoring Location	Total Number of Monitoring Locations	Target Area	Justification
On-Site Locations					
Jack in the Box Creek	Bi-Annual	SW302, SW307, SW310	3	South Bandiana, On-Site, Source Area 2	Locations target surface water within and downgradient of the source area.
		SW311, SW313, SW316, SW321	4	South Bandiana, On-Site, Source Area 1	Locations target surface water within and downgradient the source area.
		SW322	1	South Bandiana, On-Site	Location targets surface water downgradient of the source area.
		SW323	1	South Bandiana, On-Site	Location targets drainage Off-Site downgradient of Source Areas 5, 6 and 7.
		SW324, SW326, SW332, SW336	4	South Bandiana, On-Site, Source Area 6	Locations target surface water discharge from Source Area 6.
		SW333, SW338	2	South Bandiana, On-Site, Source Area 5	Locations target surface water discharge from and downgradient of Source Areas.
Kiewa River	Bi-Annual	SW340	1		
Jack in the Box Creek	Bi-Annual	SW448	1	South Bandiana, On-Site, Source Area 7	Location targets surface water discharge from Source Area 7.
Kiewa River	Bi-Annual	SW346, SW349, SW355	3	South Bandiana, On-Site, Source Area 9 , and Stormwater Ponds (wetlands)	Surface water locations target discharge into, within and discharging from the South Bandiana Stormwater Ponds.
		SW370, SW374, SW375	3	North Bandiana, On-Site, Source Areas 10, 11 and 12	Locations target contributions from Source Areas 10, 11 and 12.
		SW379, SW380	2	East Bandiana, On-Site, Source Area 13, 14 and 15	Locations are targeting surface water discharge from Source Area 13.
		SW382, SW387, SW388	3	East-Bandiana, On-Site	Locations target surface water at the points of discharge from

					East Bandiana into the Kiewa River, and the Kiewa River floodplain.
Off-Site Locations					
Jack in the Box Creek	Bi-Annual	SW424, SW463	2	Upper Jack in the Box Creek	Locations target publicly accessible open space land use areas.
		SW427	1	Lower Jack in the Box Creek	Locations are targeting surface water along Jack in the Box Creek.
		SW430	1		
		SW431	1		Location targets several downgradient Off-Site sources identified within the DSI.
		SW432	1		
		SW434	1	Jack in the Box and Wodonga Creek confluence	Represents the down gradient point of monitoring within the Management Area within the Jack in the Box Creek catchment.
Kiewa River	Bi-Annual	SW409	1	Unnamed Creek	Location targets the creek near sensitive land use areas.
		SW403, SW405, SW412, SW462	4	Unnamed Creek and Kiewa River ox-bows	Locations target surface water Unnamed Creek and Kiewa River ox-bows downgradient of East and North Bandiana.
		SW395, SW396, SW397, SW400, SW401, SW470, SW471, SW487	8	Kiewa River ox-bows	Locations target the ox-bow lakes downgradient of East Bandiana source areas.
		SW390	1	Kiewa River – main channel	Kiewa River background location and represents conditions upstream of the Baranduda WTP and Middle Creek.
		SW393	1	Middle Creek	Location represents potential contributions from the Middle Creek catchment.
		SW398, SW404	2	Kiewa River – main channel	Locations target Kiewa River main channel and represents conditions downgradient of the On-Site discharges.
		SW416	1		Downgradient point of monitoring within the Management Area within the Kiewa River catchment.

4.3.2 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 4-5.

Table 4-5 Surface Water Monitoring Methodology

Item	Details
Field parameters	Surface water physiochemical parameters (i.e. pH, electrical conductivity (EC), oxidation reduction potential (ORP), dissolved oxygen (DO), and temperature) will be recorded at the time of sampling using a pre-calibrated water quality meter. The water quality meter will be bump tested daily and re-calibrated as required. Field observations such as colour, turbidity, presence of suspended solids and odours, sheen, oily film, nuisance organisms, floating debris or frothing will be recorded on field sampling sheets. The condition of the water body that was sampled from including the type (lake, stream etc.) and channel width will also be recorded as applicable. Flow rate will also be quantitatively recorded where possible using the float method, with qualitative flow rates to be recorded where quantitative measurements are unable to be taken by field staff (such as when environmental conditions significantly limit visibility or there are access constraints).
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) '<i>Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples</i>'.
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. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates 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 de-ionised water before the sample collection.
Laboratory Testing	All surface water samples will be analysed for the full PFAS analytical suite (see Appendix B). The LOR for surface water, PFAS – Full Suite (28 Analytes), is 0.01-0.1 µg/L.
Laboratory Testing – Quality Control	Surface water QC samples will be collected at the following frequencies in accordance with the guidance in the PFAS NEMP (HEPA, 2020): - 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 to be sent to the secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)].

Item	Details
	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).
Laboratory Accreditation	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.

4.4 Sediment Monitoring

4.4.1 Monitoring Locations

The sediment locations sampled as part of the OMP (Golder, 2020c) are presented in Figures 3A and 3B (Appendix A) and are summarised in Table 4-6.

Table 4-6 OMP Sediment Monitoring Locations and Frequency

Catchment	Frequency	Monitoring Location	Total Number of Monitoring Locations	Target Area	Justification
On-Site Locations					
Jack in the Box Creek	Annual (February to May)	SD323	1	South Bandiana, On-Site	Locations targets sediment down gradient of Areas 5, 6 and 7.
Kiewa River		SD346, SD355	2	South Bandiana, On-Site, Source Area 9 , and Stormwater Ponds (wetlands)	Locations are targeting sediment from the South Bandiana Stormwater Ponds.
		SD375	1	North Bandiana, On-Site, Source Areas 10, 11 and 12	Locations targets sediment down gradient of Source Areas 10, 11 and 12.
		SD382	1	East-Bandiana, On-Site	Location targets the points of discharge from East Bandiana into the Kiewa River, and the Kiewa River floodplain.
Off-Site Locations					
Jack in the Box Creek	Annual (February to May)	SD424, SD463	2	Upper Jack in the Box Creek	Locations are targeting down gradient of sources within South Bandiana
Kiewa River		SD412	1	Unnamed Creek	Locations are targeting impacts of North Bandiana within the Unnamed Creek
		SD395, SD396, SD397, SD400	4	Kiewa River ox-bows	Locations are targeting sediment within ox-bow lakes located on the Kiewa River floodplain within the Southern Pastoral Area

4.4.2 Sediment Sampling Methodology

The methodology for sediment sampling is detailed in Table 4-7.

Table 4-7 Sediment Monitoring Methodology

Item	Details
Sample Collection	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 using hand tools (e.g. sediment corer, hand auger or trowel). 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 (including physical description) recorded on field data sheets.
Field Records	Field records will include the following information: - Sampling time, date and name of the sampler. - Weather conditions. - Sample collection method. - Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Decontamination	All re-usable sampling equipment (such as a trowel) will be thoroughly washed using phosphate-free detergent (Liquinox), then double rinsed with de-ionised water before the 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 DCMM (Defence, 2021b). 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".
Laboratory Testing	All sediment samples will be analysed for the full PFAS analytical suite (see Appendix B). The LOR for sediment, PFAS – Full Suite (28 Analytes), is 0.0002-0.001 mg/kg.
Laboratory Testing – Quality Control	Sediment QC samples will be collected at the following frequencies in accordance with the guidance in the PFAS NEMP (HEPA, 2020): - 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 to be sent to the 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.

4.5 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.

4.6 Data Management

All data collected as part of the monitoring program will be reviewed and managed in accordance with the requirements of Annex L of the DCMM (Defence, 2021b), and uploaded into Defence's Environmental Data Management Software (EDMS). Data management will include the following:

- > The Defence ESdat email address (DERP.LabReports@esdat.com.au) will be included on CoCs as a laboratory report recipient;
- > The laboratory Project ID and the laboratory provided ESdat files will be populated to match the Project ID setup in the Defence ESdat;
- > The location code and sample naming conventions outlined in Annex L of the DCMM will be followed;
- > Field data will be uploaded to Defence's EDMS; and
- > Laboratory data will be uploaded to Defence's EDMS, associated QA/QC data will be reconciled, and the laboratory data will be approved.

5 Assessment Criteria

5.1 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 (Golder, 2020c), 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. Screening levels will be reviewed and updated (if deemed necessary) as part of the OMP review process.

Table 5-1 PFAS Criteria for Groundwater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS and PFOS ⁴	PFOA	
	µg/L		
Human Health – Surface Water Recreational	2 ²	10	PFAS NEMP (HEPA, 2020)
Human Health – Drinking Water Quality Guideline ¹	0.07 ²	0.56	PFAS NEMP (HEPA, 2020)
Ecological (99% species protection – high conservation value systems)	0.00023 ³	19	PFAS NEMP (HEPA, 2020)
Ecological (95% species protection – slightly to moderately disturbed systems)	0.13 ³	220	PFAS NEMP (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; For 99% species protection, the criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR), however, the PFAS NEMP (HEPA, 2020) allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement. 4. Where the guidance values refer to the sum of PFOS and PFHxS, this includes PFOS only, PFHxS only, and the sum of the two.			

5.2 Sediment

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

6 Deviations from the OMP

Details of deviations from the OMP (Golder, 2020c) and the associated impacts are as follows:

Table 6-1 OMP Deviations

Detail	Justification	Impact
Sampling frequency increased from annual to bi-annual at MW304, MW307, MW312 and MW342.	Four annual groundwater sampling locations were altered to a biannual sampling frequency following the 2021 November/December event. This was due to significant increases in PFAS concentrations being reported at two On-Site locations compared with previous monitoring results. Two additional downgradient locations were included to monitor the potential for any PFAS migration and changes in risk profile. The appropriateness of a biannual sampling frequency for these locations has been reviewed prior to each monitoring event and is still deemed appropriate.	No impact - increased frequency of sampling at these locations will allow for more timely monitoring of any PFAS migration and changes in risk profile.
Sampling of alternate wells MW325 and MW328, to replace blocked well MW326.	During the May 2022 Sampling event, damage to well MW326 at South Bandiana was observed. Damage included broken stickup housing and casing and a blockage suspected to be caused by debris entering the well, rendering the well unable to be sampled. Field Staff attempted to remove blockage, purge and sample well but were unsuccessful. During the October 2022 sapling event, two alternative groundwater wells, MW325 (downgradient) and MW328 (upgradient) targeting Source Area 6 were sampled to fill this data gap.	Moderate impact - as well MW326 is considered to be a critical location by the lead consultant (LC). However, wells MW325 and MW328 were sampled as replacements to provide data upgradient and downgradient of MW326.
Replacement of well MW326 with MW416.	In April 2023, MW326 was replaced by a new groundwater monitoring well MW416 in the same location.	No impact - the data gap is considered closed as this location is now able to be monitored by MW416.

7 Reporting

7.1 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 Defence Contamination Management Manual (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 or 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, bump test records and other relevant documentation.
- > Any deviations from the SAQP encountered during completion of the sampling event, justification for the deviations and any impacts of these changes on the data or program.

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, 2019). The data are live and location data will be uploaded and reconciled as received.

7.2 Ongoing Monitoring Reporting

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

- > The factual information described in Section 7.1.
- > 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 QA/QC procedures.
- > A discussion of analytical results in relation to the following:
 - Trends in PFAS concentrations, including an assessment of temporal changes and/or changes to the extent of PFAS impacts. Trends should be assessed using an appropriate statistical analysis approach (e.g. using Mann-Kendall or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed.
 - Consideration, based on data trends, as to whether any of the existing remediation / management measures should be re-assessed, with a view to potential modification, supplementation or cessation.
 - Assessment of whether changes to the CSM and/or risk assessment are required.
 - Whether recalibration or changes to the groundwater model are required to provide a better understanding of the potential future extent of PFAS impact in groundwater.
- > Based on the data obtained, an assessment of the OMP sampling requirements with a view to establishing whether:
 - The number of locations monitored could be reduced, such as where PFAS concentrations are stable and are considered to present a low risk to receptors.
 - Additional monitoring locations are required, including the installation of new monitoring wells or sampling of additional existing wells (and/or private bores) to provide better understanding of the nature, extent or magnitude of PFAS impacts in a particular portion of the Management Area.
 - The frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors.

- > An overview of remedial works or construction and maintenance activities undertaken in the management area during the reporting period, which may impact the CSM. Defence will assist with understanding other activities occurring within the management area during the monitoring period.
- > All deviations from the SAQP encountered in the monitoring period will be documented, along with a statement of how these deviations impact on the DQO 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.
- > The sampling event Factual Reports and SAQP for the relevant year of monitoring will be appended to the OMR.

In addition to the OMR, a Factsheet summarising the monitoring period and findings will be prepared to accompany the publication of the OMR.

7.3 Provision of Results to Private Property Owners

In addition to the reporting of groundwater, surface water and sediment data collected from private properties in the factual and interpretive reports described in Section 7.1 and Section 7.2, the analytical results of private property sampling will also need to be reported to the property landowners, by way of a factual results letter. The results letters will be delivered to the property owners 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.

7.4 SAQP Review

Prior to each monitoring event, the SAQP will be reviewed to ensure it complies with the following guidelines:

- > PFAS National Environmental Management Plan (NEMP) Version 2.0, HEPA, 2020;
- > National Environment Protection (Assessment of Site Contamination) Measure (NEPM), National Environment Protection Council (NEPC), 2013;
- > Department of Defence, 2019. Pollution Prevention Guidance - Routine Water Quality Monitoring;
- > 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.

8 References

General References

1. Australian Standard (2005), AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds.
2. ANZG (2018), Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
3. Department of Defence (2019), 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), Contamination Management Manual (DCMM), Annex L – Data Management, August 2019, Amended June 2021.
6. Department of Defence (2022), PFAS OMP Annual Interpretive Report Guidance, Version 0.4, October 2022.
7. Department of Defence, Department of Energy (2018), Quality System Manual Schedule B15 USEPA DQO Process.
8. EPA Victoria (2009), Industrial Waste Resources Guidelines, Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, Publication 701.
9. EPA Victoria (2020), Interim Position Statement on PFAS, Publication 1669.4.
10. The Heads of EPAs Australia and New Zealand (HEPA; 2020), PFAS National Environmental Management Plan (NEMP) Version 2.0, January 2020.
11. National Environment Protection Council (NEPC) (2013), National Environmental Protection (Assessment of Site Contamination) Measure (as amended), registered May 2013.
12. National Health and Medical Research Council (NHMRC) (2011 – updated 2018), National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
13. 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. Golder (2018), PFAS Detailed Site Investigation (DSI), Bandiana Military Area, September 2018.
18. Golder (2020a), Human Health and Ecological Risk Assessment (HHERA), Bandiana Military Area, November 2020.
19. Golder (2020b), Bandiana Military Area, PFAS Management Area Plan (PMAP), November 2020.
20. Golder (2020c), Bandiana Military Area, PFAS Ongoing Monitoring Plan, November 2020.
21. GHD (2016), *Defence per- and poly-fluoroalkyl Substances (PFAS), Environmental Management Preliminary Sampling Program – Albury Wodonga Military Area (Bandiana)*, September 2016.

APPENDIX

A

FIGURES

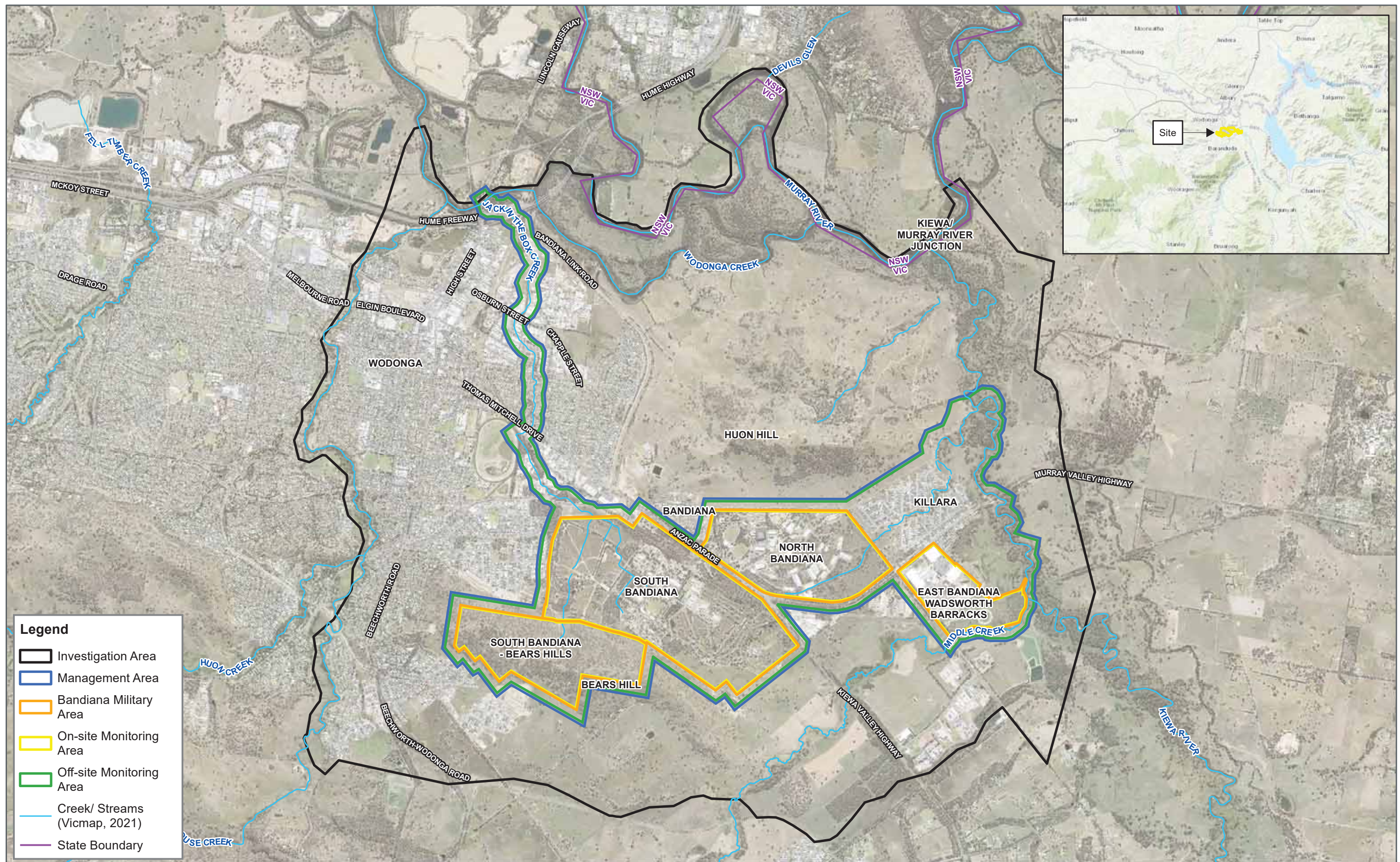


FIGURE 1
1:38,000 Scale at A3



Site Locality Plan

SAMPLING & ANALYSIS QUALITY PLAN
BANDIANA MILITARY AREA
DEPARTMENT OF DEFENCE



Map Produced by Cardno VIC
Date: 2021-10-14 | Project: DEF19008
Coordinate System: GDA 1994 MGA Zone 55
Map: DEF19008-GS-0150-SiteLocalityPlan_Bandiana.mxd 02
Aerial Imagery Supplied by Metromap (March, 2021)

SA 1	Petroleum Platoon – Former Fire Training Ground
SA 2	Base Fire Services (BFS) – Former Fire Training Ground
SA 3	Potential Disposal Burial Ground (not considered a source)
SA 4	Former 25 m Firing Range (not considered a source)
SA 5	Petroleum Platoon – Fuel Handling Facility
SA 6	Current Fire Training Area, Building 600
SA 7	Old Fire Station, Building 421
SA 8	Corner of Anderson Road and Donegon Road (not considered a source)
SA 9	Petroleum, Oils and Lubricants (POL), Building 490
SA 10	Former Unit Training Area, between Warehouse 1 and 2
SA 11	Fire Extinguisher Disposal – Warehouse 13
SA 12	Armoured Vehicle Maintenance Training, Building 100
SA 13	Fire Station – Current
SA 14	Former Unit Training, Building 592
SA 15	Former Unit Training, Football Field

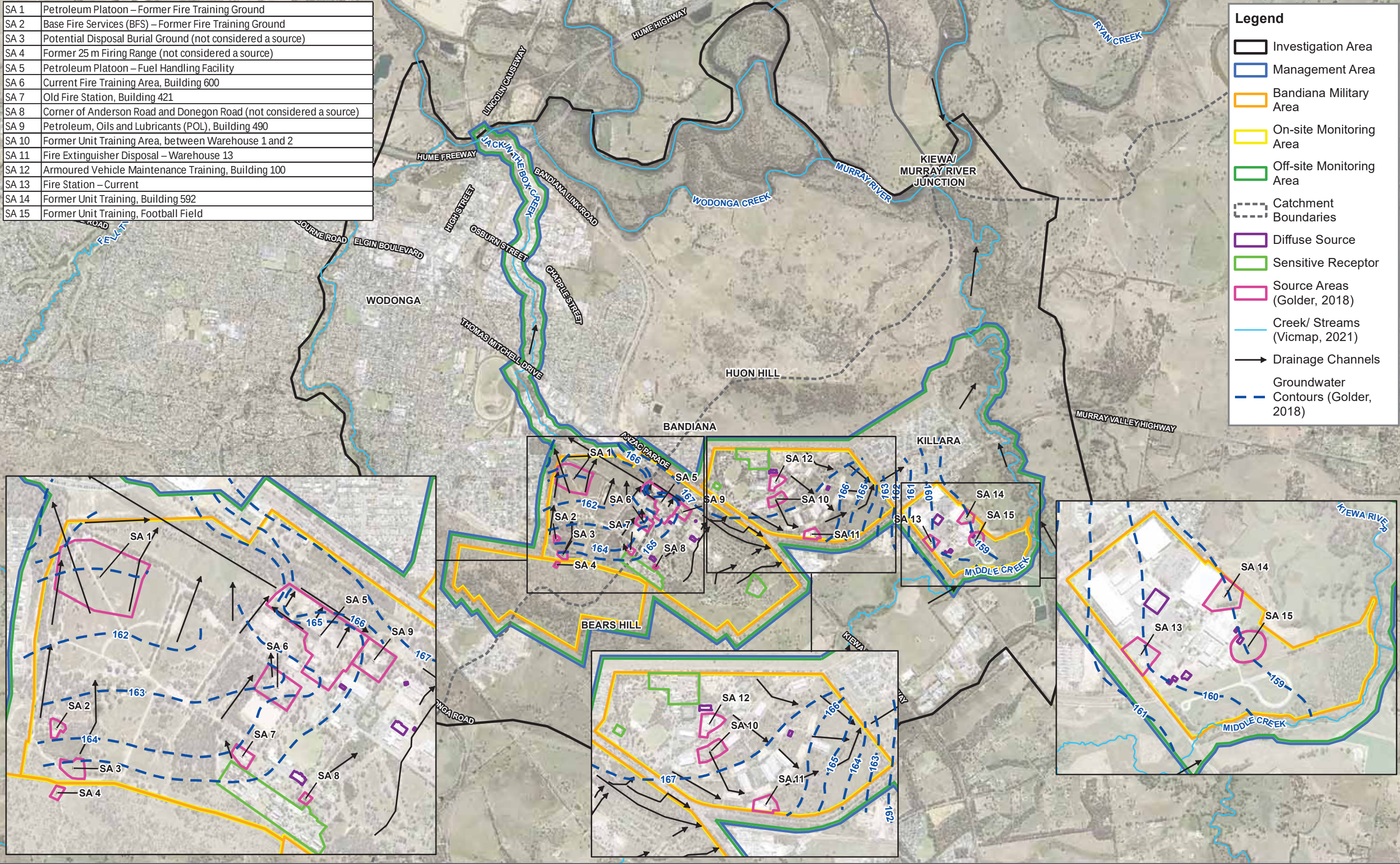
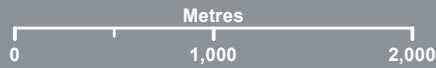


FIGURE 2
1:38,000 Scale at A3



Source Area and Migration Pathways

SAMPLING & ANALYSIS QUALITY PLAN
BANDIANA MILITARY AREA
DEPARTMENT OF DEFENCE



Map Produced by Cardno VIC
Date: 2021-10-14 | Project: DEF19008
Coordinate System: GDA 1994 MGA Zone 55
Map: DEF19008-GS-0151-SourceAreas_MigrationPath_Bandiana.mxd 02
Aerial Imagery Supplied by Metromap (March, 2021)

SA 1	Petroleum Platoon – Former Fire Training Ground
SA 2	Base Fire Services (BFS) – Former Fire Training Ground
SA 3	Potential Disposal Burial Ground (not considered a source)
SA 4	Former 25 m Firing Range (not considered a source)
SA 5	Petroleum Platoon – Fuel Handling Facility
SA 6	Current Fire Training Area, Building 600
SA 7	Old Fire Station, Building 421
SA 8	Corner of Anderson Road and Donegon Road (not considered a source)
SA 9	Petroleum, Oils and Lubricants (POL), Building 490
SA 10	Former Unit Training Area, between Warehouse 1 and 2
SA 11	Fire Extinguisher Disposal – Warehouse 13
SA 12	Armoured Vehicle Maintenance Training, Building 100
SA 13	Fire Station – Current
SA 14	Former Unit Training, Building 592
SA 15	Former Unit Training, Football Field

Legend

Investigation Area

Management Area

Bandiana Military Area

On-site Monitoring Area

Off-site Monitoring Area

Catchment Boundaries

Sensitive Receptor

Source Areas (Golder, 2018)

Creek/ Streams (Vicmap, 2021)

Drainage Channels

Sediment Sampling Location (Annual Sampling – February to May)

Surface Water Sampling Location (Biannual Sampling)

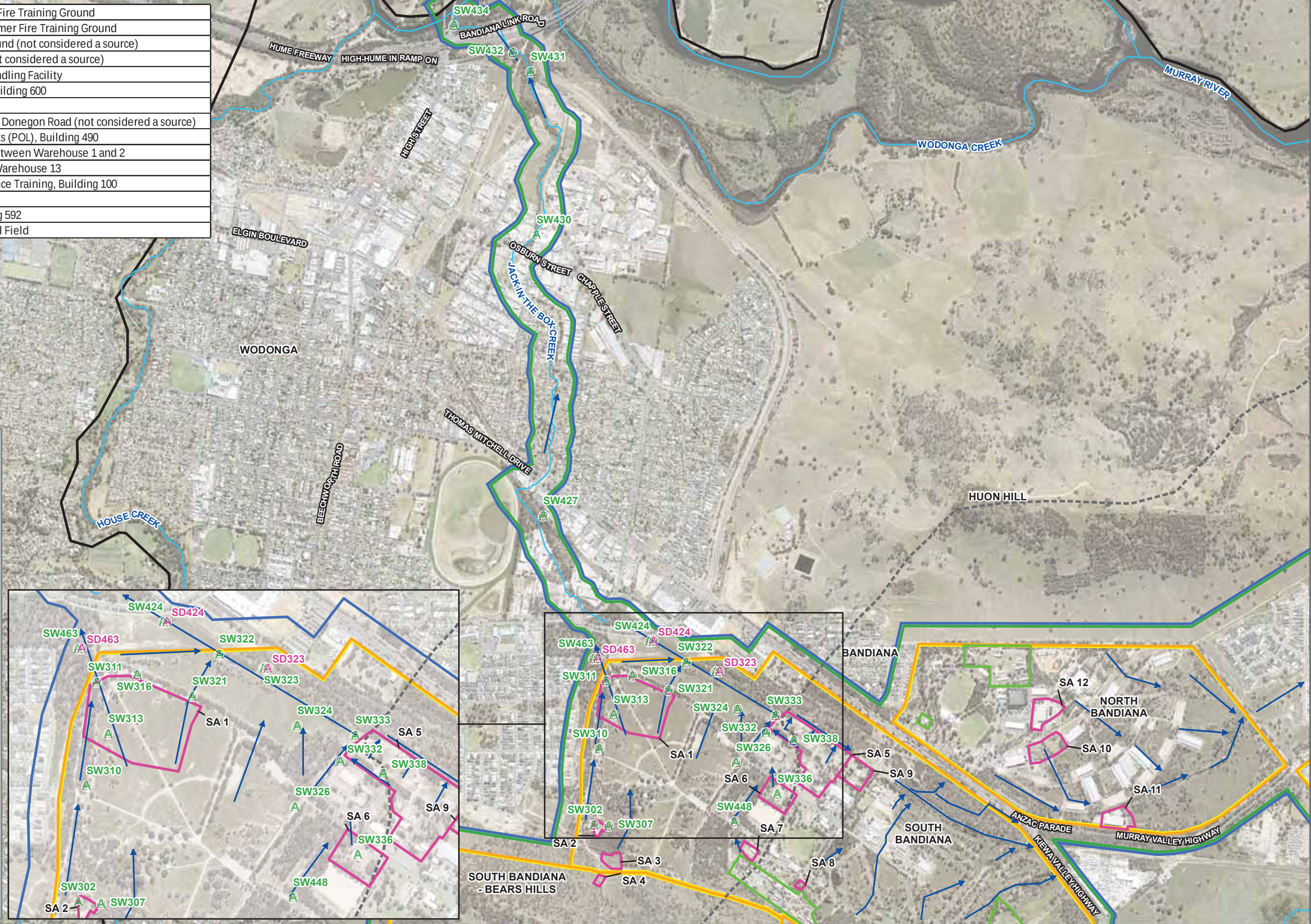
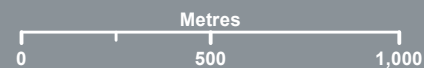


FIGURE 3A
1:20,000 Scale at A3



Surface Water and Sediment Monitoring Network – Jack in the Box Creek Catchment

SAMPLING & ANALYSIS QUALITY PLAN
BANDIANA MILITARY AREA
DEPARTMENT OF DEFENCE



Map Produced by Cardno VIC
Date: 2021-10-15 | Project: DEF19008
Coordinate System: GDA 1994 MGA Zone 55
Map: DEF19008-GS-0152-SWandSED_JITBCC_Bandiana.mxd 02
Aerial Imagery Supplied by Metromap (March, 2021)

SA 1	Petroleum Platoon – Former Fire Training Ground
SA 2	Base Fire Services (BFS) – Former Fire Training Ground
SA 3	Potential Disposal Burial Ground (not considered a source)
SA 4	Former 25 m Firing Range (not considered a source)
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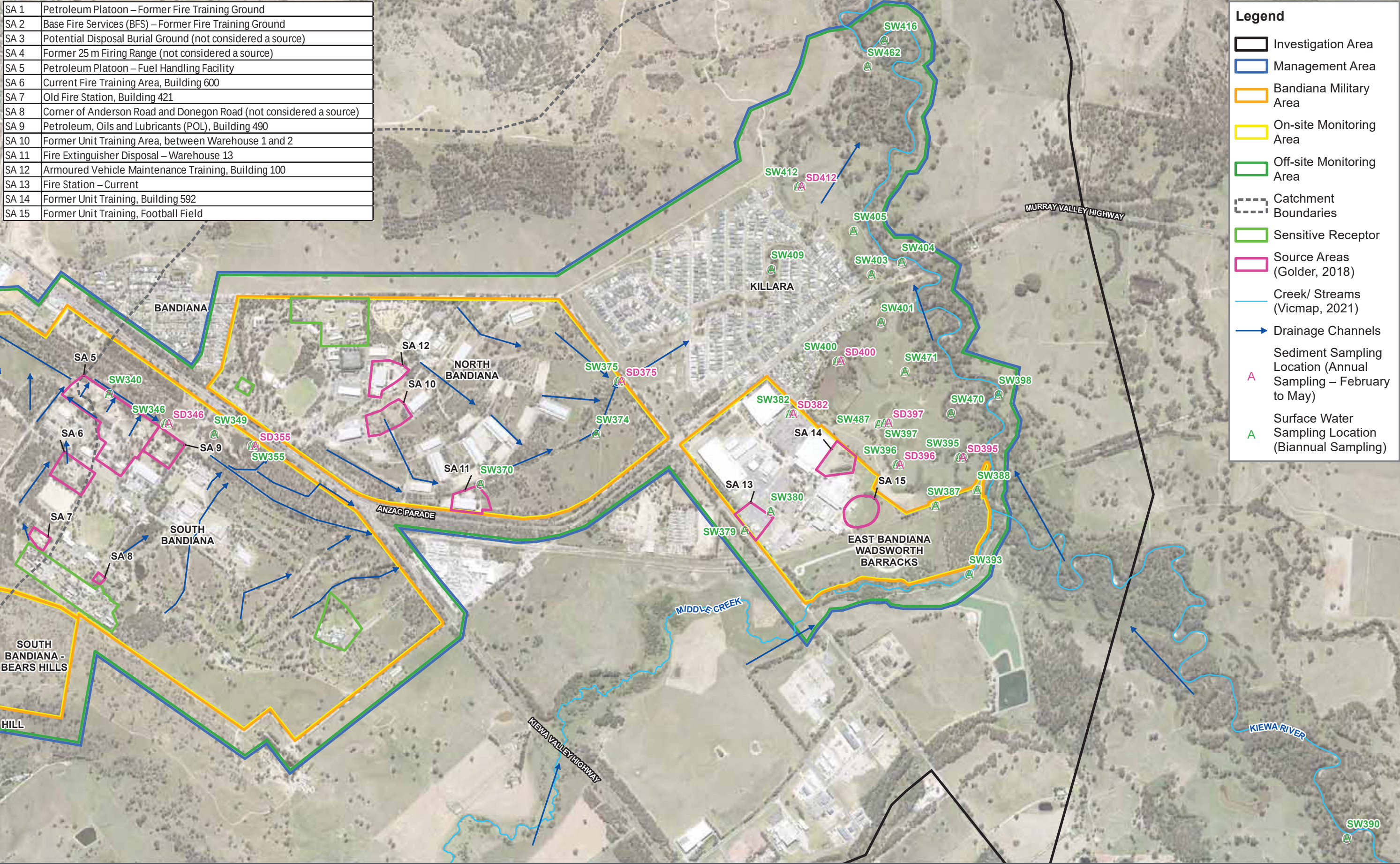
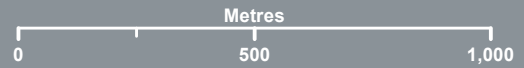


FIGURE 3B
1:16,000 Scale at A3



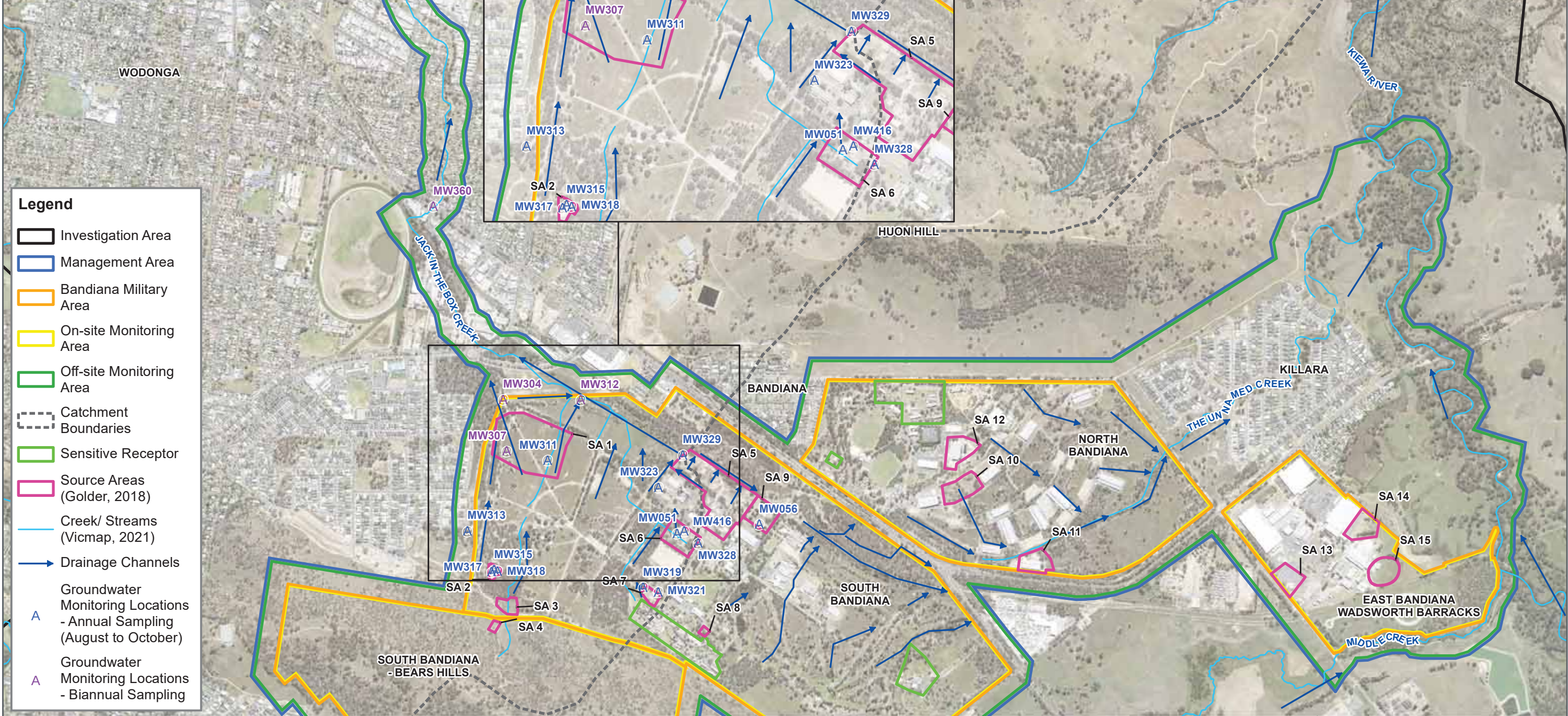
Surface Water and Sediment Monitoring Network – Kiewa River Catchment

SAMPLING & ANALYSIS QUALITY PLAN
BANDIANA MILITARY AREA
DEPARTMENT OF DEFENCE



Map Produced by Cardno VIC
Date: 2021-10-15 | Project: DEF19008
Coordinate System: GDA 1994 MGA Zone 55
Map: DEF19008-GS-0153-SWandSED_KRC_Bandiana.mxd 02
Aerial Imagery Supplied by Metromap (March, 2021)

SA 1	Petroleum Platoon – Former Fire Training Ground
SA 2	Base Fire Services (BFS) – Former Fire Training Ground
SA 3	Potential Disposal Burial Ground (not considered a source)
SA 4	Former 25 m Firing Range (not considered a source)
SA 5	Petroleum Platoon – Fuel Handling Facility
SA 6	Current Fire Training Area, Building 600
SA 7	Old Fire Station, Building 421
SA 8	Corner of Anderson Road and Donegon Road (not considered a source)
SA 9	Petroleum, Oils and Lubricants (POL), Building 490
SA 10	Former Unit Training Area, between Warehouse 1 and 2
SA 11	Fire Extinguisher Disposal – Warehouse 13
SA 12	Armoured Vehicle Maintenance Training, Building 100
SA 13	Fire Station – Current
SA 14	Former Unit Training, Building 592
SA 15	Former Unit Training, Football Field



**Groundwater Monitoring Network –
Jack in the Box Creek Catchment**

SAMPLING & ANALYSIS QUALITY PLAN
BANDIANA MILITARY AREA
DEPARTMENT OF DEFENCE

SA 1	Petroleum Platoon – Former Fire Training Ground
SA 2	Base Fire Services (BFS) – Former Fire Training Ground
SA 3	Potential Disposal Burial Ground (not considered a source)
SA 4	Former 25 m Firing Range (not considered a source)
SA 5	Petroleum Platoon – Fuel Handling Facility
SA 6	Current Fire Training Area, Building 600
SA 7	Old Fire Station, Building 421
SA 8	Corner of Anderson Road and Donegon Road (not considered a source)
SA 9	Petroleum, Oils and Lubricants (POL), Building 490
SA 10	Former Unit Training Area, between Warehouse 1 and 2
SA 11	Fire Extinguisher Disposal – Warehouse 13
SA 12	Armoured Vehicle Maintenance Training, Building 100
SA 13	Fire Station – Current
SA 14	Former Unit Training, Building 592
SA 15	Former Unit Training, Football Field

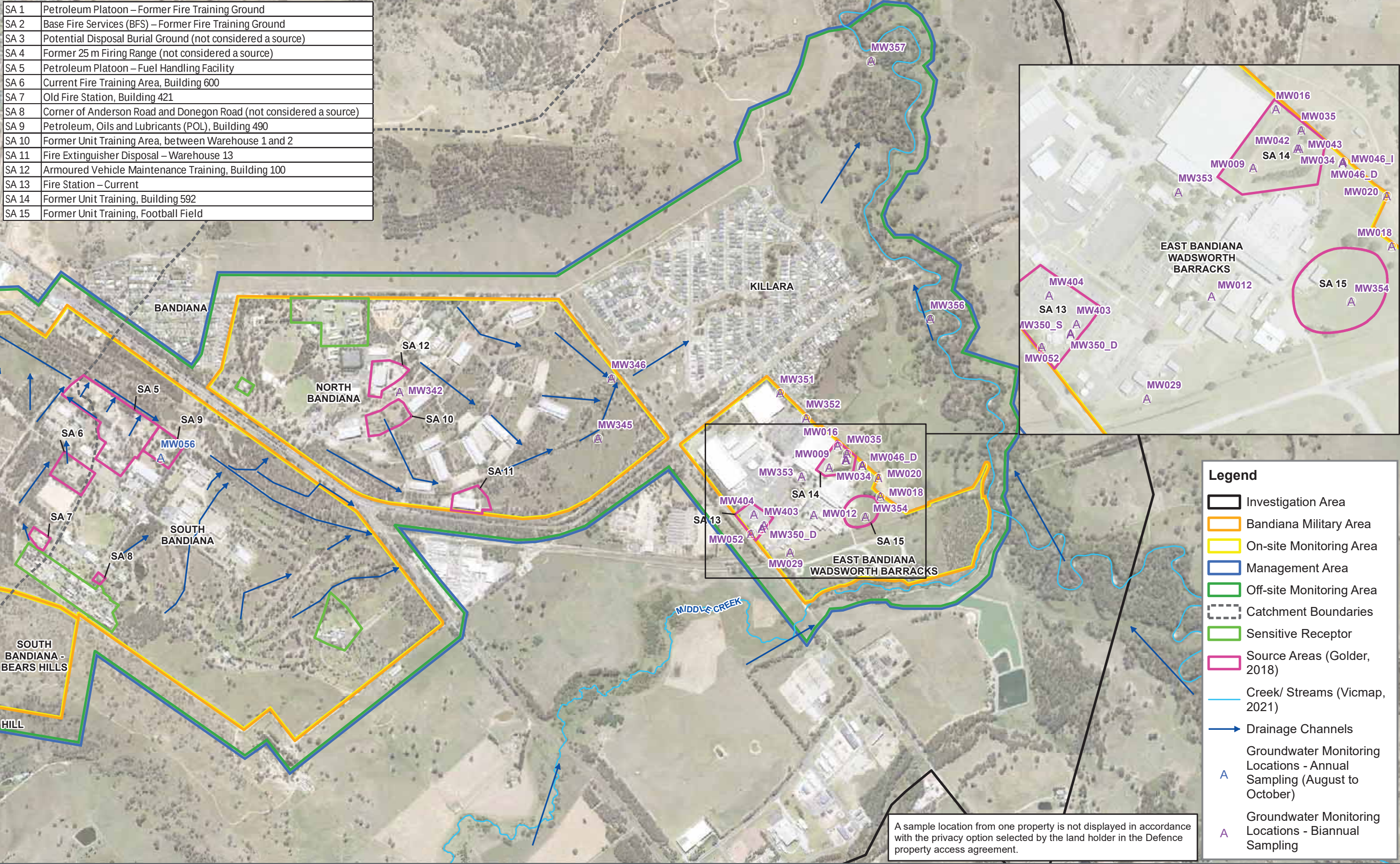
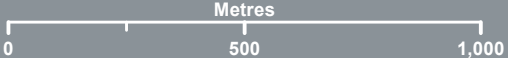


FIGURE 4B
1:16,000 Scale at A3



**Groundwater Monitoring Network –
Kiewa River Catchment**

SAMPLING & ANALYSIS QUALITY PLAN
BANDIANA MILITARY AREA
DEPARTMENT OF DEFENCE

APPENDIX

B

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 (PFUnA or PFUnDA)
	Perfluorododecanoic acid (PFDoA or PFDoDA)
	Perfluorotridecanoic acid (PFTTrDA or PFTTriDA)
	Perfluorotetradecanoic acid (PFTeDA)
Fluorotelomer Sulfonates (FTSs)	1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2 FTS)
	1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2 FTS)
	1 H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2 FTS)
	1H, 1H, 2H, 2H-perfluorododecane sulfonate (10:2 FTS)
Perfluoroalkyl sulfonates (PFSAs)	Perfluorobutane sulfonic acid (PFBS)
	Perfluoropentane sulfonic acid (PFPeS)
	Perfluorohexane sulfonate, or perfluorohexane sulfonic acid (PFHxS)
	Perfluoroheptane sulfonate (PFHpS)
	Perfluorooctane sulfonate, or perfluorooctane sulfonic acid (PFOS)
	Perfluorodecane sulfonic acid (PFDS)
Perfluorooctane sulfonamidoethonals and perfluorooctane sulfonamidoacetic acids	N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)
	N-ethyl perfluoro-1-octane sulfonamide (N-EtFOSA)
	2-(N-methyl perfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)
	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)
	2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)
	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)

APPENDIX

C

WELL LOCATION CODES AND WELL
CONSTRUCTION DETAILS

Catchment	Property	Location Code	Frequency	Alternative Name	Updated Easting	Updated Northing	TOC (ESdat export)	Depth (mbgl)	Top Screen Depth	Bottom Screen Depth	Aquifer
Kiewa River	On-base	MW009	Biannual	MW09, (0445E)MW009	495603.37	5999848.02	166.28	11.6	8.6	11.6	Shepparton Fluvium
Kiewa River	On-base	MW012	Biannual	MW12, (0445E)MW012	495534.14	5999634.04	167.36		156.92	159.82	Shepparton Fluvium
Kiewa River	On-base	MW016	Biannual	MW16, (0445E)MW016	495641.49	5999946.12	166.16		155.35	158.38	Shepparton Fluvium
Kiewa River	On-base	MW018	Biannual	MW18, (0445E)MW018	495834.70	5999717.39	165.43	9.27	6.27	9.27	
Kiewa River	On-base	MW020	Biannual	MW20, (0445E)MW020	495826.29	5999801.50	165.41	8.5	5.5	8.5	
Kiewa River	On-base	MW029	Biannual	MW29, (0445E)MW029	495426.45	5999463.69	168.11	10	7	10	
Kiewa River	On-base	MW034	Biannual	MW34, 0445_MW34, (0445E)MW034	495753.66	5999858.29	166.63	9.9	6.9	9.9	
Kiewa River	On-base	MW035	Biannual	MW35, (0445E)MW035	495683.72	5999911.25	166.22	10.3	7.2	10.3	
Kiewa River	On-base	MW042	Biannual	MW42, BH03, MW42/MW43, 0445_MW42, (0445E)MW042	495677.04	5999879.86	166.62	17	15	17	
Kiewa River	On-base	MW043	Biannual	MW43, (0445E)MW043	495680.27	5999879.94	166.55	12.6	9.8	12.3	
Kiewa River	On-base	MW046_D	Biannual	BH08, MW46/MW47, (0445E)MW046, (0445E)MW047	495752.45	5999855.99	166.49	21	18	21	
Kiewa River	On-base	MW046_I	Biannual	BH08, MW46/MW47, (0445E)MW046, (0445E)MW047	495752.45	5999855.99	166.48	13.4	11.4	13.4	
Jack in the Box Creek	On-base	MW051*	Annual	MW04, 0445S_MW04, (0445S)MW004	492170.69	5999846.02	187.95				
Kiewa River	On-base	MW052	Biannual	MW06-A, MW06A, MW6-A, 0445E_MW06-A, (0445E)MW006	495251.08	5999549.74	168.49		6.06	11.06	Shepparton Fluvium
Kiewa River	On-base	MW056**	Biannual	0445_MW361, 0445_MW157, 0445_MW157A, 0445S(BH111), (0445S)MW405, OTH019	492586.6	5999892.65	183.59	4			Shepparton Colluvium
Jack in the Box Creek	On-base	MW304	Annual	0445S_MW304	491289.32	6000521.98	176.131		18.78	21.78	Shepparton Colluvium
Jack in the Box Creek	On-base	MW307	Annual	0445S_MW307	491307.09	6000261.17	181.086		24.37	27.37	Shepparton Colluvium
Jack in the Box Creek	On-base	MW311	Annual	0445S_MW311	491514.62	6000214.45	182.452		19.71	22.71	Shepparton Colluvium
Jack in the Box Creek	On-base	MW312	Annual	0445S_MW312	491682.00	6000520.00	175.841		14.64	17.64	Shepparton Colluvium
Jack in the Box Creek	Off-base	MW313	Annual	0445_MW313	491109.26	5999857.37	193.128		30.89	33.89	Shepparton Colluvium
Jack in the Box Creek	On-base	MW315	Annual	0445S_MW315	491244.00	5999661.00	204.875		37.75	41.75	Shepparton Colluvium / Weathered OMC
Jack in the Box Creek	On-base	MW317	Annual	0445S_MW317	491231.00	5999650.00	204.364		34.93	38.93	Weathered Omeo-Metamorphic Complex
Jack in the Box Creek	On-base	MW318	Annual	0445S_MW318	491261.00	5999655.00	205.965		37.87	40.87	Shepparton Colluvium / Weathered OMC
Jack in the Box Creek	On-base	MW319	Annual	0445S_MW319	491998.00	5999572.00	199.524		38.789	41.789	Shepparton Colluvium / Weathered OMC
Jack in the Box Creek	On-base	MW321	Annual	0445S_MW321	492074.00	5999548.00	200.815		35.969	38.969	Shepparton Colluvium
Jack in the Box Creek	On-base	MW323	Annual	0445S_MW323	492076.00	6000078.00	184.472		19.84	22.84	Shepparton Colluvium
Jack in the Box Creek	On-base	MW326***	Annual	0445S_MW326	492216.00	5999856.00	188.819		28.03	31.03	Shepparton Colluvium
Jack in the Box Creek	On-base	MW329	Annual	0445S_MW329	492199.00	6000242.00	181.435		16.649	19.649	Shepparton Colluvium
Kiewa River	On-base	MW342	Annual	0445N_MW342	493664.00	6000189.00	180.605		13.42	17.42	Shepparton Colluvium
Kiewa River	On-base	MW345	Biannual	0445N_MW345	494560.00	5999979.00	168.316		4.48	7.48	Shepparton Fluvium
Kiewa River	On-base	MW346	Biannual	0445N_MW346	494621.00	6000250.00	166.944		6.8	9.8	Shepparton Fluvium

Catchment	Property	Location Code	Frequency	Alternative Name	Updated Easting	Updated Northing	TOC (ESdat export)	Depth (mbgl)	Top Screen Depth	Bottom Screen Depth	Aquifer
Kiewa River	On-base	MW350_D	Biannual	(0445E)MW350_D, (0445E)MW350_S, MW356(Stage4)	495299.30	5999571.30	168.229				Shepparton Fluvium
Kiewa River	On-base	MW350_S	Biannual	(0445E)MW350_D, (0445E)MW350_S, MW356(Stage4)	495299.30	5999571.30	168.233				Shepparton Fluvium
Kiewa River	On-base	MW351	Biannual	0445E_MW351	495382.00	6000184.00	164.79				Shepparton Fluvium
Kiewa River	On-base	MW352	Biannual	0445E_MW352	495498.59	6000070.77	164.493				Shepparton Fluvium
Kiewa River	On-base	MW353	Biannual		495479.00	5999808.00	166.625				Shepparton Fluvium
Kiewa River	On-base	MW354	Biannual	0445E_MW353	495767.20	5999625.80	166.142				
Kiewa River	Off-base	MW356	Biannual	0445E_MW354, (0445E)MW354	496059.80	6000518.40	156.882				Coonambigdal Fluvium
Kiewa River	Off-base	MW357	Biannual		495793.41	6001682.22	156.243				Coonambigdal Fluvium
Jack in the Box Creek	Off-base	MW360	Biannual	0445_MW357	490936.64	6001498.75	164.89				Shepparton Fluvium
Jack in the Box Creek	Off-base	MW361	Biannual	0445_MW360	490943.84	6003056.80	153.716				Shepparton Fluvium
Kiewa River	On-base	MW403	Biannual	0445_BH1, (0445)MW362	495312.20	5999591.49	166.926		6.98	9.98	
Kiewa River	On-base	MW404	Biannual	0445_BH2, MW363, (0445)MW363	495269.66	5999632.70	166.617		7.03	10.03	
Jack in the Box Creek	On-base	MW416***	Annual		492206.45	5999857.15	187.720		25.50	30.00	Shepparton Colluvium
Kiewa River	Off-base	OTH019	Biannual		Coordinates not shown		Private property bore - no well construction details available in ESdat.				

* Well was repaired and resurveyed in May 2023 due to damage to the standpipe

** Well was resurveyed in May 2023 as a point of reference location

*** MW326 was decommissioned in May 2023 and replaced with MW416

DSI/PMAP Location Code	Revised Location Code	Updated Location Code	Current Location Code for OMP
MW04	MW004	MW051	MW051
MW09	MW009	N/A	MW009
MW12	MW012	N/A	MW012
MW16	MW016	N/A	MW016
MW18	MW018	N/A	MW018
MW20	MW020	N/A	MW020
MW29	MW029	N/A	MW029
MW34	MW034	N/A	MW034
MW35	MW035	N/A	MW035
MW42	MW042	N/A	MW042
MW43	MW043	N/A	MW043
MW46	MW046	N/A	MW046
MW47	MW047	MW046	MW046
MW06-a	MW052	N/A	MW052
MW304	MW304	N/A	MW304
MW307	MW307	N/A	MW307
MW311	MW311	N/A	MW311
MW312	MW312	N/A	MW312
MW313	MW313	N/A	MW313
MW315	MW315	N/A	MW315
MW317	MW317	N/A	MW317
MW318	MW318	N/A	MW318
MW319	MW319	N/A	MW319
MW321	MW321	N/A	MW321
MW323	MW323	N/A	MW323
MW326	MW326	N/A	MW326
MW329	MW329	N/A	MW329
MW342	MW342	N/A	MW342
MW345	MW345	N/A	MW345
MW346	MW346	N/A	MW346
MW350_D	MW350	MW350	MW350
MW350_S	MW350	MW350	MW350
MW351	MW351	N/A	MW351
MW352	MW352	N/A	MW352
MW353	MW353	N/A	MW353
MW354	MW354	N/A	MW354
MW356	MW356	N/A	MW356
MW357	MW357	N/A	MW357
MW360	MW360	N/A	MW360
MW361	MW361	N/A	MW361
BH1	MW403	N/A	MW403
BH2	MW404	N/A	MW404
BH111	MW405	MW056	MW056
OTH019	OTH019	N/A	OTH019

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].

Contact

Level 4
501 Swanston Street
Melbourne VIC 3000
Australia

Phone +61 3 8415 7777
Fax +61 3 8415 7788

Web Address
www.cardno.com



Appendix B JBS&G SAQP (JBS&G 2024c)





Bandiana Military Area – PFAS Ongoing Monitoring Plan (OMP) Sampling and Analysis Quality Plan (SAQP)

Department of Defence

Report

JBS&G | 61395 | 163,009 – FINAL (Rev 0)

22 November 2024





We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community.

We pay respect to Elders past and present and in the spirit of reconciliation, we commit to working together for our shared future.

Caring for Country The Journey of JBS&G
Artist: Patrick Caruso, Eastern Arrernte

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Appendices

Appendix A	PFAS Sampling Guidance
Appendix B	HydraSleeve Standard Operating Procedure
Appendix C	Water Volume Length in Monitoring Wells Sampled as part of the April 2024 OMP

Abbreviations

Term	Definition
AFFF	Aqueous Film Forming Foam
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended in 2013)
BMA	Bandiana Military Area
BoM	Bureau of Meteorology
COC	Chain of Custody
CSM	Conceptual Site Model
CSR	Contaminated Sites Record
DCMM	Defence Contamination Management Manual
DO	Dissolved Oxygen
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EC	Electrical Conductivity
ECC	Environmental Clearance Certificate
EPA	Environment Protection Authority Victoria
ERA	Environment Reference Standards
HDPE	High-density polyethylene
HSEMP	Health, Safety and Environmental Management
HHERA	Human Health and Ecological Risk Assessment
JBS&G	JBS&G Australia Pty Ltd
LOR	Limit of Reporting
mbgl	Metres below ground level
mBTOC	M below top of case
NAPL	Non-aqueous phase liquids
NATA	National Association of Testing Authorities
NEMP	Heads of EPAs Australia and New Zealand (HEPA), PFAS National Environmental Management Plan – Version 2; January 2020
NHRMC	National Health and Medical Research Council
OMP	Ongoing Monitoring Plan
OMR	Ongoing Monitoring Report
ORP	Oxidation reduction potential
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Perfluorohexanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
pH	Potential of Hydrogen
PMAP	PFAS Area Management Plan

Term	Definition
QA/QC	Quality Assurance / Quality Control
RPD	Relative Percent Difference
RRP	Riverina Redevelopment Program
SWMS	Safe Work Method Statement
SWL	Standing Water Level
SAQP	Sampling, Analysis and Quality Plan
USEPA	United States Environment Protection Authority
WA DER	Western Australia Department of Water and Environmental Regulation
WTP	Water Treatment Plant

1. Introduction

JBS&G Australia Pty Ltd (JBS&G) has been engaged by the Department of Defence (Defence) to provide this Sampling and Analysis Quality Plan (SAQP) for the Ongoing Monitoring Plan (OMP) component of work on and around the Bandiana Military Area (BMA), Victoria (the base) as part of the PFAS Management Area Plan (PMAP) Delivery Services. These works are part of a National Defence program to understand the nature and extent of per- and poly-fluoroalkyl substances (PFAS) contamination resulting from the historical use of Aqueous Film Forming Foam (AFFF) on and adjacent to identified Defence properties across Australia.

BMA, that is the subject of this work, is located adjacent to the New South Wales (NSW) – Victorian State border south east of Wodonga, Victoria. BMA itself comprises three areas, the boundaries of which have been provided in **Figure 1**:

- Gaza Ridge Barracks (North Bandiana);
- Gaza Ridge Barracks (South Bandiana); and
- Wadsworth Barracks (East Bandiana).

The Management Area has also been shown in **Figure 1** and comprises BMA along with off-base areas including Jack in the Box Creek, Kiewa River and their associated floodplains. The Management Area was derived based on the results of previous environmental investigations and relate to pathways in surface water and groundwater for potential PFAS contamination derived from BMA.

This SAQP applies to surface water, groundwater and sediment monitoring locations on the base and within the surrounding Management Area.

The base is located on Commonwealth Land and is regulated under Commonwealth environmental legislation.

The OMP document, as provided in the PMAP (Defence 2020), outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in surface water, groundwater and sediment at and around the base. Findings from the OMP monitoring will be used to assess changes to the nature and extent of PFAS where there is an identified risk of harm to a receptor or a potential future risk to a receptor.

It should be noted that a PFAS baseline sewage sampling scope has also been included as part of this SAQP to provide data prior to the commencement of the Riverina Redevelopment Program (RRP) during 2025. The program is going to undertake significant civil redevelopment in the central portion of South Bandiana, and the collected data will be used to understand the influence of redevelopment works on PFAS concentrations within the sewerage network.

1.1 Scope and Objectives

The objective of this SAQP is to present the specific monitoring locations, sampling methodologies and quality control/quality assurance (QA/QC) measures to assess PFAS concentration and extent in surface water, groundwater and sediment within the base and the surrounding Management Area.

These findings will inform risk management decisions by Defence and the Victorian Government to protect human health and the environment.

The objectives of the OMP, as set out in the OMP document, is to provide information on changes in PFAS contamination originating from a Defence base to inform risk management decisions by Defence and State/Territory agencies to protect human health and the environment.

The scope of the monitoring specified in the OMP includes:

- Evaluate changes in risk from PFAS in surface water and groundwater associated with base sources of PFAS;

- Monitor the migration of PFAS in surface water, groundwater and sediment from the base;
- Evaluate the nature and extent of PFAS impact in surface water, groundwater and sediment;
- Provide confirmation of the current understanding of risks from PFAS within surface water and groundwater; and
- Where relevant, provide supporting data for assessment of PFAS management actions.

The objective of the sewage sampling is to provide a PFAS baseline characterisation of sewerage conditions across South and North Bandiana prior to the commencement of the RRP.

1.2 Relevant Guidelines

This SAQP has been prepared in general accordance with current 'industry standards' for site investigation to address the scope and objectives of the SAQP. These standards are set out in:

- AS4482.1-2005, Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils, Part 1 - Non-volatile and Semi-volatile Compounds (withdrawn as pending revision, referred to for 'state of knowledge'). (AS 2005);
- Australian/New Zealand Standard AS/NZS 5667.6:1998 Water Quality – Sampling, Part 6: Guidance on Sampling Rivers and Streams. (AS/NZS 1998);
- Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance – Routine Water Quality Monitoring. (Defence 2019);
- Contamination Management Manual (DCMM), Annex L – Data Management, August 2019, Amended June 2021. (Defence 2021b);
- Quality System Manual Schedule B15 USEPA DQO Process. (Department of Defence, Department of Energy 2018);
- Groundwater Sampling Guidelines, Publication 669.1, February 2022. (Environment Protection Authority Victoria (EPA) 2022);
- Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, Publication 701, June 2009. (EPA 2009);
- PFAS National Environmental Management Plan (NEMP) Version 2.0, January 2020. (Heads of Environmental Protection Authority's Australia and New Zealand (HEPA) 2020);
- National Environmental Protection (Assessment of Site Contamination) Measure (1999, as amended 2013) (ASC NEPM). (National Environment Protection Council (NEPC) 2013);
- Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water, August 2019. (National Health and Medical Research Council (NHMRC) 2019);
- Sampling Design Part 1 – Application, Contaminated Land Guidelines. August 2022. (NSW EPA 2022a);
- Sampling Design Part 2 – Interpretation, Contaminated Land Guidelines. August 2022. (NSW EPA 2022b);
- Guidance for the Data Quality Objectives Process (EPA QA/G-4). (United States Environment Protection Authority (USEPA) 2006);
- Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8). (USEPA 2002); and
- Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances, Western Australia Department of Water and Environmental Regulation (WA DER) (WA DER 2017).

2. Base and Management Area Setting

The following base and environmental setting information has been summarised from previous investigations across the base.

2.1 Base Identification Details

The base is located approximately 255 kilometres (km) northeast of Melbourne and is adjacent to the New South Wales – Victorian State border. It is located on the eastern fringe of the large town of Wodonga. The site details have been summarised in the following **Table 2.1** below. The base boundary has been provided in **Figure 1**.

Table 2.1: Site Identification Details

Item	Details
Site Address	Murray Valley Highway, Bandiana
Site Area	650 hectares
Site Owner and Occupier	Department of Defence
Municipality	Wodonga City Council
Legal Description	North Bandiana – 2 PS437772, 1 and 2 TP849697 South Bandiana – 1, 2 and 3 TP849698, 3 PS420756 and 2 PS420756 East Bandiana – 1 TP849660, 1 TP139782 and 1 TP81825
Zoning	Commonwealth Land under the Wodonga Planning Scheme Amendment C120

2.2 Base Use and Features

The base is primarily used for administration, accommodation, training, equipment maintenance and storage and warehousing/logistics associated with Defence activities. The general land uses and features present across each area of the site has been provided in **Table 2.2**.

Table 2.2: Site Use and Features

Item	Details
South Bandiana (Gaza Ridge Barracks)	- Built infrastructure such as workshops, warehouses, office buildings, gymnasium, hardstand areas including roads and vehicle access and training areas; - On-base personnel accommodation areas; - Bandiana Primary School; - Golf course; - The Bandiana Army Museum; - Former and current fire training areas; - Grassed and vegetated areas which are generally undeveloped and contain little to no infrastructure; and - Sheep grazing is permitted in the southwestern portion of BMA along the base of Bears Hill.
North Bandiana (Gaza Ridge Barracks)	- Built infrastructure such as workshops, warehouses, office buildings, gymnasium, hardstand areas including roads and vehicle access and training areas; - On-base personnel accommodation areas;

Item	Details
	- Bandiana Neighbourhood House (child care centre); and - Grassed and vegetated areas which are generally undeveloped and contain little to no infrastructure.
East Bandiana (Wadsworth Barracks)	- Built infrastructure such as workshops, warehouses, office buildings, gymnasium, hardstand areas including roads and vehicle access and training areas; - Test track; and - Current fire station.

2.3 Surrounding Land Uses

The land uses surrounding the BMA has been summarised in **Table 2.3**.

Table 2.3: Surrounding Land Uses

Item	Details
North	Huon Hill Parklands is located directly north of North Bandiana, while residential developments are located directly north of East and South Bandiana. Commercial properties are also present along Anzac Parade located to the north of South Bandiana. Beyond the parklands is the Murray River and associated floodplain.
East	Residential developments are present east of both East and North Bandiana, while commercial properties and open farmland is east of South Bandiana. Beyond this is the Kiewa River and associated floodplain.
South	Bears Hill is used primarily for grazing and is located directly south of South Bandiana. Commercial properties, open farmland and minor rural residential development is present south of North and East Bandiana.
West	Wodonga townships is located directly west of the base and consists primarily of residential properties, with areas of commercial and/or industrial development.

2.4 General Site History

The full site history of the BMA has been detailed in the Detailed Site Investigation (DSI) (Golder 2018). The following site history summary was provided in the DSI:

North, South and East Bandiana were acquired in 1942 as part of the war efforts during World War II, with an estimated 4,000 troops stationed there to operate the facility. At this time, the facility served as a tank armoured vehicle and equipment workshop as well as containing administration and warehouse facilities. Vehicle handling included receiving vehicles direct from manufacturers and holding them before issue within Australia or overseas (which continues today). Construction of storage depots and workshops commenced in 1942, with railway tracks from NSW and Victoria also established around this time. The BMA has remained in use as a storage and vehicle processing facility with the addition of Army logistics training.

The North Bandiana Historic Warehouse Precinct, developed during World War II between 1942 and 1945, is recognised as one of Australia's largest facilities for the storage and processing of technical and motor transport stores. Since the early 1960s many of the World War II buildings at the three facilities have been demolished to make way for new constructions such as training, administration and accommodation facilities. Furthermore, from approximately the mid-1990s, portions of the property have been progressively divested. These have included the portions of the land now occupied by the adjacent residential estates.

2.5 Topography

The base is part of a relatively low-lying river and creek floodplain located between two topographically significant features (Huon Hill to the north and Bears Hill to the south, as shown on **Figure 1**). There is a topographic divide that runs across BMA in a general north-south alignment. To the west of the divide, the area generally slopes to the northwest towards Jack in the Box Creek, while to the east of the divide, the area generally slopes to the east or northeast towards the Kiewa River. Elevation of the respective areas of the base are as follows:

- **South Bandiana:** this portion of the base generally slopes gently from the southern boundary, 240 m above sea level at its highest point, to the northern boundary, 175 m above sea level at its lowest point. South Bandiana is divided into two separate watersheds which slope to the northwest and northeast respectively;
- **North Bandiana:** Generally slopes gently from northwest, approximately 203 m above sea level at its highest point to the eastern boundary of the site, approximately 165 m; and
- **East Bandiana:** this portion of the base generally slopes gently from the western boundary, approximately 167 m above sea level at its highest point to the eastern boundary of the base, approximately 157 m above sea level. The eastern portion of East Bandiana (to the east of the test track) falls off into the Kiewa River floodplain.

2.6 Climate

Long-term climatic data collected from the closest Bureau of Meteorology (BoM) station located at Wodonga (2.7 km west of base), indicated the following between 1898 and 2018 for rainfall, and 1957 and 1968 for temperature:

- Annual rainfall is approximately 710 mm;
- Highest average monthly rainfall is approximately 81.2 mm, which occurs in July;
- Lowest average monthly rainfall is approximately 38.3 mm, which occurs in February;
- The highest average temperature is 31.8 °C, which occurs in January; and
- The lowest average temperature is 12.6 °C, which occurs in July.

2.7 Hydrology

As indicated previously, the base is divided into two catchments. West of the topographic divide flows to the northwest towards Jack in the Box Creek, while east of the divide flows into Middle Creek and an unnamed creek, both of which flow into the Kiewa River. Both the Jack in the Box Creek and Kiewa River catchments drain north into the Murray River catchment.

West of the divide comprises the western portion of South Bandiana, with the divide occurring approximately along Russell Road (internal road). Surface water is drained by a series of below ground stormwater infrastructure and above ground natural and man-made channels. Surface water flows in a north to northwest direction and exits the base via a surface channel which flows directly into Jack in the Box Creek. The on-base surface water channels are primarily ephemeral and only have flow during or immediately following rainfall. Jack in the Box Creek flows into Wodonga Creek, located approximately 3.5 km north of the base.

East of the divide comprises the balance of South Bandiana, along with North Bandiana and East Bandiana. The eastern most portion of South Bandiana drains eastward overland into Middle Creek which flows approximately 2.8 km east into Kiewa River. The balance of South Bandiana drains north into North Bandiana, with accumulated surface water flowing northeast across this portion of the base before exiting the eastern boundary adjacent Whytes Road and flowing down an unnamed creek before discharging into the Kiewa River approximately 1.4 km northeast of the base. East Bandiana stormwater flows to the northeast and is

discharged into off-base oxbow lakes on the Kiewa River floodplain immediately east of the base. Surface water infrastructure on the balance of the base also comprises of a series of below ground stormwater infrastructure and surface drainage channels. The Kiewa River is a meandering watercourse and discharges into the Murray River approximately 3.0 km north of the base.

The stormwater divide and general surface water flow directions have been provided in **Figure 3**.

2.8 Geology and Hydrogeology

Details of the regional and local geological/hydrogeological setting are provided in previous investigation reports such as the DSI (Golder 2018) and DSI Addendum (JBS&G 2024a). There are three main geological units which are present at the base. From deepest to shallowest these are as follows:

- **Omeo-Metamorphic Complex:** Ordovician aged schist with intrusions of granite and gneiss. This material forms the bedrock of the area, with both Bears Hill and Huon Hill consisting of this unit;
- **Shepparton Formation:** Tertiary aged deposits of sand, silt and clay. Erosion and accumulation of sediments from the local hill are defined as the Shepparton Colluvium and can be found through the centre of the base. Deposition of alluvial sediments also occurred during this period and are termed the Shepparton Fluvium and are primarily found in the northwest and southwest of the site; and
- **Coonambigdal Formation:** Quaternary aged deposits of sand, silt and clay. More recent hill erosion is defined as the Coonambigdal Colluvium and can be found around the foot of Bears Hill and Huon Hill. Deposition around current waterways, including the Murray River, Kiewa River, Wodonga Creek and Middle Creek, is the Coonambigdal Fluvium.

While groundwater is present within the bedrock, the primary aquifers of concern with respect to PFAS are those present in the unconsolidated Shepparton and Coonambigdal Formations and in particular the colluvium at North and South Bandiana and fluvium at East Bandiana. These are discussed below for each portion of the base:

- **South Bandiana:** the sub surface at South Bandiana generally consists of unconsolidated hill-wash deposits (colluvium) (sands, silts, clays and gravels) from the Quaternary (Coonambigdal) and Tertiary (Shepparton) period. Based on site observations, the material consists primarily of fine-grained sediments (clays and silts) with some interbedded sands and gravels. These unconsolidated formations have been encountered to depths of approximately 32 to 36 metres below ground level (mbgl) depending on position on-base. Across the flatter northern portion of South Bandiana, the depth to groundwater in ranges between 10 to 15 mbgl, although this increases up to approximately 40 mbgl in the sloped southern portion (depending on seasonality and weather conditions);
- **North Bandiana:** observations from the northern and western portions of North Bandiana are considered representative of the Shepparton Colluvium, while the south portion is more consistent with the Shepparton Fluvium (alluvial sediments). In the north and west of North Bandiana, groundwater depth is up to 14.7 mbgl, while to the south east it is between 1.8 to 3.8 mbgl; and
- **East Bandiana:** observations from East Bandiana identified various layers of clays, silt and sand across the base consistent with a depositional environment (Shepparton/Coonambigdal Fluvium). Due to the presence of PFAS at the base boundary this area has been subject to significant investigation works. The depositional processes that occurred in this area of the base have resulted in a distribution of permeable sediments that is highly variable. The shallow portion (<10 mbgl) of the aquifer includes variably distributed (and generally discontinuous) sands and clays and has standing water levels ranging between approximately 6.6 and 8.2 m below top of case (mBTOC). A more continuous sandy layer is present between 10.0 and 15.0 mbgl and has a standing water level range between approximately 6.6 and 8.1 mBTOC. The sandy layer has an estimated hydraulic conductivity of approximately 10-20 m/day. Beneath the sandy layer, clay is present to the depth of completed investigations.

Groundwater flow directions are consistent with topography and surface water drainage. In South Bandiana, groundwater flow is primarily to the northwest towards Jack in the Box Creek, while in North and East Bandiana it is primarily to the east towards Kiewa River.

The Kiewa River, associated oxbows, Wodonga Creek and possibly the northern portion of Jack in the Box Creek are likely gaining streams (i.e. surface water bodies which receive groundwater discharge). Middle Creek and the unnamed creek are considered losing streams (surface water discharges into groundwater).

In addition to the above, it has been identified that a deeper sandy portion of the aquifer (i.e. between 10.0-15.0 mbgl) on East Bandiana intercepts one or more off-base oxbow lakes in the Kiewa River Floodplain to the northeast of the base.

3. Conceptual Site Model Summary

Significant environmental investigation have been completed across BMA and the Management Area which has developed the current Conceptual Site Model (CSM). The following key investigations and reports have assisted in developing the CSM, and which are relied upon for this OMP SAQP:

- DSI (Golder 2018);
- Human Health and Ecological Risk Assessment (HHERA) (Golder 2020);
- PMAP and OMP (Defence 2020);
- DSI Addendum (JBS&G 2024a);
- PFAS Mass Flux Study (JBS&G 2024b); and
- Previous OMP event results from November 2021, May and October 2022, May and October 2023, as summarised in the Ongoing Monitoring Report (OMR) (JBS&G 2024c).

Based on the information provided in these documents, a summary of the current CSM for the BMA and Management Area has been summarised in the sections below.

3.1 Sources

Investigations completed to date have identified that there are various sources of PFAS across the base which relate to use or storage of AFFF products. Source Areas 1 through 15 (see **Figure 2** for locations) are considered the primary sources of PFAS, although varying concentrations of PFAS have been reported for affected media. The Source Areas also relate to different surface water catchments, flowing into Jack in the Box Creek or Kiewa River – further discussed in **Section 3.2** below. Current investigation results divide the identified PFAS Source Areas into the following categories:

- PFAS concentrations above relevant health-based criteria: Source Areas 1, 2, 5, 6, 7, 9, 11, 12, 13, 14 and 15;
- PFAS concentrations above laboratory standard limits of reporting, but below health-based criteria: Source Area 10; and
- Not considered a source: Source Areas 3, 4 and 8.

Description of the Source Areas, and their respective Contaminated Site Record (CSR) ID, with PFAS concentrations above laboratory standard limits of reporting are as follows:

- Source Area 1 (CSR_VIC_000353) – Petroleum Platoon – Former Fire Training Ground (South Bandiana);
- Source Area 2 (CSR_VIC_000478) – Base Fire Services (BFS) – Former Fire Training Ground (South Bandiana);
- Source Area 5 (CSR_VIC_000365) – Petroleum Platoon – Fuel Handling Facility (South Bandiana);
- Source Area 6 (CSR_VIC_000350) – Fire Training Area, Building 600 (South Bandiana) ¹;
- Source Area 7 (CSR_VIC_000357) – Old Fire Station, Building 421 (South Bandiana);

¹ Source Area 6 in previous documentation, including the PMAP (Defence 2020), has been identified as the Current Fire Training Area, Building 600. A new Fire Training Area however has since been constructed and commissioned and the facility located at Source Area 6 retired from active service. This Source Area will therefore just be referred to as the Fire Training Area, Building 600 for the balance of this document.

- Source Area 9 (CSR_VIC_000374) – Petroleum, Oils and Lubricants (POL), Building 490 (South Bandiana);
- Source Area 10 (CSR_VIC_000479) – Former Unit Training Area, between Warehouse 1 and 2 (North Bandiana);
- Source Area 11 (CSR_VIC_000480) – Fire Extinguisher Disposal – Warehouse 13 (North Bandiana);
- Source Area 12 (CSR_VIC_000483) – Armoured Vehicle Maintenance Training, Building 100 (North Bandiana);
- Source Area 13 (CSR_VIC_000383) – Fire Station – Current (East Bandiana);
- Source Area 14 (CSR_VIC_000481) – Former Unit Training, Building 592 (East Bandiana); and
- Source Area 15 (CSR_VIC_000482) – Former Unit Training, Football Field (East Bandiana).

It should be noted that Defence have completed significant investigation work subsequent to the DSI (Golder 2018) which have provided further data on Source Areas and their contribution of PFAS mass to the migration pathways. This additional work has identified a PFAS plume in multiple aquifers originating from Source Area 13 that is migrating northeast across East Bandiana and migrating into off-base areas. Furthermore, several Source Areas, including Source Area 1, 6 and 7 on South Bandiana (further discussed in this report), identified concentrations of PFAS in soil which are considered to contribute to PFAS concentrations in surface water. Based on this, these four Source Areas and pathways are the primary focus of Defence and are planned to have remediation work carried out during 2025 to reduce PFAS migration levels. All other Source Areas across BMA continue to be monitored as part of the OMP program to ensure PFAS concentrations continue to present a low risk to on- and off-base users and the environment, however are not to be considered for remediation at this stage.

3.2 Pathways

3.2.1 Surface Water

Surface water drains into and across BMA in a network of above ground drainage channels, swales and shallow below ground pipes. Surface water has been identified as a pathway for migration of PFAS from identified PFAS Source Areas on North, South and East Bandiana towards both Jack in the Box Creek and Kiewa River catchments. PFAS will continue to migrate through this pathway in the absence of management controls. Broadly the surface water catchment for the base runs north to south, with a divide through South Bandiana in the approximate location of Russell Road. Based on this, surface water drainage from the following Source Areas flow into each of the two respective catchments shown in **Figure 3**:

- Jack In the Box Creek (flow direction to the west/northwest) receives surface water from South Bandiana that includes Source Areas 1, 2, 3, 4, 5 (partial), 6 and 7;
- Kiewa River (flow direction to the east):
 - South Bandiana – Source Areas 5 (partial), 8 and 9;
 - North Bandiana – Source Areas 10, 11 and 12; and
 - East Bandiana – Source Areas 13, 14 and 15.

Based on investigations completed to date, the primary PFAS transport pathway for both South and North Bandiana has been shown to be through surface water, primarily owing to PFAS leaching from soils and infrastructure in the key Source Areas identified above. Surface water is a secondary PFAS transport pathway for East Bandiana. Site history (Golder 2018) has shown that previous base re-development has either capped or removed a large portion of potentially PFAS affected soils, removing this as a potential source for surface water.

3.2.2 Groundwater

In the Management Area, and particularly on the base itself, groundwater has been identified as a primary pathway for the migration of PFAS from Source Areas in East Bandiana and as a secondary pathway for those in South and North Bandiana. Groundwater is likely discharging to the lower portion of Jack in the Box Creek (from a portion of South Bandiana) and to the oxbows in the Kiewa River floodplain or the Kiewa River itself for the balance of the base.

Groundwater contours within the Management Area, consistently show that a groundwater divide is present through the centre of the Area – on-base through North Bandiana itself. Based on this, groundwater flow from the following Source Areas can be attributed to each of the two catchments:

- Jack in the Box Creek (flow direction to the west/northwest):
 - South Bandiana – Source Areas 1, 2, 3, 4, 5, 6, 7, 8 and 9; and
 - North Bandiana – Source Areas 10 (partial) and 12 (partial).
- Kiewa River (flow direction to the east):
 - North Bandiana – Source Areas 10 (partial), 11 and 12 (partial); and
 - East Bandiana – Source Areas 13, 14 and 15.

Due to a combination of the depth to groundwater, the clayey nature of the geology below the Jack in the Box Creek catchment portion of the base in North and South Bandiana and the distance to the discharge point, PFAS from Source Areas migrates slowly from soil into groundwater and there is limited lateral migration in groundwater. Therefore, groundwater is not considered a significant pathway for PFAS discharge off-base to this catchment, although significant (>100 ug/L of Sum PFAS) PFAS concentrations have been identified in several Source Areas within these portions of the base, including Source Area 1 and 7. In these instances, the concentrations of PFAS in groundwater are due to historic excavation/use of a fire training bund and installation of infrastructure, respectively. These areas will be the subject of remedial action.

In the eastern portion of the Management Area, the geology and hydrogeology differ to North and South Bandiana, with the Shepparton Fluvium on this part of the base and off-base to the east in the Kiewa River catchment comprising variable deposits of sands, clays and silts. Previous investigations have identified a relatively continuous sand layer, semi-confined and interconnected with shallower and deeper portions of the aquifer, below East Bandiana between a depth of approximately 10.0-15.0 mbgl. The depth of this layer correlates with the off-base springs, oxbow lakes and the Kiewa River situated beyond the northeastern boundary of the base. Groundwater flow in this layer is therefore considered a pathway for PFAS migration from East Bandiana.

3.2.3 Sewerage System

A sewerage network has been constructed below ground across North, South and East Bandiana and services the base buildings. The sewerage network runs within or adjacent to multiple Source Areas before discharging off-base to the North East Region Water municipal waste treatment facility. Previous investigation work included PFAS analysis from the sewer. It was identified that minor PFAS concentrations infiltrate into sewerage infrastructure during rain events from Source Areas, while PFAS is also likely present within the concrete infrastructure of the system itself, which diffuses back into sewage which flows occur. Overall, the sewerage network is considered a secondary pathway for PFAS migration for the BMA, compared to groundwater and surface water pathways.

3.3 Receptors and Receptor Linkages

The receptors and associated potential receptor linkages for PFAS, can be summarised in **Table 3.1**.

Table 3.1: Receptors and Associated Potential Receptor Linkages

Exposure Group	Potential Exposure Via
On-base residents who live on the base	- Incidental ingestion of soil and/or water on the base and eating potentially impacted biota grown or caught on the base; - Inhalation of dust; or - Eating potentially affected biota grown within the catchment area, including home grown foods, such as fruit and vegetables and livestock.
On-base workers, army personnel and visitors who work or visit the base	- Incidental ingestion of soil and/or water on the base; or - Inhalation of dust.
On-base terrestrial or aquatic ecosystems including flora and/or fauna	- Direct contact with and/or uptake of contaminants from soil, sediment or surface water; - Ingestion by fauna including eating affected biota (including incidental ingestion of soil/sediment adhering to plants/grass) and drinking impacted surface water; or - Ingestion by fauna of greater PFAS concentrations by higher trophic level predatory species due to the tendency for PFAS compounds to bioaccumulate and biomagnify within ecosystems.
Off-base sensitive receptors including people who either live, or attend schools or childcare facilities within the portions of the Jack in the Box Creek or Kiewa River catchments downstream of the base	- Drinking potentially affected water; - Incidental ingestion of potentially affected soil, sediment, surface water or groundwater; - Inhalation of potentially affected dust; or - Eating potentially affected biota grown, caught or reared within the catchment area, including home grown or agriculturally produce.
Recreational users including people using public open recreational spaces within the portions of the Jack in the Box Creek or Kiewa River catchments downstream of the base	- Incidental ingestion of potentially affected soil, sediment, surface water or groundwater; - Inhalation of potentially affected dust; or - Eating potentially affected biota caught within the catchment area, including recreationally caught fish and yabbies.
Commercial/industrial workers including general commercial/industrial workers, sewage treatment plant workers and maintenance/trench workers operating within the portion of the Jack in the Box Creek or Kiewa River catchments downstream of the base	- Incidental ingestion of potentially affected soil, sediment, surface water, sewage or groundwater; or - Inhalation of potentially affected dust.
Off-base terrestrial or aquatic ecosystems including flora and/or fauna	- Incidental ingestion of potentially affected soil, sediment, surface water or groundwater; or - Inhalation of potentially affected dust.
Off-base terrestrial or aquatic ecosystems including flora and/or fauna	- Direct contact with and/or uptake of contaminants from soil, sediment or surface water; - Ingestion including eating impacted biota (including incidental ingestion of soil/sediment adhering to plants/grass) and drinking affected surface water; or - Ingestion of greater PFAS concentrations by higher trophic level predatory species due to the tendency for PFAS compounds to bioaccumulate and biomagnify within ecosystems.

3.4 Exposure and Risk

The work undertaken to inform the DSI (Golder 2018), HHERA (Golder 2020) and DSI Addendum (JBS&G 2024a) has confirmed that for each of the key exposure scenarios identified as currently being realised (of which there are six, refer to HHERA for further information), the potential exposure to PFAS was assessed to present a low and acceptable risk to human health. This related to both on-base and off-base areas.

The only potentially unacceptable human health risks were associated with unrealised scenarios relating to East Bandiana and the off-base land to the east which were assessed to inform stakeholders of potential future risks. There were eight risks identified in total which have been summarised in the following points:

- Use of groundwater as drinking water or stock watering;
- Home consumption of cattle (meat and offal) raised within the southern pastoral area;
- Consumption of recreationally caught carp from the main Kiewa River channel, oxbow lakes of the Kiewa River floodplain and Unnamed Creek;
- Consumption of recreationally caught fin fish and yabbies from oxbow lakes in the floodplain of the Kiewa River, adjacent to East Bandiana;
- Consumption of eggs from home raised poultry watered with extracted groundwater – boundary of East Bandiana and Jack in the Box Creek catchment;
- Consumption of home grown produce (vegetables and eggs) irrigated with extracted surface water – floodplain of the Kiewa River adjacent to East Bandiana and Jack in the Box Creek;
- Consumption of home grown produce (vegetables) irrigated with extracted groundwater – floodplain of the Kiewa River adjacent to the southern portion of East Bandiana; and
- Incidental ingestion of surface water during recreational activities – floodplain of the Kiewa River adjacent to East Bandiana.

4. Data Quality Objectives

The Data Quality Objectives (DQO) process outlined in the ASC NEPM (NEPC 2013) has been adopted to establish the purpose of the OMP monitoring. Schedule B2 of the ASC NEPM outlines the seven step DQO process developed by the USEPA as one example of a suitable systematic planning approach for site investigations. The seven step DQO process is as follows:

- Step 1 – State the problem;
- Step 2 – Identify the decision or goal of the investigation;
- Step 3 – Identify the information inputs;
- Step 4 – Define the investigation boundaries;
- Step 5 – Develop the analytical approach or decision rule;
- Step 6 – Specify the performance or acceptance criteria; and
- Step 7 – Optimise the design for obtaining the data.

4.1 Step 1 – State the Problem

Investigations conducted at the base have identified PFAS associated with the use, storage and disposal of AFFF in the groundwater, surface water, affected soil, sediment, biota and sewage within the Management Area, at concentrations exceeding the relevant screening criteria. Ongoing surface water, groundwater and sediment monitoring is required to be undertaken within the Management Area to assess the spatial and temporal variation in PFAS concentrations and to provide supporting data for assessment of management actions to reduce PFAS migration from the base. Sewage sampling is required to provide a baseline of sewerage conditions prior to the RRD.

4.2 Step 2 – Identification of the Decision or Goal of the Investigation

The primary decision statement outlined in the OMP document that needs to be answered by the OMP program is:

- Do the analytical results and field observations allow for the interpretation of the spatial and temporal variation in PFAS concentrations in the Management Area and do these trends warrant a re-evaluation of the CSM or management options in the PMAP (Defence 2020)?

The alternative actions of the principal study question are:

- The analytical results and field observations allow for interpretation of the spatial and temporal variation in PFAS concentrations and warrant a re-evaluation of the CSM and PFAS management options; and
- The analytical results and field observations allow for interpretation of the spatial and temporal variation in PFAS concentrations, and do not warrant a re-evaluation of the CSM and PFAS management options.

4.3 Step 3 – Identify the Information Inputs

The primary information inputs for the work are outlined in the following table.

Table 4.1: Information Inputs

Aspect	Description
Site Conditions	• Historical information, site observations, and data collected during previous investigations;

Aspect	Description
	• Historic data collected as part of the OMP and Mass Flux Study (JBS&G 2024c); • Field observations such as water quality parameters (pH, dissolved oxygen etc.) and visual/olfactory observations; and • Collection of surface water, groundwater and sediment samples and analysis for PFAS to achieve a sufficient distribution of data to characterise the distribution of contamination across the Management Area.
Analytical Data	• PFAS concentrations in representative samples in surface water, groundwater, sediment and sewage; and • Assessment of the suitability of the data through application of Data Quality Indicators (DQIs).
Geological and Hydrogeological Data	• Measuring water depth in groundwater monitoring wells; • Calculated aquifer flow direction based on field measurements; and • Rainfall data.

4.4 Step 4 – Define the Investigation Boundaries

The lateral extent of the study encompasses the Management Area established around the base and the surrounding off-base waterways. The base and Management Area boundaries have been provided in **Figure 1**.

The vertical extent of the investigation will be shallow sediment and the depth of groundwater across the Management Area (deepest groundwater well is 41.0 mbgl at MW328).

The temporal boundaries for the works detailed in this SAQP comprise a period of 2 months (i.e. the period to complete the OMP sampling and reporting). It is likely that the OMP document will be revised, which will ultimately amend the overall OMP sampling scope for the next event in 2025.

Constraints on the previously identified investigation boundaries may be influenced by:

- Activities on-base, including operational or base access restrictions, or upgrade or redevelopment works;
- Off-base access restrictions;
- Access restrictions associated with sampling equipment; and
- Dry weather during proposed surface water sampling events resulting in features which cannot be sampled. Consideration will be made for reasonable rain events when planning surface water events.

4.5 Step 5 – Develop the Decision Rule and Analytical Approach

The purpose of this step is to define the parameters of interest, specify action levels and combine the outputs of the previous DQO steps to develop a series of options if certain trigger events occur. Key decision rules for the investigation will be:

- Has the analytical data collected as part of the investigation met the DQIs (see below)? If yes, then the data can be used to answer the decision rule below and the decision statement developed in Step 2. If no, then an assessment of the need to collect additional data will be required; and
- Does the analytical data collected meet the requirements to determine the nature and extent of PFAS within the identified source areas, and address the decision points for the investigation? If yes, then the data can be used to assess the potential for re-evaluation of management options outlined in the PMAP (Defence 2020). If no, then an assessment of an alternative approach to collect this data will be required.

In order to assess the useability of the data for making decisions, the data will be assessed against a set of DQI, developed based on the parameters provided in **Section 4.7.2**.

The measurements employed along with the acceptance criteria has also been presented in **Section 4.7.2**.

4.6 Step 6 – Specify Performance or Acceptance Criteria

This step involves specifying acceptable limits on decision errors. Decision errors are incorrect decisions caused by using data that are not representative of site conditions due to sampling or analytical error.

Specific decision rules as a statistical hypothesis test relevant to this investigation are summarised as follows:

- **Null hypothesis:** contaminated site media present at the base or Management Area is identified as an unacceptable risk to current or future users.
- **Alternative hypothesis:** no contaminated media is present at the base or Management Area which is identified as an unacceptable risk to current or future users.

This may result in decision errors that can occur for the investigation including:

- a) **Type II Error:** Collection of samples which overestimate real PFAS concentrations or contribution to risk, resulting in implementation of management actions, or remediation areas being defined, which are too stringent. The consequence of this error would be corrective actions being undertaken to a degree which is more than necessary; and
- b) **Type I Error:** Collection of samples which underestimate real PFAS concentration, resulting in implementation of management actions, or remediation areas being defined, which are not stringent enough to sufficiently reduce off-base migration of PFAS. The consequence of this error may be unacceptable impacts to human health and the environment.

The more severe consequences are with decision error b) since the risk of jeopardising human health and/or the environment outweighs the consequences of undertaking management actions that are not necessary.

Acceptance limits on field and laboratory data collected for this investigation have been identified with reference to the NEPM and the PFAS NEMP. In this case acceptable limits on the likelihood of making decision errors, an alpha risk (Type I error) of $\alpha = 0.05$, and a beta risk (Type II error) of $\beta = 0.2$ will be applied.

The potential for significant decision errors will be minimised by completing a QA/QC program, including adoption of appropriate DQIs used to assess QA/QC performance, and implementing JBS&G procedures for field sampling and handling designed specifically for PFAS investigations (refer to **Section 7**).

The pre-determined DQIs established for precision, accuracy, representativeness, comparability, completeness and sensitivity, and are shown in **Section 4.7.2**. The DQIs are based on the ASC NEPM and the requirements of the National Association of Testing Authorities (NATA) accreditation for the nominated laboratories.

If any of the DQIs are not met, further assessment will be necessary to determine whether the non-conformance will significantly affect the usefulness of the data. Corrective actions may include requesting further information from samplers and/or analytical laboratories, downgrading of the quality of the data or alternatively, re-collection of the data.

4.7 Step 7 - Plan for Obtaining Data

The SAQP is developed in accordance with the OMP and the relevant guidelines through a targeted approach to produce a resource-effective design that targets known and potential sources, pathways and receptors at within the Management Area.

4.7.1 Ongoing Monitoring Sampling Overview

The OMP (Defence 2020) sampling requirements are detailed in the PMAP (Defence 2020). **Table 4.3** provides a list of groundwater, surface water and sediment sampling locations which are to be completed during each sampling event, along with the reasoning for the position of each sample location in the context of the overall program and the base. The footnotes to **Table 4.3** identify changes to the OMP requirements.

In total, 44 groundwater wells, 53 surface water locations and 12 sediment locations are sampled as part of the OMP, although the number of locations sampled depends on season, which has been detailed in **Table 4.2**.

Table 4.2: Sampling Frequencies

Sampling Period	Sampling Required
Autumn (May)	Bi-Annual Surface Water sampling, Annual Sediment, and Bi-annual Groundwater sampling columns apply from Table 4.3
Spring (October)	Bi-Annual Surface Water sampling and the Annual and Bi-annual Groundwater sampling columns apply from Table 4.3

Groundwater sample locations are provided in **Figure 4**, while surface water and sediment locations are provided in **Figure 5A** and **5B**.

Table 4.3: OMP Sampling Locations as per PMAP (Defence 2020)

Catchment	Surface Water (Bi-Annual)	Sediment (Annual)	Groundwater		Target Area	Justification
			Annual	Bi-annual		
On-base Locations						
Jack in the Box Creek	SW302, SW307, SW310		MW315, MW317 MW318		South Bandiana, on-base, Source Area 2	Locations targeting surface water and groundwater within and downgradient of the Source Area.
	SW311, SW313, SW316, SW321		MW304, MW307, MW311		South Bandiana, on-base, Source Area 1	Locations target surface water and groundwater within and downgradient of the Source Area. SW311 and MW304 is the point of discharge off-base into Jack in the Box Creek.
	SW322		MW312		South Bandiana, on-base	SW322 and MW312 is a point of discharge off-base into Jack in the Box Creek. The point is also at the confluence of surface water drainage from Source Areas 1, 2, 5, 6 and 7.
	SW323	SD323			South Bandiana, on-base	This point represents the confluence of drainage from Source Areas 5, 6 and 7 and depositional environment prior to discharging off-base.
	SW324, SW326, SW332, SW336		MW051 ¹ , MW416 ² , MW323		South Bandiana, on-base, Source Area 6	Locations target surface water and groundwater discharge from Source Area 6. SW336 is located within the Fire Training Area settling pond. SW324 and SW332 target two different flow paths from the Source Area.
	SW333, SW338		MW329		South Bandiana, on-base, Source Area 5	Locations target surface water and groundwater discharge from Source Area 5. SW333 targets discharge to Jack in the Box Creek. SW338 is the large pond within the Source Area. SW340 targets discharge to the Kiewa River.
Kiewa River	SW340					
Jack in the Box Creek	SW448		MW319, MW321		South Bandiana, on-base, Source Area 7	Locations target surface water and groundwater discharge from Source Area 7.
Kiewa River	SW346, SW349, SW355	SD346, SD355	MW056 ³		South Bandiana, on-base, Source Area 9 and Stormwater Ponds (wetlands)	MW056 targets perched groundwater identified within Source Area 9. Surface water locations are targeting discharge into, within and discharging from the South Bandiana Stormwater Ponds.
	SW370, SW374, SW375	SD375	MW342	MW345, MW346	North Bandiana, on-base, Source Areas 10, 11 and 12	SW370 is within the unnamed creek, targeting contributions from Source Areas 10, 11 and 12. MW342 targets Source Area 12. MW345 is within the shallow Fluvium where potential groundwater/surface water interactions may be occurring. SW375, SD375 and MW346 is the point of discharge off the Site.
	SW379, SW380			MW052 ⁴ , MW403 ⁵ , MW404 ⁶ , MW350_S, MW350_D, MW009, MW016, MW042, MW043, MW035, MW034, MW046_I ⁷ , MW046_D ⁷ , MW018, MW020, MW012, MW029, MW352, MW353, MW354	East Bandiana, on-base, Source Area 13, 14 and 15	Locations are targeting surface water discharge from Source Area 13. The groundwater locations are targeting the East Bandiana groundwater plume, which is emanating from Source Area 13 and discharges off-base across the eastern site boundary.
	SW382, SW387, SW388	SD382		MW351	East-Bandiana, on-base	Locations are targeting the points of discharge from East Bandiana into the Kiewa River and floodplain. MW351 targets the downgradient boundary adjacent to the residential properties.
	Off-base Locations					
Jack in the Box Creek	SW424, SW463	SD424, SD463	MW313		Upper Jack in the Box Creek	Locations are targeting publicly accessible open space land use areas where yabby trapping occurs. MW313 targets the residential estate located beyond the South Bandiana boundary. Groundwater monitoring locations represent potential human health exposure, as it targets the residential estate located beyond the South Bandiana boundary where a number of groundwater bores with unknown use were identified in the DSI (Golder 2018).
	SW427			MW360	Lower Jack in the Box Creek	SW427 is located where the creek passes near sensitive land use areas (a child care centre) where sensitive receptors such as children could be exposed. MW360 is located within the Fluvium where elevated concentrations were identified and where potential groundwater/surface water interactions may be occurring.
	SW430			MW361		MW361 is located within the fluvium where elevated concentrations were reported. SW430 is in proximity to groundwater well (MW361) to allow assessment of groundwater/surface water interactions.

Catchment	Surface Water (Bi-Annual)	Sediment (Annual)	Groundwater		Target Area	Justification
			Annual	Bi-annual		
Kiewa River	SW431					SW431 is located where flood diversion structures are located and if used may results in the release of water into Wodonga Creek upgradient of the North East Water abstraction point.
	SW432					SW432 is located downgradient of several off-base sources identified within the DSI (Golder 2018).
	SW434				Jack in the Box and Wodonga Creek confluence	SW434 is located at the confluence of Jack in the Box Creek and Wodonga Creek and represents the downgradient point of monitoring within the Management Area within the Jack in the Box Creek catchment.
	SW409				Unnamed creek	SW409 is located where the unnamed creek passes near sensitive land use areas (i.e. the Killara residential development and park land) where sensitive receptors such as residents may be present.
	SW403, SW405, SW412, SW462	SD412		MW357	Unnamed creek and Kiewa River oxbows	Locations SW403 and SW405 are oxbow lakes within the Central Pastoral area and SW412 and SW462 are where the unnamed creek passes through the Northern and Central Pastoral Areas. The HHERA (Golder 2020) identified potential unacceptable human health risks associated with the consumption of carp from within the unnamed creek. SW462 and MW357 are at the point where the unnamed creek discharges into the Kiewa River. SD412 is a depositional environment within the unnamed creek on the Kiewa River floodplain.
	SW395, SW396, SW397, SW400, SW401, SW470, SW471, SW487	SD395, SD396, SD397, SD400		OTH019	Kiewa River oxbows	Locations are oxbow lakes located on the Kiewa River floodplain within the Southern Pastoral Area. Groundwater location OTH019 represents point of potential human health exposure where bore water is used for irrigation of home grown produce and drinking water for chickens. SW487 is targeting seepage water, where groundwater seeps were identified at the Kiewa River floodplain during the HHERA (Golder 2020). MW356 targets the assessment of groundwater/surface water interactions at the Kiewa River.
	SW390				Kiewa River – main channel	SW390 is the Kiewa River background location and represents conditions upstream of the Baranduda Water Treatment Plant (WTP) and Middle Creek.
	SW393				Middle Creek	SW393 is located within Middle Creek and represents potential contributions from the Middle Creek catchment. The HHERA (Golder 2020) identified potential unacceptable human health risks associated with the consumption of carp from within the Middle Creek.
	SW398, SW404			MW356		Locations are within the Kiewa River main channel and represents conditions downgradient of the on-base discharges and where recreational activities commonly occur within the river. MW356 targets the assessment of groundwater/surface water interactions at the Kiewa River.
	SW416				Kiewa River – main channel	SW416 is located within the main Kiewa River channel at the point of confluence with the unnamed creek where recreational activities commonly occur within the river and represents the downgradient point of monitoring within the Management Area and within the Kiewa River catchment.

- Notes
- Monitoring well MW051 was previous identified as MW04 within the PMAP (Defence 2020). MW051 is the current Defence labelling for this well and will be adopted for the purposes of this report.
 - In April 2023, damaged MW326 was replaced by a new groundwater monitoring well MW416 in the same location.
 - Monitoring well MW056 was previous identified as BH111 within the PMAP (Defence 2020). MW056 is the current Defence labelling for this well and will be adopted for the purposes of this report.
 - Monitoring well MW052 was previous identified as MW06-a within the PMAP (Defence 2020). MW052 is the current Defence labelling for this well and will be adopted for the purposes of this report.
 - Monitoring well MW403 was previous identified as BH1 within the PMAP (Defence 2020). MW403 is the current Defence labelling for this well and will be adopted for the purposes of this report.
 - Monitoring well MW404 was previous identified as BH2 within the PMAP (Defence 2020). MW404 is the current Defence labelling for this well and will be adopted for the purposes of this report.
 - Monitoring wells identified within the PMAP (Defence 2020) as MW046 and MW047, have been identified as MW046_I and MW046_D respectively during Stantec sampling events. MW046_I and MW046_D will be the sample locations adopted for the purposes of this report.
 - It should be noted that groundwater monitoring wells MW325 and MW328 within Source Area 6 on South Bandiana have been sampled on occasion when the normal OMP wells have been unavailable.

4.7.2 Groundwater Sample Location

As detailed previously in **Section 4.7.1**, a total of 44 groundwater monitoring wells are sampled across the base and the Management Area as part of the OMP. As discussed in **Section 2**, multiple geological units are present across the base. In general groundwater wells within the Jack in the Box Creek catchment, on the western side of the base, are within the Shepparton Colluvium, while wells within the Kiewa River catchment, on the eastern side of the base, are within the Shepparton Fluvium and Coonambigdal Fluvium.

Table 4.4 below divides the OMP wells into their respective aquifers.

It is noted that OTH019 is groundwater sampled from a private bore off-base. The well however is not accessed during OMP sampling events (rather a tap is sampled from extracted groundwater which is understood to be held in an above ground storage tank) and the construction details of the well are unknown. As such, this sample location has not been assigned an aquifer.

Table 4.4: OMP Sampled Wells vs. Aquifers

Geological Unit	Aquifer Interval	Aquifer Depth (mbgl)	OMP Wells
Shepparton Colluvium	Shallow 'S'	Variable, based on position on-base. Identified between approximately 5.0 and 42 mbgl	MW051, MW304, MW307, MW311, MW312, MW313, MW315, MW317, MW318, MW319, MW321, MW323, MW325, MW326, MW328, MW329, MW342, MW360, MW361, MW416
Shepparton Fluvium and Coonambigdal Fluvium	Shallow 'S'	5.0-10.0	MW012, MW016, MW018, MW020, MW029, MW034, MW035, MW043, MW052, MW345, MW346, MW350_S, MW351, MW352, MW353, MW354, MW356, MW357, MW403, MW404
	Intermediate 'I'	10.0-15.0	MW009, MW042, MW046_I
	Deep 'D'	>15.0	MW046_D, MW350_D
Perched Water	-	Approximately 3.0	MW056

4.7.3 Groundwater Sampling Methodology

Groundwater wells have historically been sampled as part of the OMP program via HydraSleeve, with wells which have a short water column (i.e. <1.0 m) sampled via bailer.

As part of this SAQP, JBS&G have reviewed the groundwater sampling approach to understand if the methods are suitable and whether they will provide the most representative data for the OMP and the expected Base conditions. As part of this assessment, JBS&G have reviewed relevant well details which has been summarised in the table provided in **Appendix C**. Based on the review completed, this OMP sampling round will follow the existing groundwater sampling methodology based on the following justification:

- The HydraSleeve sampling method is endorsed by the Groundwater Sampling Guidelines (EPA 2022), with the only limitation identified being the limited sample volume removed, which can be countered by providing larger HydraSleeves at necessary locations (i.e. those where QA/QC samples are collected);
- The Groundwater Sampling Guideline (EPA 2022) recommends that sampling with a bailer should only be completed when other sampling method are not available. Owing to expected short water columns, see dot points below, is it considered unlikely that other sampling methods would be practical for several wells within the Management Area;
- For the sake of consistency during the sampling event, it is the preference to only adopt two sampling methods (i.e. a primary method and a back up method), rather than introducing low flow as a third sampling option. It is acknowledged that low flow sampling is a more preferred method to bailer.

However, it is unlikely that low flow can be practically implemented in a number of wells due to the short water columns;

- Maintaining the existing groundwater sampling methodology will enable direct comparison of results between current and historic sampling rounds;
- The majority of monitoring wells across the OMP network have sufficient water column (i.e. >1.0 m) to enable sampling via HydraSleeve;
- The wells which do not have sufficient water column for HydraSleeve sampling (i.e. <1.0 m), generally have very minimal water columns (i.e. <0.3 m). It is considered that this level of water in a well is unlikely to be conducive to low flow sampling, owing to the inlet height of the pump and likely drawn down when sampling. Based on this, and for the sake of consistency, wells with minimal water columns should continue to be sampled via bailer; and
- The Shepparton and Coonambigdal Fluvium aquifers are characterised by high groundwater flow rates, while the Shepparton Colluvium is of a slower rate. The deployment time of a HydraSleeve prior to sampling (24 hours, see **Section 5.4** for further details) is considered sufficient to enable groundwater exchange between the well and the aquifer system to gain a representative sample from all aquifer types.

4.7.4 Baseline Sewage Sampling

A sewerage network has been constructed below ground across North, South and East Bandiana and services the base buildings. Based on the current appreciation of the base sewerage network, all sewerage lines across South Bandiana are gravity fed from south to north, with two sewerage lines crossing Anzac Parade into North Bandiana before existing the base in a single point in the north east corner. A trunk sewer then runs south east down Whytes Road toward the North East Region Water municipal waste treatment facility.

This understanding of the sewerage system and the position of the civil work for the RRP in the central portion of South Bandiana, has led to the development of a scope which will collect ten sewage samples across South and North Bandiana. The sewerage network and the proposed samples have been provided in **Figure 6**. The justification of the locations has been provided in **Table 4.5**.

Table 4.5: Sewage Sample Locations

Sample Location ID	Base Area	Rational for Sampling
OTH047	South Bandiana	Immediately up-gradient of Source Area 6 and down-gradient from Source Area 7. This location was sampled as part of the Mass Flux Study and results will be able to be compared.
OTH048	South Bandiana	Immediately down-gradient from Source Area 6. This location was sampled as part of the Mass Flux Study and results will be able to be compared.
OTH067	South Bandiana	Alternative flow path down-gradient from Source Area 7, but prior to the sewerage branch for Source Area 8.
OTH071	South Bandiana	Down-gradient of both Source Area 7 and 8. Comparison to OTH067 will identify potential contribution from Source Area 8.
OTH072	South Bandiana	Down-gradient of Source Area 5.
OTH073	South Bandiana	Down-gradient of Source Area 9.
OTH074	South Bandiana	Location within the footprint of major civil works of the RRP.
OTH075	North Bandiana	Location provided immediately down-gradient of the RRP works area, prior to other sewerage network branches entering the main sewer.
OTH076	North Bandiana	Further down-gradient in North Bandiana following the addition of sewerage network branches which are no related to Source Areas.

Sample Location ID	Base Area	Rational for Sampling
OTH077	North Bandiana	Further down-gradient in North Bandiana following the addition of sewerage network branches which are related to North Bandiana Source Areas.

4.8 Data Quality Indicators

The pre-determined DQIs established for the project are discussed below in relation to precision, accuracy, representativeness, comparability and completeness parameters, as summarised in **Table 4.6**, with specific DQIs adopted for the investigation works summarised in **Table 4.7**.

Table 4.6: Data Quality Indicators

DQIs	Field	Laboratory
Precision	- Compliance with JBS&G's work instructions; - Compliance with groundwater sampling guidance such as field sampling methodologies, sample storage and preservation; - Investigation by suitably qualified and experienced personnel; and - Collection of blind duplicate and split samples.	- Use of NATA accredited laboratories; - Compliance with Defence Guidance Document E (Standard PFAS Analytical Suite (Revision 4, 1 October 2021)); - Using NATA accredited testing methods for analysis of PFAS; - Analysis of blind duplicate and split samples at a frequency of 1 in every 10 primary samples; and - Laboratory internal duplicate samples.
Accuracy	- Compliance with JBS&G's work instructions; - Compliance with groundwater sampling guidance such as field sampling methodologies, sample storage and preservation; - Calibration of sampling equipment; - Investigation by suitably qualified and experienced personnel; and - Collection of quality control samples.	- Analysis of method blanks, matrix spike recoveries, surrogate spikes recoveries, laboratory control spike recoveries; - Compliance with Defence Guidance Document E (Standard PFAS Analytical Suite (Revision 4, 1 October 2021)); and - Compliance with sample holding times.
Representativeness	Compliance with JBS&G's work instructions.	- Analysis of contaminants of concern; - Analysis within holding times; - Analysis of rinsate, trip and field blanks; and - Analysis of laboratory field blanks.
Comparability	Compliance with JBS&G's work instructions.	- Use of NATA accredited laboratories; - Using NATA accredited testing methods for analysis of PFAS; - Analysis of split samples; - Comparison of analytical results against adopted screening criteria; and - Comparison of data against historic data where available.
Completeness	All critical locations sampled	All critical samples analysed.

Table 4.7: Summary of Quality Assurance / Quality Control Program

Data Quality Objectives	Frequency	Data Quality Indicator
Precision		

Data Quality Objectives	Frequency	Data Quality Indicator
Blind duplicates (intra laboratory)	1 / 10 samples	<30 RPD ^a
Blind duplicates (inter laboratory)	1 / 10 samples	<30 RPD ^a
Laboratory duplicates ^b	1 / 10 samples	<30 RPD ^a
Accuracy		
Method blanks	1 per lab batch	Less than the laboratory limit of reporting (<LOR)
Laboratory control samples	1 per lab batch	70-130% or as nominated in the laboratory's QC report
Matrix spikes	1 per lab batch	70-130% or as nominated in the laboratory's QC report
Representativeness		
Sampling appropriate for media and analytes	-	- ^c
Samples extracted and analysed within holding times.	All samples	Samples analysed within 28 days (Eurofins and Envirolab) holding time for PFAS
Trip blank	1 per lab batch	<LOR
Rinsate blank	1 per day per field crew, where reusable equipment is used	<LOR
Field Blank	1 per day	<LOR
Laboratory blanks	1 per lab batch	<LOR
Comparability		
Standard operating procedures for sample collection and handling	All Samples	Samples collected in accordance with relevant procedure ^c
Standard analytical methods used for all analyses	All Samples	All samples analysed by a laboratory that is NATA accredited for the analyses performed
Consistent field conditions, sampling staff and laboratory analysis	All Samples	- ^c
Limits of reporting appropriate and consistent	All Samples	Laboratory LOR is below adopted screening criteria, where practical and allows relevant comparability between results where more than one laboratory is used
Completeness		
Sample description and Chain of Custody (COC) completed and appropriate	All Samples	- ^c
Appropriate documentation	All Samples	- ^c
Satisfactory frequency and result for QC samples	All QA/QC samples	5% frequency is met, RPDs within acceptable range identified above
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		

Data Quality Objectives	Frequency	Data Quality Indicator
Analytical methods and limits of recovery appropriate for media and adopted site screening criteria	All Samples	Laboratory LOR is below adopted screening criteria, where practical

Table Notes:

- a. If the relative percent difference (RPD) between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.
- b. Duplicate sample analysis performed by the laboratory as part of their internal QA/QC program for the data.
- c. A qualitative assessment of compliance with standard procedures and appropriate sample collection methods will be completed during the DQI compliance assessment.

5. Sampling Methodology

The following sections detail the methodology to be undertaken for all sampling listed in this SAQP.

5.1 Prior to Sampling

Prior to the commencement of sampling activities, the field team will review the field sampling guide (**Appendix A** and **Appendix B**) and complete the checklist to ensure no prohibited items are brought to the investigation areas that may potentially contaminate or affect the integrity of the samples. Appropriate health and safety and environmental control documentation will be completed prior to the commencement of fieldworks. This documentation includes:

- A Health, Safety and Environmental Management (HSEMP) including Safe Work Method Statement (SWMS) developed to encompass hazard management and risk mitigation. This Site-specific safety plan will be reviewed, revised and understood by all field staff prior to the commencement of field works; and
- JBS&G will, if directed to by the base Environment and Sustainability Manager, complete a Environmental Clearance Certificate (ECC) prior to commencing fieldworks. The ECC will outline environmental conditions which are required to be implemented as part of the works.

5.2 General Sampling Requirements

The following sampling requirements will apply to all surface water, groundwater and sewage methodologies detailed in the following sections.

- 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;
- Field records will be collected throughout the sampling event, which will include the following information as a minimum:
 - Sampling time, date and name of the sampler;
 - Weather conditions;
 - Sample collection method;
 - Sampling equipment decontamination procedures; and
 - Calibration and bump test records.
- A 'shaker test' will be undertaken on a small volume of the sample (approximately 10-25 mL). If foaming is noted within the sample, this will be documented on the sampling sheet;
- Each of the sample bottles will be labelled only using ball point pens with the project ID, date, sampler's initials and unique sample location ID (or QC sample name);
- Samples will be collected directly into appropriately preserved laboratory supplied bottles (Teflon-free). In order to minimise exposure to sunlight, sample bottles will be placed immediately into a pre-chilled ice chest, for subsequent transport to the testing laboratories. 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";
- Chain of custody documentation will be completed for each batch of samples relinquished to the laboratory;

- Re-usable sampling equipment (e.g. sampling pole, interface probe, etc.) will be decontaminated in accordance with the procedure outlined in **Section 5.6**;
- QA/QC samples will be collected in accordance with **Section 4.7.2** and **Section 7** to assess the effectiveness of the sampling and decontamination procedures; and
- Samples will be analysed for the PFAS suite as outlined in **Table 6.1**.

In addition, sampling will be completed in accordance with the JBS&G field sampling guide which has been developed specifically for sampling for PFAS. The field sampling guide includes a detailed field checklist to mitigate potential sample contamination from PFAS during the investigation.

5.3 Surface Water Sampling

5.3.1 In-situ Sampling

Samples will be collected using the methodology outlined below which considers Australian/New Zealand Standard AS/NZS 5667.6:1998 Water Quality – Sampling, Part 6: Guidance on sampling rivers and streams, with amendments made as per WA DER 2017 guidance which address the specific issues associated with PFAS sampling.

In-situ surface water sampling will be undertaken from accessible swales and water bodies listed in **Table 4.3**. Sampling methodologies will consist of the following:

- Surface water 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;
- Field observations such as flow, turbidity, presence of suspended solids and odours, sheen, oily film, nuisance organisms which may fall into the well (i.e. ants or spiders), floating debris or frothing will be recorded on field sampling sheets. The condition of the water body from which the sample was obtained will include a record of the sample type, qualitative flow speed (e.g. stagnant, gentle flow, high flow) and channel width, to the extent practicable;
- When sampling is to be completed from a water body, a new laboratory-supplied (Teflon-free) container will be attached to a sampling pole and lowered into the water stream;
- Samples will be collected with the sample container positioned with opening orientated in downwards, facing down stream and at least 10 cm below the water surface to minimise disturbance of the water column and to minimise collection of sediment in the samples. The sample bottle will be filled to the top to ensure no headspace and the cap will be immediately applied; and
- Where sampling is to be conducted from surface inlets or outlets, the sample will be collected directly into the laboratory-supplied (Teflon-free) sample bottles with a gloved hand.

5.4 Groundwater Sampling

The following hierarchy of groundwater sampling methodology will be adopted:

1. Passive sampling using a High-density polyethylene (HDPE) HydraSleeve; and
2. Sample collection by bailer.

HydraSleeve sampling methodology is considered an appropriate method for the collection of samples as part of this OMP and is the technique that has been used during previous OMPs sampling rounds. As such is the first preference for representativeness and consistency purposes. Sampling with a bailer is considered an appropriate back up methodology owing to the limited water column identified in several of the wells, which are unlikely to be appropriate for sampling via a low flow methodology. Justification for sampling types has been further discussed in **Section 4.7.3**.

5.4.1 Well Gauging

Prior to groundwater sampling, all well will be gauged based on the following methodology:

- Prior to sampling, groundwater levels will be gauged with an interface probe and measured against a specific mark at the top of the well casing, to assess standing water levels (SWLs) and the potential but unlikely presence of non-aqueous phase liquids (NAPL) within the groundwater well; and
- A consolidated groundwater gauging event (initial gauging round) will be undertaken across the OMP groundwater monitoring well network at each monitoring event to the extent practicable. The gauging event is intended to be completed in one day to the extent practicable, however is subject to access and availability. Wells which have specific or difficult access constraints will not be included.

5.4.2 HydraSleeve Sampling

Groundwater sampling will be undertaken from all accessible groundwater monitoring wells listed in **Table 4.3**. Sampling methodologies will comprise the following:

- The correct HydraSleeve size selection for each monitoring well will be undertaken in line with the HydraSleeve Standard Operation Procedure (refer **Appendix B**). All wells are installed with the standard 50 mm diameter PVC, and as such the 2" 1L HydraSleeves will be adopted for the OMP;
- The HydraSleeve sampler is a flexible lay-flat HDPE sleeve with a weight on the bottom and check valve on the top that is lowered into the well to the prescribed sampling depth. HydraSleeve will be either deployed to approximately 10 cm above the base of wells or accumulated sediment layer or a minimum of 2.5 m within the screen interval (so HydraSleeve has sufficient space to deploy within the screen). If sufficient water column is available, the HydraSleeve will be positioned such that it does not sit at the base of the well where sediment may be present. HydraSleeve will be deployed directly following gauging in most instances;
- After placement in the monitoring well, the HydraSleeve will be left for a minimum of 24 hours to re-equilibrate;
- The groundwater sample will then be collected by pulling the HydraSleeve up through the water column and to the surface at a rate of approximately 30 cm per second. The recovered water sample will be decanted into the appropriate laboratory supplied sample bottles;
- Groundwater water quality parameter field measurements (field parameters) will be recorded with a water quality meter following sample collection using extra sample water from within the deployed HydraSleeve decanted into a clean jar. Field parameters including pH, EC, Redox potential, DO and temperature will be measured using a calibrated water quality meter and sample container;

Wells sampled via HydraSleeve methods are not purged prior to sampling. It is therefore proposed to collect an additional water sample for analysis of field parameters post sample collection, where insufficient volume is recovered from the initial HydraSleeve deployment; and

Field observations such as colour, presence of suspended solids, turbidity, and the presence of odours, sheen, oily film, nuisance organisms, floating debris or frothing will also be recorded on field sampling sheets.

5.4.3 Bailer Sampling

Should the water column be identified as too short for the deployment of HydraSleeve, a bailer will be used to collect the sample based on the following methodology:

- A new disposal bailer will be lowered into the well and into the available water column, with care taken not to strike the well base nor to stir up sediment. Additional deployments of the bailer will be made to collect sufficient sample; and
- Groundwater water quality parameter field measurements (field parameters) will be recorded with a water quality meter following sample collection using extra sample water from the bailer decanted into a clean jar. Field parameters including pH, EC, Redox potential, DO and temperature will be measured using a calibrated water quality meter and sample container.

5.5 Sewage Sampling

Sewer sampling will be undertaken from accessible service pits when flows are identified within the infrastructure. Sampling will consist of the following:

- When sampling is to be completed from pits, a new laboratory-supplied (Teflon-free) container will be attached to a sampling pole and lowered into the water stream. Consultants are never to enter pits to collect samples; and
- Samples will be collected immediately below the water surface to minimise disturbance of the water column and to minimise collection of sediment in the samples.

5.6 Decontamination Procedures

Before and between sampling at each location, all non-disposable equipment (e.g. interface probe, HydraSleeve weights) will be decontaminated to reduce the risks of cross-contamination using the following procedure:

- Any debris will be removed from re-usable sampling equipment by scrubbing with a plastic brush followed by thorough rinsing with tap water then triple rinsing with laboratory supplied deionised water;
- If required, suitable soaps (Alconox® and Liquinox®) may be used following the water only decontamination approach. Detergents or Decon 90® will not be used for decontamination; and
- Rinsate blank samples collected from re-usable equipment following decontamination will be collected and analysed to assess the effectiveness of the decontamination procedures.

5.7 Waste Management

Generation of bulk wastes, such as purged groundwater are not anticipated during the proposed works (due to use of Hydrasleeves), although minor water wastes may be generated as part of the works. Any waste waters will be collected in a drum located in the environmental shed on the South Bandiana golf course, for later off-base disposal to a licensed facility.

Waste gloves and sampling containers etc. will be collected and appropriately containerised and disposed of appropriately.

JBS&G will coordinate with the base Environment and Sustainability Manager and the AWMA base support team should additional support be required regarding Waste Management.

6. Sample Analysis

The key parameters of interest for the study comprise PFAS compounds that were historically present in fire-fighting foams used at the base, principally perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexanesulfonic acid (PFHxS). However, all samples recovered during the investigation will be analysed for a broad PFAS analytical suite comprising the analytes listed in **Table 6.1**.

It is noted that the list is the same as that presented in Defence Guidance Document E, Standard PFAS Analytical Suite (Revision 4, 1 October 2021).

Table 6.1: PFAS Analytical Suite (28 Analytes)

Chemical Compound	CAS No.
Perfluorobutanoic acid (PFBA)	375-22-4
Perfluoro pentanoic acid (PFPA or PFPeA)	2706-90-3
Perfluoro-n-hexanoic acid (PFHxA)	307-24-4
Perfluoro-n-heptanoic acid (PFHpA)	375-85-9
Perfluoro-n-octanoic acid (PFOA)	335-67-1
Perfluoro-n-nonanoic acid (PFNA)	375-95-1
Perfluoro-n-decanoic acid (PFDA)	335-76-2
Perfluoro-n-undecanoic acid (PFUnA)	2058-94-8
Perfluoro-n-dodecanoic acid (PFDoDA)	307-55-1
Perfluoro-n-tridecanoic acid (PFTrDA)	72629-94-8
Perfluoro-n-tetradecanoic acid (PFTeDA)	376-06-7
Perfluorobutane sulfonic acid (PFBS)	375-73-5
Perfluoropentanesulfonic acid (PFPeS)	2706-91-4
Perfluoro-n-hexane sulfonic acid (PFHxS)	355-46-4
Perfluoro-n-heptane sulfonic acid (PFHpS)	375-92-8
Perfluoro-n-octane sulfonic acid (PFOS)	1763-23-1
Perfluorodecanesulfonic acid (PFDS)	335-77-3
Perfluorooctane sulfonamide (PFOSA)	754-91-6
N-Methylperfluoro-1-octane sulphonamide (N-MeFOSA)	31506-32-8
N-Ethylperfluoro-1-octane sulphonamide (N-EtFOSA)	4151-50-2
2-(N-Methylperfluoro-1-octane sulphonamide)-ethanol (N-MeFOSE)	24448-09-7
2-(N-Ethylperfluoro-1-octane sulphonamide)-ethanol (N-EtFOSE)	1691-99-2
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2991-50-6
N-methyl-perfluorooctanesulfonamidoacetic acid (NMEFOSAA)	2355-31-9
1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTS)	757124-72-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2 FTS)	27619-97-2
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2 FTS)	39108-34-4
1H,1H,2H,2H-dodecanesulfonic acid (10:2 FTS)	120226-60-0

The laboratory analytical results will be compared against relevant criteria as outlined in **Section 8**.

6.1 Laboratory Analysis

Sample analysis will be undertaken by Eurofins as the primary analytical laboratory and Envirolab as the secondary analytical laboratory, both NATA accredited for the analyses proposed.

Laboratory analytical methods used by both laboratories for PFAS and its individual chemical compounds are summarised as follows:

- Eurofins: LTM-ORG-2100 PFAS; and
- Envirolab: Org-035.

Both methods are in general accordance with the Defence Guidance Document E, Standard PFAS Analytical Suite (Revision 4, 1 October 2021). The laboratory LOR for waters range between 0.01-0.1 µg/L.

As listed throughout this document, all surface water, groundwater and sediment samples will be analysed for PFAS suite as listed in **Table 6.1**. Samples that are not selected for analysis will be placed on hold at the laboratory.

Based on the scope provided in **Section 1.1**, the sewage sampling scope is restricted to PFAS only. No co-contaminate analysis is proposed.

7. Quality Assurance and Quality Control

The QA/QC procedures have been developed based on the guidance in Schedules B2 and B3 of the ASC NEPM (NEPC 2013) and Section 8 of the Australian Standard 4482.1-2005: Guide to the investigation and sampling of sites with potentially contaminated soil (AS4482.1-2005) (acknowledging that this standard has been revoked but is nonetheless considered relevant for prevailing industry technical practice).

7.1 Field QA/QC Program

Field quality control will comprise of:

- Ensuring all sampling is undertaken by suitably qualified and experience JBS&G personnel;
- Adherence to standard procedures for field sampling and record keeping;
- Use of laboratory supplied sample containers;
- Preservation of samples on ice and transport to laboratories under chain of custody documentation;
- Submission of samples within the recommended holding times;
- Appropriate decontamination of any sampling equipment prior to sampling and between sampling locations;
- Collection of quality control samples; inter- and intra-laboratory duplicates, rinsate blanks and trip blanks; and
- Calibration of all field measuring equipment, such as water quality meters, and retention of calibration records.

7.1.1 Sample Labelling

All samples (including QC samples) will be labelled to include the sample identification number, date of collection, sampler initials and project number. The unique sample identification numbers will be determined in accordance with Defence's Annex L: Guidance on Data Management (see **Section 7.4**).

7.1.2 Intra-laboratory Duplicate Samples

Blind duplicate samples will be provided by the collection of two environmental samples from the same location. These samples will be preserved, stored, transported, prepared and analysed in an identical manner. As a minimum, the results of analyses on the blind duplicate sample pair will be assessed by calculating the RPDs between the results. The RPD will be calculated as the difference between the results divided by their mean value and expressed as a percentage. If the RPD exceeded the value adopted for any analytes, additional investigation would be required, or justification provided for not conducting additional investigation.

Blind duplicate samples will be collected at a rate of one duplicate for every 10 environmental samples in accordance with AS 4482.1-2005.

7.1.3 Inter-laboratory Duplicate Samples

Split samples provide a check on the analytical proficiency of the laboratories. Split samples will be provided by the collection of two environmental samples from the same location. These samples will be preserved, stored and transported in an identical manner. The split sample will be analysed by the secondary laboratory. As a minimum, the results of analyses on the split duplicate sample pair will be assessed by calculating the RPDs between the results. The RPD will be calculated as the difference between the results divided by their mean value and expressed as a percentage. If the RPD exceeds the value adopted for any analytes, additional investigation would be required, or justification provided for not conducting additional investigation.

Split duplicate samples will be collected at a rate of one duplicate for every 10 environmental samples in accordance with AS 4482.1-2005.

7.1.4 Rinsate Blanks

Rinsate blanks are collected from decontaminated field equipment using laboratory-supplied water. The purpose of the rinsate blanks is to detect potential cross-contamination associated with using the same equipment at multiple sampling locations (e.g. hand auger).

7.1.5 Field Blanks

Field blanks are collected from laboratory-supplied water sitting adjacent to a sample location for the duration of the sample period. The purpose of the field blanks is to identify if potential cross-contamination associated with the base is impacting samples as they are being collected.

7.1.6 Trip Blanks

Trip blanks consist of laboratory-supplied purge water and clean sand. The purpose of trip blanks is to detect potential contamination during sample transport. These samples will be kept within eskies during sampling activities and will not be opened in the field. Trip blanks will be analysed at the laboratory as regular samples for PFAS.

Trip blanks will be submitted with every batch of soil and water samples delivered to the respective primary laboratories.

7.2 Laboratory QA/QC Program

All analysis will be performed by laboratories accredited by NATA. For the purposes of this investigation, Eurofins will be the primary laboratory and Envirolab will be the nominated secondary laboratory. The reliability of test results from the analytical laboratories will be monitored according to the QA/QC procedures used by the NATA accredited laboratories. The laboratory QA/QC program will specify holding times, extraction dates, method descriptions, COC requirements, analysis, LOR and acceptance criteria for the results. Laboratory QA/QC requirements will be consistent with ASC NEPM requirements and are outlined below.

7.2.1 Laboratory Duplicate Samples

Laboratory duplicates provide data on analytical precision for each batch of samples.

Laboratory duplicates are performed at a rate of one duplicate for batches of 8-10 samples with an additional duplicate for each subsequent ten samples.

7.2.2 Laboratory Control Samples

Laboratory control samples consist of a clean matrix (de-ionised water or clean sand) spiked with a known concentration of the analyte being measured. These samples monitor method recovery in clean samples and are used (where required) to evaluate matrix interference by comparison with matrix spikes.

7.2.3 Surrogate Spike Recoveries

For organic analyses, a surrogate is added at the extraction stage in order to verify method effectiveness. The surrogate is then analysed with the batch of samples and percentage recovery calculated.

7.2.4 Matrix Spike Recoveries

Matrix spikes consist of samples spiked with a known concentration of the analyte being measured, in order to identify properties of the matrix that may hinder method effectiveness. Sample are spikes with concentrations equivalent to 5 to 10 times the LOR and percentage recovery calculated.

7.2.5 Method Blanks

Method blanks (de-ionised water or clean sand) are carried through all stages of sample preparation and analysis at a rate of 1 per 20 or 1 per batch. Analyte concentrations in blanks should be less than the stated LOR. Reagent blanks are run if the method blank exceeds the LOR. The purpose of method blanks is to detect laboratory contamination.

7.3 Data Validation Acceptance Criteria

Data validation of the QA/QC elements will be undertaken to ensure that the data reported can be used to achieve the project objectives. Should data be found to fall outside the data acceptance criteria, an investigation will be performed to determine if the data is acceptable or if corrective actions need to be instigated. The QA/QC data will be assessed against the DQIs, as summarised in **Section 4.7.2**.

7.4 Sample Naming Convention

The sample naming convention to be adopted for the study will be as per that detailed in Annex L (Guidance on Data Management) of the DCMM (Defence 2021b). A summary of sampling naming requirements is listed below:

- Property ID (PPPP, four characters);
- Type of sample recovered (e.g. MW: Monitoring Well, SW: Surface Water);
- Location Specific ID (000, minimum three numeric characters);
- For grouped groundwater wells, the aquifer sampled [P (perched), S (shallow), I (intermediate), D (deep)] is required. For standard wells, aquifer is not required in the naming convention; and
- Date in reverse order (YYMMDD).

Examples, for groundwater 0939_MW104S_200818.

Naming convention for QA/QC samples:

- Blind Field Duplicate: PPP_QC1XX_YYMMDD;
- Blind Field Triplicate: PPP_QC2XX_YYMMDD;
- Rinsate: PPP_QC3XX_YYMMDD;
- Field Blank: PPP_QC4XX_YYMMDD; and
- Trip Blank: PPP_QC5XX_YYMMDD.

It should be noted that the Property ID for South Bandiana is 0445S, for North Bandiana is 0445N and East Bandiana is 0445E.

7.5 Field Work Communication Protocol and Reporting

The works described above will comply with the Defence Field Work Communication Protocol and Reporting document (Defence 2021a) to ensure that the agreed scope has satisfactorily been completed. Processes to be followed include:

- Prior to field works: Field consultants to review SAQP prior to undertaking field works and take documentation into the field for easy reference;
- During field works: If a portion of the field works as defined in the SAQP cannot be completed owing to site conditions or circumstances, field consultants are to inform the project manager, who will in turn communicate with Defence; and
- Post field works: The consultant will provide a Field Work Report (template provided in Defence 2021a) within five working days of receiving all laboratory analytical results.

Communication with Defence will also be undertaken if JBS&G identify evidence that potential re-sampling or re-analysis is required as per the review triggers identified in the PMAP (Defence 2020).

8. Screening Criteria

While the assessment of risk is not the primary objective of the OMP assessment scope, the analytical data will be screened against relevant Tier 1 Guidance Values as outlined in the ASC NEPM (2013) and PFAS NEMP (HEPA 2020) to identify if the base risk profile has changed compared to current risk profile.

8.1 Groundwater and Surface Water

Under the Environment Protection Act 2017 (VIC) (the Act) the Environment Reference Standard (Victorian Government 2021b) (ERS) has been made under Section 93 of the Act, which requires Environmental Values of groundwater to be protected, according to the natural salinity of the groundwater. The groundwater quality across the BMA and Management Area is classified as Segment A1, A2 and B (according to analysis completed as part of the DSI (Golder 2018) and DSI Addendum (JBS&G 2024)). Under the ERS, the base is also within the geographic region that falls within the Murray and Western Plains, Rivers and Streams Segment, as such, conservatively, the applicable Environmental Values have been summarised in **Table 8.1**:

Table 8.1: Groundwater and Surface Water Environmental Values

Environmental Value	Groundwater	Surface Water	Notes
Water Dependent Ecosystems and Species	✓	✓	Slightly to moderately modified applies to surface water
Potable Water Supply (Desirable)	✓	✓	Identified as human consumption after appropriate treatment for surface water
Potable Mineral Water Supply	✓		
Agriculture and Irrigation (Irrigation)	✓	✓	
Agriculture and Irrigation (Stock Watering)	✓		
Human consumption of aquatic foods		✓	
Aquaculture		✓	
Industrial and Commercial	✓	✓	
Water-based Recreation (Primary Contact Recreation)	✓	✓	
Water-based Recreation (Secondary Contact)		✓	
Water-based Recreation (Aesthetic Enjoyment)		✓	
Traditional Owner Cultural Values	✓	✓	
Buildings and Structures	✓		
Geothermal Properties	✓		

An evaluation of groundwater and surface water Environmental Values is presented in **Table 8.2**, which summarises whether they are existing, likely or potential or unlikely for on- and off-base, in accordance with the work completed as part of the DSI (Golder 2018), HHERA (Golder 2020) and DSI Addendum (JBS&G 2024). Further details on the assessment of relevant environmental values (previously termed beneficial users under the State Environmental Protection Policy (Waters)) can be found in these documents.

Table 8.2: Groundwater and Surface Water Environmental Values On- and Off-Base

Environmental Value	On-Base			Off-Base		
	Existing	Likely/ Potential	Unlikely	Existing	Likely/ Potential	Unlikely
Water Dependent Ecosystems and Species	✓			✓		
Potable Water Supply (Desirable);			✓		✓	

Environmental Value	On-Base			Off-Base		
	Existing	Likely/ Potential	Unlikely	Existing	Likely/ Potential	Unlikely
Potable Mineral Water Supply			✓			✓
Agriculture and Irrigation (Irrigation)			✓		✓	
Agriculture and Irrigation (Stock Watering)			✓	✓		
Industrial and Commercial			✓			✓
Human consumption of aquatic foods			✓			✓
Aquaculture			✓			✓
Water-based Recreation (Primary Contact Recreation)			✓	✓		
Water-based Recreation (Secondary Contact)		✓		✓		
Water-based Recreation (Aesthetic Enjoyment)	✓			✓		
Traditional Owner Cultural Values	✓			✓		
Buildings and Structures	✓			✓		
Geothermal Properties			✓			✓

Based on the above, the Tier 1 screening criteria that has been adopted for the relevant Environmental Values has been provided in **Table 8.3**.

It should be noted that surface water interacts with groundwater on off-base areas. As such, from a screening perspective, the applicable groundwater criteria will also be applied to surface water for the purposes of this assessment.

Table 8.3: Tier 1 Screening Criteria for Water

Adopted Tier 1 Screening Criteria	Relevant Environmental Value	PFOS/PFHxS	PFOA
Freshwater: High conservation/ecological value systems (99% species protection)	Water Dependent Ecosystems and Species	0.00023 µg/L	19 µg/L
Freshwater: Slightly to moderately disturbed systems (95% species protection)		0.13 µg/L	220 µg/L
Drinking water	Traditional Owner Cultural Values, Agriculture and Irrigation (Irrigation and stock watering)	0.07 µg/L	0.56 µg/L
Recreational water	Water-based Recreation (Primary Contact Recreation, Secondary Contact, Aesthetic Enjoyment)	2 µg/L	10 µg/L

HEPA 2020 has adopted trigger values or species protection levels for toxicants, which provide guidance for assessment of aquatic ecosystems. Percent species protection levels range from 80% (highly disturbed systems) to 99% (largely unmodified systems). The water bodies on and surrounding the site range in ecosystem disturbance and modification, and as such different protection levels apply. The following is a general guide and justification for adopted species protection based on water feature:

- **On-base built drainage channel, swale or pipework:** No species protection as protection of beneficial uses in artificial stormwater drains is not a requirement;
- **On-base stormwater pond, dam or depression:** 95% species protection adopted as vegetation is generally present in and around the moderately to highly modified feature which supports a freshwater ecosystem; and

- **On and off-base water bodies (i.e. rivers, creeks, lakes and wetlands):** 99% species protection adopted.

For the purposes of this SAQP, all results have been compared to 99% species protection as all waters samples have the potential to migrate into on and off-base creeks, lakes, wetlands and retention basins, and the NEMP recommends the adoption of this criteria owing to bioaccumulation and biomagnification in wildlife. The screening criteria for 95% species protection have been provided for reference in regard to on-base stormwater ponds, dams or depressions.

In the absence of a published guideline value for irrigation and stock watering, the drinking water values have been considered as an initial screening value, as is consistent with the HHERA (Golder 2020).

No criteria have been adopted for the environmental values Potable Mineral Water Supply, Industrial and Commercial and Geothermal Properties, as these uses are considered unlikely to be realised within the Management Area. No criteria have been adopted for the environmental value Buildings and Structures as no PFAS criteria has been developed for this scenario and not known to affect the integrity of structures.

It is acknowledged that in November 2024, the National Health and Medical Research Council (NHRMC) released draft health based drinking water guideline values for public consultation. Defence is considering how the draft guidelines, if adopted, may affect its PFAS Investigation and Management Program, and communities surrounding the Defence Estate. An initial step to this is the adoption of a lower laboratory limit of reporting at select locations to understand any future implications. Until the revised PFAS guideline values are finalised and published, the current guideline values remain in effect.

8.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. As such, no tier 1 criteria will be adopted for sediment as part of this investigation.

8.3 Sewage

Sewage samples are being collected for baseline and comparison purposes. Screening criteria relating to risk will not be adopted as part of this investigation.

9. Reporting

9.1 OMP Factual Reporting

A factual report will 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 Ongoing Monitoring Program Reporting Guidance document (Defence 2024). 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 (Defence 2021b);
- Summary of any changes to the monitoring network condition that may affect data integrity, or require rectification works, and recommendations for repair, replacement or decommissioning of a location;
- Evaluation of the applicability of adopted screening criteria;
- Review of the suitability of the data for assessment purposes (QA/QC evaluation);
- Summary tables presenting gauged groundwater and surface water levels;
- Presentation of inferred groundwater contours for the relevant aquifers and inferred groundwater flow direction in a figure;
- Summary tables of analytical results in comparison to adopted screening criteria generated through management of data on the Defence ESdat database, and naming of sampling locations as per DCMM Annex L (Defence 2021b);
- Review and identification of triggers as outlined in the OMP, noting this document is under revision and new triggers may be available at the time of OMP preparation;
- Figures showing results in accordance with the Ongoing Monitoring Program Reporting Guidance document (Defence 2024);
- Laboratory reports, COC documentation, field sampling records, data validation and QA/QC details, equipment calibration certificates and bump test records and other relevant documentation; and
- Any deviations from the SAQP encountered during completion of the sampling event, justification for the deviations and any impacts of these changes on the data or program.

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

9.2 Ongoing Monitoring Reporting

Upon completion of each monitoring period an ongoing monitoring report (OMR) will be prepared. The report will be prepared in accordance with the Defence Ongoing Monitoring Program Reporting Guidance document (Defence 2024). As a minimum, each ongoing monitoring report should include the following:

- The factual information described in **Section 7.1**;
- 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 (Defence 2021b);
- Laboratory results and analysis including comparison with relevant screening criteria as identified in each OMP;
- Assessment and commentary on appropriate QA/QC procedures;
- A discussion of analytical results in relation to the following:
 - Trends in PFAS concentrations, including an assessment of temporal changes and/or changes to the extent of PFAS impacts. Trends should be assessed using an appropriate statistical analysis approach (e.g. using Mann-Kendall or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed;
 - Consideration, based on data trends, as to whether any of the existing remediation/management measures should be re-assessed, with a view to potential modification, supplementation, or cessation;
 - Assessment of whether changes to the CSM and/or risk assessment are required; and
 - 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; and
 - 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 monitoring period 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. 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; and
- The sampling event Factual Reports and SAQP for the relevant monitoring period will be appended to the OMR.

It is noted that the OMP document is currently under revision and is likely to be finalised by the end of 2024. While this SAQP is based on the existing OMP (Defence 2020), the chance may be taken to evaluate the data in the OMR against updated parameters such as trigger levels if the OMP document is updated.

9.3 Sewage Baseline Factual Reporting

The Sewage Baseline investigation will be reported separately to the OMP in a factual report. This report will contain the following:

- Review and analysis of data obtained;
- Tabulation and comparison of the data obtained with previous Mass Flux Study results;
- Figures with sampling locations and data;
- Revision of the CSM based on the data and interpretation of the information and data obtained; and
- Finalisation of the summary report following comment from Defence and the Technical Advisor.

10. References

10.1 Previous Investigation Reports

Bandiana Military Area, PFAS Management Area Plan. Document Number 1777738-153-R-RevA. November 2020. (Defence 2020).

PFAS Detailed Site Investigation, Bandiana Military Area. Document Number 1777738-081-R-RevB. 14 September 2018 (Golder 2018).

Human Health and Ecological Risk Assessment, Bandiana Military Area. Document Number 1777738-150-R-RevB. November 2020 (Golder 2020).

Health Safety and Environment Management Plan, PFAS Management Area Plan (PMAP) Delivery at Bandiana Military Area. Document Number 61395/143,083 Rev 0. 25 March 2022. (JBS&G 2023).

PFAS Management Area Plan (PMAP) Delivery at Bandiana Military Area, Detailed Site Investigation (DSI) Addendum. Document Number 61395/ 146,407 Rev 1. 14 June 2024 (JBS&G 2024a).

PFAS Mass Flux Study – PFAS Management Area Plan (PMAP) Delivery at Bandiana Military Area. Document Number 61395/ 153,765 – Draft Rev B. 6 September 2024 (JBS&G 2024b).

Ongoing Monitoring Report, Bandiana Military Area. Document Number 61395/162,111 – Draft Rev A. 17 September 2024 (JBS&G 2024b).

10.2 Standards and Guidelines

AS 4482.1-2005, Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils, Part 1 - Non-volatile and Semi-volatile Compounds (withdrawn as pending revision, referred to for 'state of knowledge'). (AS 2005);

Australian/New Zealand Standard AS/NZS 5667.6:1998 Water Quality – Sampling, Part 6: Guidance on Sampling Rivers and Streams. (AS/NZS 1998);

Ongoing Monitoring Program Reporting Guidance, dated 29 February 2024. (Defence 2024);

Pollution Prevention Management Manual – Annex 1L: Pollution Prevention Guidance – Routine Water Quality Monitoring. (Defence 2019);

Field Work Communication Protocol and Reporting, Version 1, dated 11 November 2021. (Defence 2021a);

Contamination Management Manual (DCMM), Annex L – Data Management, August 2019, Amended June 2021. (Defence 2021b);

Quality System Manual Schedule B15 USEPA DQO Process. (Department of Defence, Department of Energy 2018);

Groundwater Sampling Guidelines, Publication 669.1, February 2022. (EPA 2022);

Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, Publication 701, June 2009. (EPA 2009);

PFAS National Environmental Management Plan (NEMP) Version 2.0, January 2020. (HEPA 2020);

National Environmental Protection (Assessment of Site Contamination) Measure (1999, as amended 2013) (ASC NEPM). (NEPC 2013);

Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water, August 2019. (NHMRC 2019);

Sampling Design Part 1 – Application, Contaminated Land Guidelines. August 2022. (NSW EPA 2022a);

Sampling Design Part 2 – Interpretation, Contaminated Land Guidelines. August 2022. (NSW EPA 2022b);

Guidance for the Data Quality Objectives Process (EPA QA/G-4). (USEPA 2006);
Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8). (USEPA 2002); and
Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances, WA
DER. (WA DER, 2017).

11. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties. The report has been prepared specifically for the client for the purposes of the commission, and no warranties, express or implied, are offered to any third parties and no liability will be accepted for use or interpretation of this report by any third party.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose. This report should not be amended in any way without prior approval by JBS&G, or reproduced other than in full including all attachments as originally provided to the client by JBS&G.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements or agreed scope of work.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures

Figures included are as follows:

- Figure 1: Site Location Plan;
- Figure 2: Source Areas;
- Figure 3: Surface Water Divide and Pathways;
- Figure 4: OMP Groundwater Sample Locations;
- Figure 5A/B: OMP Surface Water and Sediment Sample Locations; and
- Figure 6: South Bandiana Baseline Sewage Sampling Locations.



Legend

- Management Area
- Bandiana Military Area
- Watercourse

Job No: 61395

Client: Department of Defence

Version: FINAL	Date: 22-Nov-2024
Drawn By: [redacted]	Checked By: [redacted]

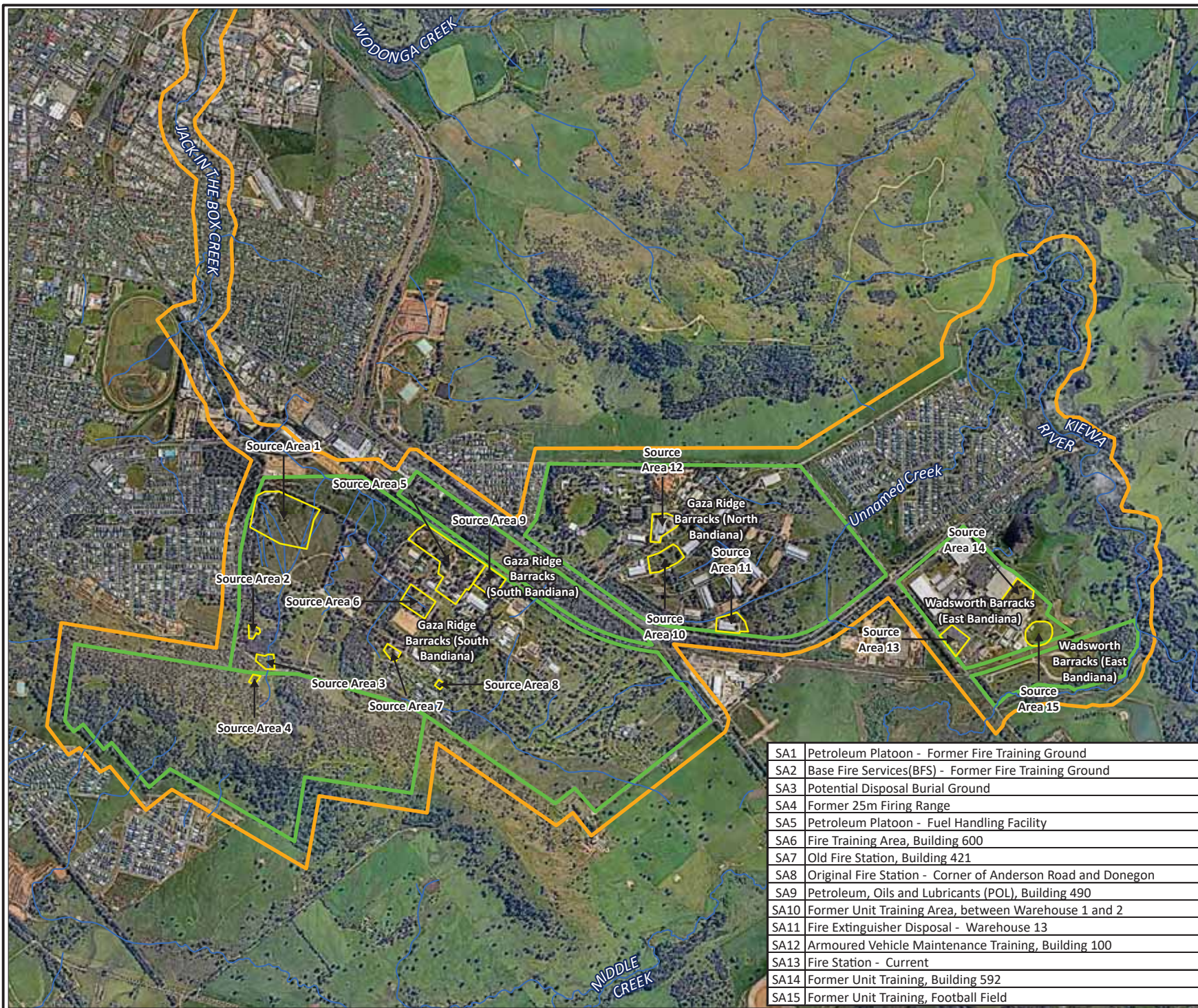
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Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

SITE LOCATION PLAN

FIGURE 1



- Legend**
- Management Area
 - Bandiana Military Area
 - Source Areas
 - Watercourse



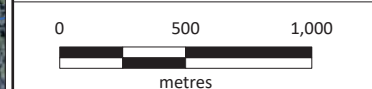
Job No: 61395

Client: Department of Defence

Version: FINAL Date: 22-Nov-2024

Drawn By: Checked By:

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Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

SOURCE AREAS

FIGURE 2

SA1	Petroleum Platoon - Former Fire Training Ground
SA2	Base Fire Services(BFS) - Former Fire Training Ground
SA3	Potential Disposal Burial Ground
SA4	Former 25m Firing Range
SA5	Petroleum Platoon - Fuel Handling Facility
SA6	Fire Training Area, Building 600
SA7	Old Fire Station, Building 421
SA8	Original Fire Station - Corner of Anderson Road and Donegon
SA9	Petroleum, Oils and Lubricants (POL), Building 490
SA10	Former Unit Training Area, between Warehouse 1 and 2
SA11	Fire Extinguisher Disposal - Warehouse 13
SA12	Armoured Vehicle Maintenance Training, Building 100
SA13	Fire Station - Current
SA14	Former Unit Training, Building 592
SA15	Former Unit Training, Football Field



Legend

- ▬ Management Area
- ▬ Bandiana Military Area
- ▬ Stormwater Divide
- ➔ Drainage Flow Direction



Job No: 61395

Client: Department of Defence

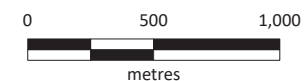
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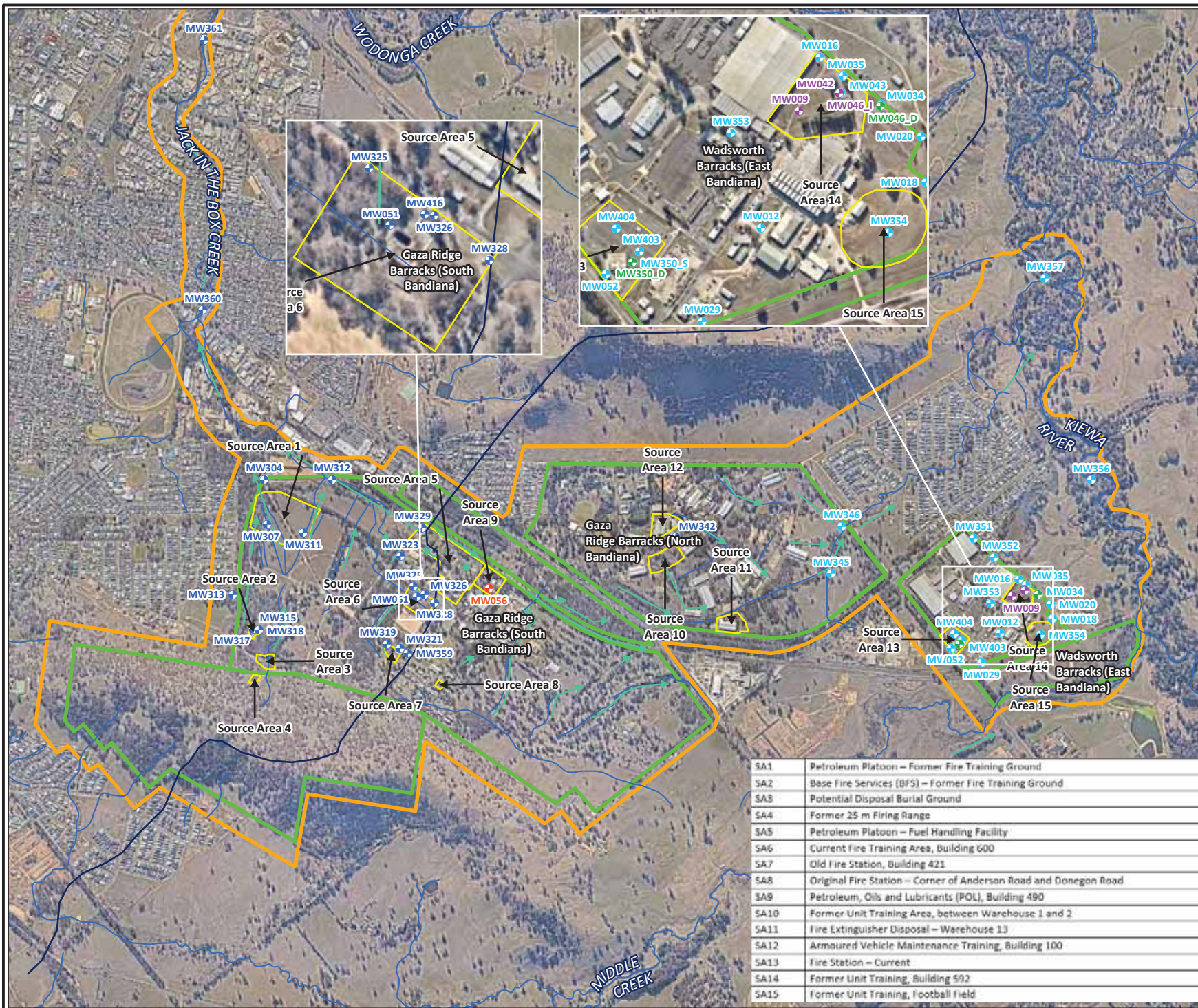


Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

SURFACE WATER DIVIDE AND PATHWAYS

FIGURE 3



Legend

- ▮ Management Area
- ▮ Bandiana Military Area
- ▮ Source Areas
- Stormwater Divide
- Watercourse
- ➔ Drainage Flow Direction
- + Shepparton Colluvium - Shallow Aquifer
- + Shepparton and Coonambigdal Fluvium - Shallow Aquifer
- + Shepparton and Coonambigdal Fluvium - Intermediate Aquifer
- + Shepparton and Coonambigdal Fluvium - Deep Aquifer
- + Perched Water



Job No: 61395

Client: Department of Defence

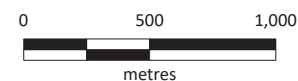
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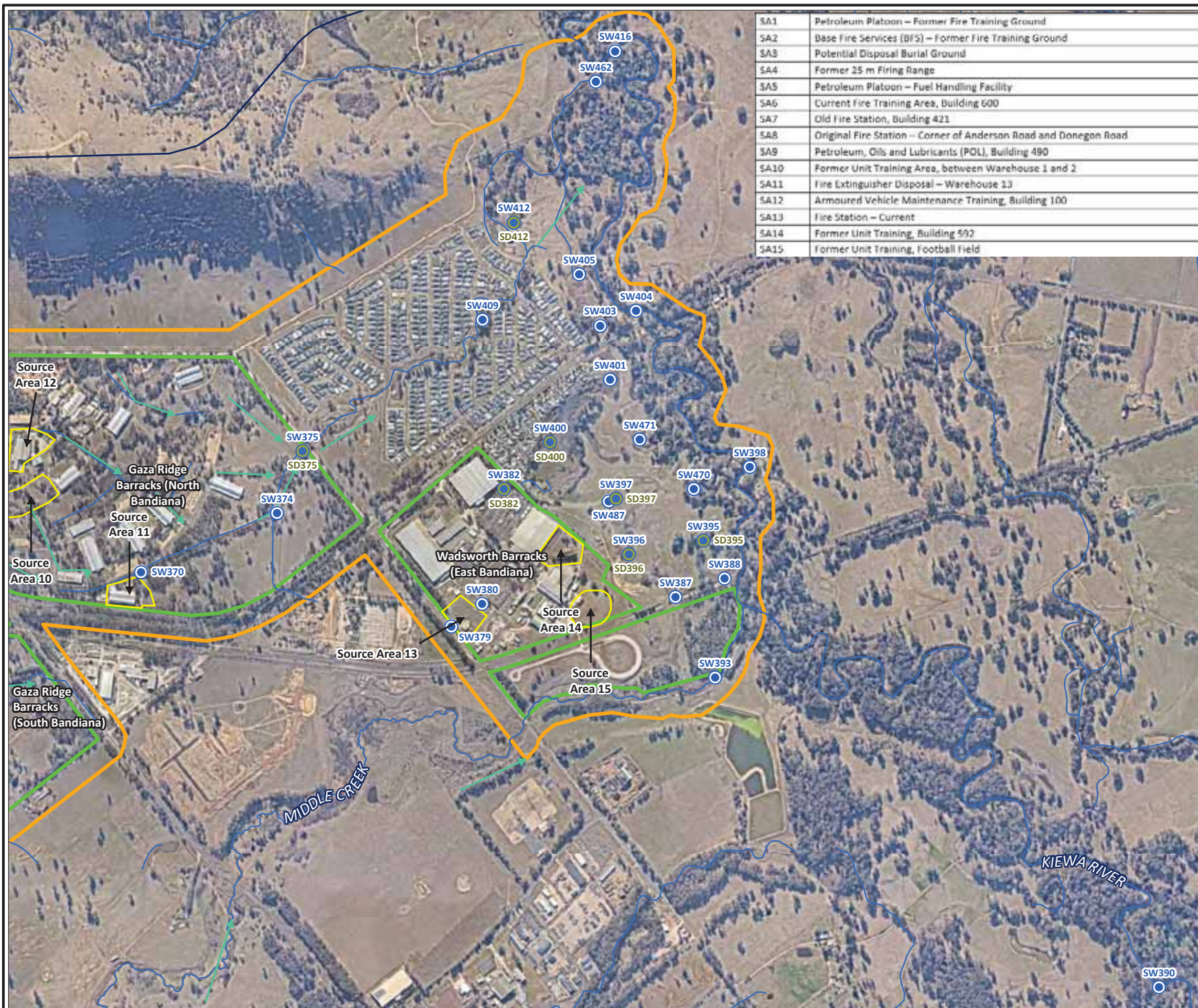


Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

OMP GROUNDWATER SAMPLE LOCATIONS

FIGURE 4



SA1	Petroleum Platoon – Former Fire Training Ground
SA2	Base Fire Services (BFS) – Former Fire Training Ground
SA3	Potential Disposal Burial Ground
SA4	Former 25 m Firing Range
SA5	Petroleum Platoon – Fuel Handling Facility
SA6	Current Fire Training Area, Building 600
SA7	Old Fire Station, Building 421
SA8	Original Fire Station – Corner of Anderson Road and Donegan Road
SA9	Petroleum, Oils and Lubricants (POL), Building 490
SA10	Former Unit Training Area, between Warehouse 1 and 2
SA11	Fire Extinguisher Disposal – Warehouse 13
SA12	Armoured Vehicle Maintenance Training, Building 100
SA13	Fire Station – Current
SA14	Former Unit Training, Building 592
SA15	Former Unit Training, Football Field

Legend

-  Management Area
-  Bandiana Military Area
-  Source Areas
-  Stormwater Divide
-  Watercourse
-  Drainage Flow Direction
-  Surface Water Location
-  Surface Water and Sediment Location



Job No: 61395

Client: Department of Defence

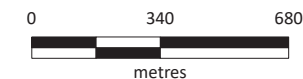
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Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

OMP SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

FIGURE 5B



Legend

- Management Area
- Bandiana Military Area
- Source Areas
- Watercourse
- Sewerage
- Baseline Sewer Sample Location

Job No: 61395

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Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

SOUTH BANDIANA BASELINE SEWAGE SAMPLING LOCATIONS

FIGURE 6

Appendix A PFAS Sampling Guidance

PFAS Sampling Checklist Part 1

Checklist for items prohibited at site during PFAS Investigations (adopted from WA DER 2017)		
Clothing and Food		Y/N
New clothing	Has all field clothing to be washed a minimum of six times after purchase before using at the site?	
Clothing, including boots, with stain-resistant, rain resistant, or waterproof coatings/treated fabric (e.g. GORE-TEX®)	Where sampling during rain was unavoidable, was polyethylene rain gear (e.g. disposable LDPE), vinyl, or polyvinyl chloride (PVC) waterproof clothing used?	
Tyvek® clothing	Have Tyvek clothes been removed from field bag and vehicle prior to mobilising to site?	
Fast food wrappers and containers, pre-wrapped foods and snacks (e.g. chocolate bars, energy bars, muesli bars, potato chips etc.)	Is all food being taken to site contained in rigid plastic containers or bags or stainless steel containers?	
Sampling Equipment and Containers		
Teflon®-containing or -coated field equipment (tubing, bailers, tape, plumbing paste, etc.)	Does all sampling equipment comprise High Density Polyethylene (HDPE), silicone tubing, and HDPE or polypropylene?	
Teflon®-lined lids on containers (e.g. sample containers, rinsate water storage containers)	Have specific sample containers provided by the laboratory confirmed to comprise either polypropylene or HDPE for sample containers?	
Other Products		
Aluminium foil	Has HDPE sheeting (commonly used as drop cloths for painting or home improvement) been sourced as a replacement for aluminium foil, if required?	
Self-sticking notes and similar office products (e.g. 3M Post-it notes)	Have these products been removed from site vehicles and field documentation?	
Waterproof paper, notebooks, and labels	Have all waterproof stationary been removed from site vehicles and field documentation and replaced with standard paper and paper labels? Aluminum clipboard to be used	
Markers (e.g. Sharpies)	Have ball point pens used for all labelling and note taking?	
Drilling fluid containing PFAS	If a drilling method requiring drilling fluid is to be used at the site has it been confirmed that drilling fluids to be used are PFAS-free?	
Detergents and decontamination solutions (e.g. Decon 90® Decontamination Solution)	Follow water-only decontamination approach. Is sufficient water available on-site for removing all debris by scrubbing with a plastic brush followed by thorough rinsing with tap water and triple rinsing with distilled or deionised water?	
Reusable chemical or gel ice packs (e.g. Blueice®)	Has all ice been contained by double bagging in plastic (polyethylene) bags?	
Many Sunscreens and Insect Repellents contain PFASs and should not be brought to site	Is one of the following or other acceptable products available for use at the site? Sunscreens - Alba Organics Natural Sunscreen, Yes to Cucumbers, Aubrey Organics, Jason Naturakl Sunblock, Kiss my face, and baby sunscreens that are PFAS free or "natural" Insect Repellants - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect Repellent, Herbal Armor, California Baby Natural Bug Spray, BabyGanics Sunscreen and insect repellent - Avon Skin So Soft Bug Guard Plus - SPF 30 Lotion	

PFAS Sampling Checklist Part 2

Other Considerations when Sampling for PFAS	Y/N or N/A	Comments
Groundwater Well Drilling, Development and Sampling		
Detergents or Decon 90® NOT TO BE USED for decontamination - Alconox® and Liquinox® soap may be used, if required following water-only decontamination approach. Is sufficient water available on-site for removing all debris by scrubbing with a plastic brush followed by thoroughly rinsing with tap water and triple rinsing with distilled and deionised water (Grade 3 or Millipore water)?		
Where water has been used during the drilling process, has a sample of the water been collected for analysis?		
Following contact with bore water have hands been washed with soap and thoroughly rinsed prior to donning a clean, new pair of disposable nitrile gloves?		
Has a new pair of disposable gloves been donned between development/sampling of each new well?		
Has additional hand washing been undertaken prior to donning a new pair of gloves when the old pair was compromised or if ungloved hands touched items that may represent potential PFAS contamination?		
Has all development/purged water transported by a licensed waste disposal contractor for appropriate disposal at a facility licensed to receive PFAS-impacted materials?		
Has a peristaltic pump with disposable HDPE or silicone tubing or polypropylene HydraSleeves been used for groundwater sampling?		
Where depth to groundwater prevents the use of a peristaltic pump, then use of bladder pumps may be considered.		
Where a bladder is to be used are all internal parts (bladders, check balls, O-rings, compression fittings) Teflon free?		
Are sufficient bladders and O-rings available for replacement at each sampling location?		
Where a bladder pump was used, were bladders and O-rings replaced prior to sampling at each location?		
Soil Drilling and Aquatic Sampling		
Detergents or Decon 90® NOT TO BE USED for decontamination - Alconox® and Liquinox® soap may be used, if required Follow water-only decontamination approach. Is sufficient water available on-site for removing all debris by scrubbing with a plastic brush followed by thoroughly rinsing with tap water and triple rinsing with distilled and deionised water (Grade 3 or Millipore water)?		
Is all equipment that will come in contact with sampling media free of Teflon?		
Are soil and/or sediment core samples being collected directly from single-use PVC liners?		
Prior to sample collection have hands been washed with soap and thoroughly rinsed prior to donning a clean, new pair of disposable nitrile gloves?		
Has a new pair of disposable gloves been donned between each sampling location?		
Has additional hand washing been undertaken prior to donning a new pair of gloves when the old pair was compromised or if ungloved hands touched items that may represent potential PFAS contamination?		
Where waders are being worn for sample collected are they constructed of fabric that has not been treated with waterproofing coatings?		
Have surface water samples been collected by inserting a capped sampling container (polypropylene or HDPE) with the opening pointing down to avoid the collection of surface films?		
Where practicable, at the time of container opening, was the container more than 10cm from the sediment bed and more than 10cm below the surface water level and as close to the centre of the channel as possible?		
During surface water sample collection was the container pointed upstream up so that gloved hands, sample container, and sampler were downstream of the sample?		

PFAS Sampling Checklist Part 2

Other Considerations when Sampling for PFAS	Y/N or N/A	Comments
Has equipment rinsate water provided by the laboratory been confirmed to be free of PFAS and supplied in HDPE containers with polypropylene lids?		
Drinking Water Samples		
Has the analytical laboratory been consulted on the requirement for Trizma®, a buffering reagent that removes free chlorine from chlorinated drinking water, or similar sample additive, prior to collection of drinking water samples for analysis?		
Additional Considerations		
Has the exposure of samples to light during sample processing and storage been minimised?		
Carry our Shaker Test - A small portion of samples (~10-25 mL) should be shaken by the sample collector on-site. If foaming is noted within the sample, this should be documented when samples are submitted for analysis.		
It is noted that all support personnel that handle any equipment that directly contacts surface water or aquatic sediment, are within 2–3m of the borehole during soil sampling, or are within 2–3m of the collection and processing area on aquatic vessels during sediment or surface water sampling, are subject to the same restrictions related to precautionary measures for clothing and food, as applied to sampling personnel.		

Appendix B HydraSleeve Standard Operating Procedure

HYDRASleeve™

Simple by Design

US Patent No. 6,481,300; No. 6,837,120 others pending

Standard Operating Procedure: Sampling Groundwater with a HydraSleeve



This guide should be used in addition to field manuals and instructions appropriate to the chosen sampling device (i.e., HydraSleeve, SpeedBag or Super/Skinny Sleeve and W3 HybridSleeve).

Find the appropriate field manual and instructions on the HydraSleeve website at <http://www.hydrasleeve.com>.

For more information about the HydraSleeve, or if you have questions, contact:
GeoInsight, P.O. Box 1266, Mesilla Park, NM 88047
800-996-2225, info@hydrasleeve.com.

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Information Required Before Deploying a HydraSleeve.....	5
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Introduction

The HydraSleeve is classified as a no-purge (passive) grab sampling device, meaning that it is used to collect groundwater samples directly from the screened interval of a well without having to purge the well prior to sample collection. When it is used as described in this Standard Operating Procedure (SOP), the HydraSleeve causes no drawdown in the well (until the sample is withdrawn from the water column) and only minimal disturbance of the water column, because it has a very thin cross section and it displaces very little water (<100 ml) during deployment in the well. The HydraSleeve collects a sample from within the screen only. It excludes water from any other part of the water column in the well through the use of a self-sealing check valve at the top of the sampler. It is a single-use (disposable) sampler that is not intended for reuse, so there are no decontamination requirements for the sampler itself.

The use of no-purge sampling as a means of collecting representative groundwater samples depends on the natural movement of groundwater (under ambient hydraulic head) from the formation adjacent to the well screen through the screen. Robin and Gillham (1987) demonstrated the existence of a dynamic equilibrium between the water in a formation and the water in a well screen installed in that formation, which results in formation-quality water being available in the well screen for sampling at all times. No-purge sampling devices like the HydraSleeve collect this formation-quality water as the sample, under undisturbed (non-pumping) natural flow conditions. Samples collected in this manner generally provide more conservative (i.e., higher concentration) values than samples collected using well-volume purging, and values equivalent to samples collected using low-flow purging and sampling (Parsons, 2005).

Applications of the HydraSleeve

The HydraSleeve can be used to collect representative samples of groundwater for all analytes (volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs], common metals, trace metals, major cations and anions, dissolved gases, total dissolved solids, radionuclides, pesticides, PCBs, explosive compounds, and all other analytical parameters). Designs are available to collect samples from wells from 1" inside diameter and larger. The HydraSleeve can collect samples from wells of any yield, but it is especially well-suited to collecting samples from low-yield wells, where other sampling methods can't be used reliably because their use results in dewatering of the well screen and alteration of sample chemistry (McAlary and Barker, 1987).

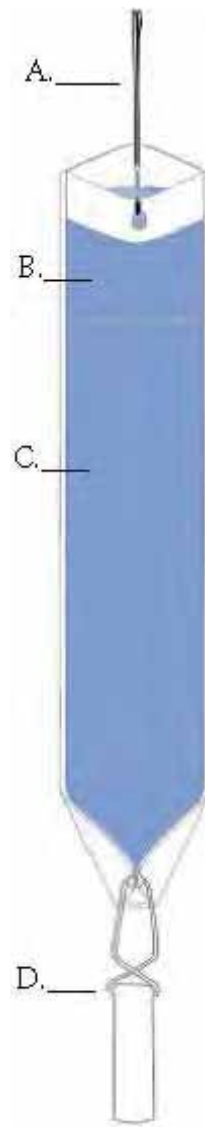
The HydraSleeve can collect samples from wells of any depth, and it can be used for single-event sampling or long-term groundwater monitoring programs. Because of its thin cross section and flexible construction, it can be used in narrow, constricted or damaged wells where rigid sampling devices may not fit. Using multiple HydraSleeves deployed in series along a single suspension line or tether, it is also possible to conduct in-well vertical profiling in wells in which contaminant concentrations are thought to be stratified.

As with all groundwater sampling devices, HydraSleeves should not be used to collect groundwater samples from wells in which separate (non-aqueous) phase hydrocarbons (i.e., gasoline, diesel fuel or jet fuel) are present because of the possibility of incorporating some of the separate-phase hydrocarbon into the sample.

Description of the HydraSleeve

The basic HydraSleeve (Figure 1) consists of the following components*:

- A suspension line or tether (A.), attached to the spring clip or directly to the top of the sleeve to deploy the device into and recover the device from the well. Tethers with depth indicators marked in 1-foot intervals are available from the manufacturer.
- A long, flexible, 4-mil thick lay-flat polyethylene sample sleeve (C.) sealed at the bottom (this is the sample chamber), which comes in different sizes, as discussed below with a self-sealing reed-type flexible polyethylene check valve built into the top of the sleeve (B.) to prevent water from entering or exiting the sampler except during sample acquisition.
- A reusable stainless-steel weight with clip (D.), which is attached to the bottom of the sleeve to carry it down the well to its intended depth in the water column. Bottom weights available from the manufacturer are 0.75" OD and are available in a variety of sizes. An optional top weight may be attached to the top of the HydraSleeve to carry it to depth and to compress it at the bottom of the well (not shown in Figure 1);
- A discharge tube that is used to puncture the HydraSleeve after it is recovered from the well so the sample can be decanted into sample bottles (not shown).
- Just above the self-sealing check valve at the top of the sleeve are two holes which provide attachment points for the spring clip and/or suspension line or tether. At the bottom of the sample sleeve are two holes which provide attachment points for the weight clip and weight.



*Other configurations such as top weighted assemblies, Super/SkinnySleeves, Speedbags, and W3 Hybrids are available.

Note: The sample sleeve and the discharge tube are designed for one-time use and are disposable. The spring clip, weight and weight clip may be reused after thorough cleaning. Suspension cord is generally disposed after one use although, if it is dedicated to the well, it may be reused at the discretion of the sampling personnel.

Selecting the HydraSleeve Size to Meet Site-Specific Sampling Objectives

It is important to understand that each HydraSleeve is able to collect a finite volume of sample because, after the HydraSleeve is deployed, you only get one chance to collect an undisturbed sample. Thus, the volume of sample required to meet your site-specific sampling and analytical requirements will dictate the size of HydraSleeve you need to meet these requirements.

Table 1. Dimensions and Volumes of HydraSleeve Models.

Diameter	Volume	Length	Lay-Flat Width	Filled Dia.
<i>2-Inch HydraSleeves</i>				
Standard 600 mls HydraSleeve	~600mls	30"	2.5"	1.4"
Standard 1-liter HydraSleeve	~1 Liter	38"	3"	1.9"
Super/SkinnySleeve 1-liter	~1 Liter	38"	2.5"	1.5"*
Super/SkinnySleeve 1.5-liter	~1.5 Liters	52"	2.5"	1.5"*
Super/SkinnySleeve 2-liter	~2 Liters	66"	2.5"	1.5"*
<i>4-Inch HydraSleeves</i>				
Standard 2.5 liter	~2 Liters	38"	4"	2.7"

* outside diameter on the Heavy Duty Universal Super/SkinnySleeves is 1.5" however when using with schedule 40 hardware the O.D. of the assembly will be 1.9"

It's also recommended that you size the diameter of the HydraSleeve according to the diameter of the well (i.e. use 2-inch HydraSleeves in 2-inch wells). Using smaller sleeves in larger diameter wells (i.e. 2-inch HydraSleeves in 4-inch wells) will result in a longer fill rate and will require special retrieval instructions (explained later).

The volume of sample collected by the HydraSleeve varies with the diameter and length of the HydraSleeve. Dimensions and volumes of available HydraSleeve models are detailed in Table 1.

HydraSleeves can be custom-fabricated by GeoInsight in varying diameters and lengths to meet specific volume requirements. HydraSleeves can also be deployed in series (i.e., multiple HydraSleeves attached to one tether) to collect additional sample to meet specific volume requirements, as described below.

If you have questions regarding the availability of sufficient volume of sample to satisfy laboratory requirements for analysis, it is recommended that you contact the laboratory to discuss the minimum volumes needed for each suite of analytes. Laboratories often require only 10% to 25% of the volume they specify to complete analysis for specific suites of analytes, so they can often work with much smaller sample volumes that can easily be supplied using a HydraSleeve.

HydraSleeve Deployment

Information Required Before Deploying a HydraSleeve

Before installing a HydraSleeve in any well, you will need to know the following:

- The inside diameter of the well
- The length of the well screen
- The water level in the well
- The position of the well screen in the well
- The total depth of the well

The inside diameter of the well is used to determine the appropriate HydraSleeve diameter for use in the well. The other information is used to determine the proper placement of the HydraSleeve in the well to collect a representative sample from the screen (see HydraSleeve Placement, below), and to determine the appropriate length of tether to attach to the HydraSleeve to deploy it at the appropriate position in the well.

Most of this information (with the exception of the water level) should be available from the well log; if not, it will have to be collected by some other means. The inside diameter of the well can be measured at the top of the well casing, and the total depth of the well can be measured by sounding the bottom of the well with a weighted tape. The position and length of the well screen may have to be determined using a down-hole camera if a well log is not available. The water level in the well can be measured using any commonly available water-level gauge.

HydraSleeve Placement

The HydraSleeve is designed to collect a sample directly from the well screen. It fills by pulling it up through the screen a distance equivalent to the length of the sampler when correctly sized to the well diameter. This upward motion causes the top check valve to open, which allows the device to fill. To optimize sample recovery, it is recommended that the HydraSleeve be placed in the well so that the bottom weight rests on the bottom of the well and the top of the HydraSleeve is as close to the bottom of the well screen as possible. This should allow the sampler to fill before the top of the device reaches the top of the screen as it is pulled up through the water column, and ensure that only water from the screen is collected as the sample. In short-screen wells, or wells with a short water column, it may be necessary to use a top-weight on the HydraSleeve to compress it in the bottom of the well so that, when it is recovered, it has room to fill before it reaches the top of the screen.

Example

2" ID PVC well, 50' total depth, 10' screen at the bottom of the well, with water level above the screen (the entire screen contains water).

Correct Placement (figure 2): Using a standard HydraSleeve for a 2" well (2.5" flat width/1.5" filled OD x 30" long, 600 ml volume), deploy the sampler so the weight (a 5 oz., 2.5" long weight with a 2" long clip) rests at the bottom of the well. The top of the sleeve is thus set at ~34" above the bottom of the well. When the sampler is recovered, it will be pulled upward approximately 30" before it is filled; therefore, it is full (and the top check valve closes) at approximately 64" (5.3 feet) above the bottom of the well, which is well before the sampler reaches the top of the screen. In this example, only water from the screen is collected as a sample.

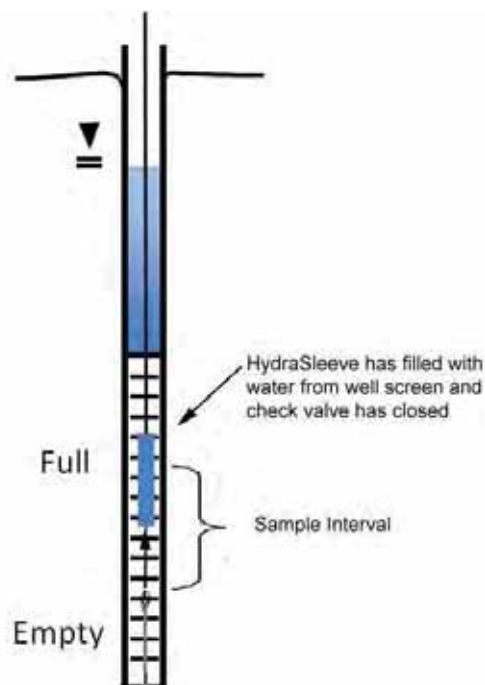


Figure 2. Correct Placement of HydraSleeve.

Incorrect Placement (figure 3): If the well screen in this example was only 5' long, and the HydraSleeve was placed as above, it would not fill before the top of the device reached the top of the well screen, so the sample would include water from above the screen, which may not have the same chemistry.

The solution? Deploy the HydraSleeve with a top weight, so that it is collapsed to within 6" of the bottom of the well. When the HydraSleeve is recovered, it will fill within 36" (3 feet) from the bottom of the well, or 2-feet before the sampler reaches the top of the screen, so it collects only water from the screen as the sample.

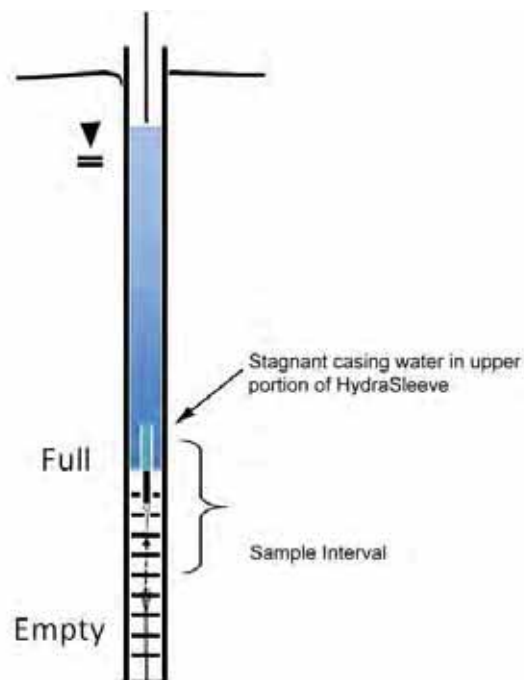


Figure 3. Incorrect placement of HydraSleeve.

This example illustrates one of many types of HydraSleeve placements. More complex placements are discussed in a later section.

NOTE: Using smaller diameter HydraSleeves (2-inch) in larger diameter wells (4-inch) causes a slower fill rate. Special retrieval methods are necessary if this is your set up (shown later in this document).

Procedures for Sampling with the HydraSleeve

Collecting a groundwater sample with a HydraSleeve is usually a simple one-person operation.

Note: Before deploying the HydraSleeve in the well, collect the depth-to-water measurement that you will use to determine the preferred position of the HydraSleeve in the well. This measurement may also be used with measurements from other wells to create a groundwater contour map. If necessary, also measure the depth to the bottom of the well to verify actual well depth to confirm your decision on placement of the HydraSleeve in the water column.

Measure the correct amount of tether needed to suspend the HydraSleeve in the well so that the weight will rest on the bottom of the well (or at your preferred position in the well). Make sure to account for the need to leave a few feet of tether at the top of the well to allow recovery of the sleeve.

Note: Always wear sterile gloves when handling and discharging the HydraSleeve.

I. Assembling the Basic HydraSleeve*

1. Remove the HydraSleeve from its packaging, unfold it, and hold it by its top.
2. Crimp the top of the HydraSleeve by folding the hard polyethylene reinforcing strips at the holes.
3. Attach the spring clip to the holes to ensure that the top will remain open until the sampler is retrieved.
4. Attach the tether to the spring clip by tying a knot in the tether.

Note: Alternatively, if spring clips are not being utilized, attach the tether to one (NOT both) of the holes at the top of the Hydrasleeve by tying a knot in the tether.

5. Fold the flaps with the two holes at the bottom of the HydraSleeve together to align the holes and slide the weight clip through the holes.
6. Attach a weight to the bottom of the weight clip to ensure that the HydraSleeve will descend to the bottom of the well.

*See Super/SkinnySleeve assembly manual and HydraSleeve Field Manual for other assembly instructions.

II. Deploying the HydraSleeve

1. Using the tether, carefully lower the HydraSleeve to the bottom of the well, or to your preferred depth in the water column

During installation, hydrostatic pressure in the water column will keep the self-sealing check valve at the top of the HydraSleeve closed, and ensure that it retains its flat, empty profile for an indefinite period prior to recovery.

Note: Make sure that it is not pulled upward at any time during its descent. If the HydraSleeve is pulled upward at a rate greater than 0.5'/second at any time prior to recovery, the top check valve will open and water will enter the HydraSleeve prematurely.

2. Secure the tether at the top of the well by placing the well cap on the top of the well casing and over the tether.

Note: Alternatively, you can tie the tether to a hook on the bottom of the well cap (you will need to leave a few inches of slack in the line to avoid pulling the sampler up as the cap is removed at the next sampling event).

III. Equilibrating the Well

The equilibration time is the time it takes for conditions in the water column (primarily flow dynamics and contaminant distribution) to restabilize after vertical mixing occurs (caused by installation of a sampling device in the well).

- Situation: The HydraSleeve is deployed for the first time or for only one time in a well

The basic HydraSleeve is very thin in cross section and displaces very little water (<100 ml) during deployment so, unlike most other sampling devices, it does not disturb the water column to the point at which long equilibration times are necessary to ensure recovery of a representative sample.

In some cases, like when using the SpeedBags, the HydraSleeve can be recovered immediately (with no equilibration time) or within a few hours. In regulatory jurisdictions that impose specific requirements for equilibration times prior to recovery of no-purge sampling devices, these requirements should be followed.

NOTE: If using top weights additional equilibration time is needed to allow the top weight time to compress the HydraSleeve into the bottom of the well.

- Situation: The HydraSleeve is being deployed for recovery during a future sampling event.

In periodic (i.e., quarterly, semi-annual, or annual) sampling programs, the sampler for the current sampling event can be recovered and a new sampler (for the next sampling event) deployed immediately thereafter, so the new sampler remains in the well until the next sampling event.

Thus, a long equilibration time is ensured and, at the next sampling event, the sampler can be recovered immediately. This means that separate mobilizations, to deploy and then to recover the sampler, are not required. HydraSleeves can be left in a well for an indefinite period of time without concern.

IV. HydraSleeve Recovery and Sample Collection

1. Hold on to the tether while removing the well cap.
2. Secure the tether at the top of the well while maintaining tension on the tether (but without pulling the tether upwards)
3. Measure the water level in the well.
4. Use one of the following 3 retrieval methods. In all 3 scenarios, when the HydraSleeve is full, the top check valve will close. You should begin to feel the weight of the HydraSleeve on the tether and it will begin to displace water. The closed check valve prevents loss of sample and entry of water from zones above the well screen as the HydraSleeve is recovered.

a. In one smooth motion, pull the tether up 30"-60" (the length of the sampler) at a rate of about 1 foot per second (or faster). The motion will open the top check valve and allow the HydraSleeve to fill (it should fill in about 1:1 ratio or the length of the HydraSleeve if the sleeve is sized to fit the well). This is analogous to coring the water column in the well from the bottom up.

b. There are times it is recommended that the HydraSleeve be oscillated in the screen zone to ensure it is full before leaving the screen area. Pull up 1-3 feet, let the sleeve assembly drop back down and repeat 3-5 times before pulling the sleeve to the surface. The collection zone will be the oscillation zone. ***When in doubt use this retrieval method.***

c. SpeedBags require check valve activation and oscillation during recovery: When retrieving the SpeedBag, pull up hard 1-2 feet to open the check valve; let the assembly drop back down to the starting point; REPEAT THIS PROCESS 4 TIMES; and then quickly recover the SpeedBag through the well screen to the surface.

5. Continue pulling the tether upward until the HydraSleeve is at the top of the well.
6. Discard the small volume of water trapped in the Hydrosleeve above the check valve by pinching it off at the top under the stiffeners (above the check valve).

v. Sample Discharge

NOTE: Sample collection should be done immediately after the HydraSleeve has been brought to the surface to preserve sample integrity.

Be sure you have discarded the water sitting above the check valve – see step #6 above.

1. Remove the discharge tube from its sleeve.
2. Hold the HydraSleeve at the check valve
3. Puncture the HydraSleeve at least 3-4 inches below the reinforcement strips with the pointed end of the discharge tube. NOTE: For some contaminants (VOC's/sinkers) the best location for discharge is the middle to bottom of the sampler. This would be representative of the deeper portion of the well screen.
4. Discharge water from the HydraSleeve into your sample containers. Control the discharge from the HydraSleeve by either raising the bottom of the sleeve, by squeezing it like a tube of toothpaste, or both.
5. Continue filling sample containers until all are full.

Measurement of Field Indicator Parameters

Field indicator parameter measurement is generally done during well purging and sampling to confirm when parameters are stable and sampling can begin. Because no-purge sampling does not require purging, field indicator parameter measurement is not necessary for the purpose of confirming when purging is complete.

If field indicator parameter measurement is required to meet a specific non-purging regulatory requirement, it can be done by taking measurements from water within a HydraSleeve that is not used for collecting a sample to submit for laboratory analysis (i.e., a second HydraSleeve installed in conjunction with the primary sample collection HydraSleeve [see Multiple Sampler Deployment below]).

Alternate Deployment Strategies

Deployment in Wells with Limited Water Columns

For wells in which only a limited water column needs to be sampled, the HydraSleeve can be deployed with an optional top weight in addition to a bottom weight. The top weight will collapse the HydraSleeve to a very short (approximately 6" to 24") length, depending on the length and volume of the sampler. This allows the HydraSleeve to fill in a water column only 3' to 10' in height (again) depending on the sampler size. Note the SuperSleeves accomplish the same thing but provide greater sample volume at a lower per sample cost.

Multiple Sampler Deployment

Multiple sampler deployment in a single well screen can accomplish two purposes:

1. It can collect additional sample volume to satisfy site or laboratory-specific sample volume requirements.
2. It can be used to collect samples from multiple intervals in the screen to allow identification of possible contaminant stratification.

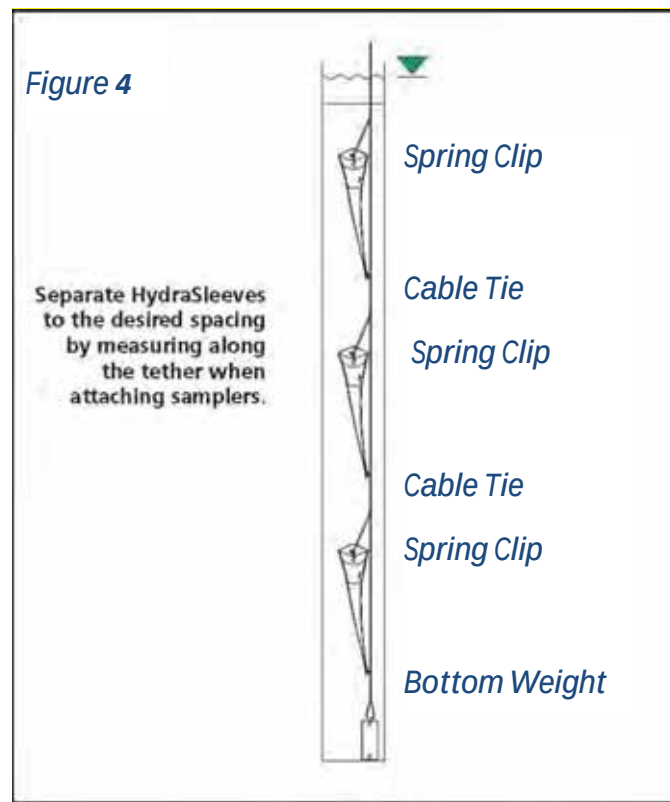


Figure 5. Multiple HydraSleeve deployment

If there is a need for only 2 samplers, they can be installed as follows. The first sampler can be attached to the tether as described above, a second attached to the bottom of the first using your desired length of tether between the two and the weight attached to the bottom of the second sampler (figure 6). This method can only be used with 2 samplers; 3 or more HydraSleeves in tandem need to be attached as described above.

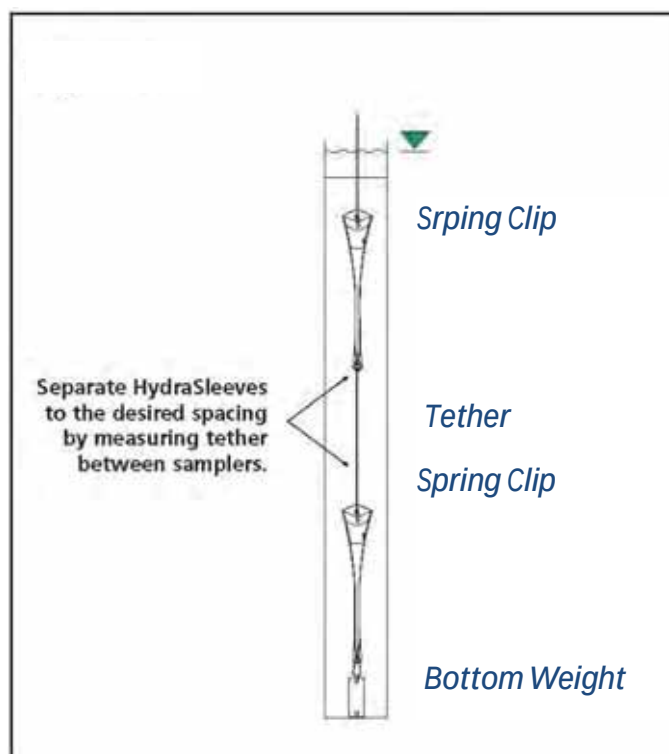


Figure 5. Alternative method for deploying multiple HydraSleeves.

In either case, when attaching multiple HydraSleeves in series, more weight will be required to hold the samplers in place in the well than would be required with a single sampler. Recovery of multiple samplers and collection of samples is done in the same manner as for single sampler deployments.

Post-Sampling Activities

The recovered HydraSleeve and the sample discharge tubing should be disposed as per the solid waste management plan for the site. To prepare for the next sampling event, a new HydraSleeve can be deployed in the well (as described previously) and left in the well until the next sampling event, at which time it can be recovered.

The weight and weight clip can be reused on this sampler after they have been thoroughly cleaned as per the site equipment decontamination plan. The tether may be dedicated to the well and reused or discarded at the discretion of sampling personnel.

References

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Parsons, 2005, Results Report for the Demonstration of No-Purge groundwater Sampling Devices at Former McClellan Air Force Base, California; Contract F44650-99-D-0005, Delivery Order DKO1, U.S. Army Corps of Engineers (Omaha District), U.S. Air Force Center for Environmental Excellence, and U.S. Air Force Real Property Agency

Robin, M. J. L. and R. W. Gillham, 1987, Field Evaluation of Well Purging Procedures, groundwater Monitoring Review, Vol. 7, No. 4, pp. 85-93

Appendix C Water Volume Length in Monitoring Wells Sampled as part of the April 2024 OMP

OMP Groundwater Monitoring Network Details

Well ID	Target Aquifer	Approximate Hydraulic Conductivity (m/day) ¹	Well Screen (mbgl) ²	Well Depth (mbgl) ²	Bore Depth (mTOC) - April 2024 ³	SWL (mTOC) - April 2024 ³	Water Column (m) - April 2024 ³	SWL (mTOC) - Oct 2023 ⁴	Hydrasleeve Deployment Depth (mTOC) - Oct 2023 ⁴
MW009	Shepparton and Coonambigdal Fluvium - Intermediate Aquifer	20	8.6-11.6	11.6	9.30	7.463	1.837	6.934	11.0
MW012	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	7.2-10.2	10.2	10.54	8.342	2.198	7.724	7.3
MW016	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	6.8-9.8	9.8	10.78	7.541	3.239	7.072	9.0
MW018	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	6.3-9.3	9.3	10.54	6.965	3.575	6.432	9.4
MW020	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	5.5-8.5	8.5	7.00	6.897	0.103	7.670	Sampled by bailer
MW029	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	7.0-10.0	10.0	11.06	8.183	2.877	7.696	9.0
MW034	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	7.0-10.0	10.0	11.27	8.095	3.175	7.670	9.0
MW035	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	7.2-10.2	10.2	11.25	7.646	3.604	7.214	9.0
MW042	Shepparton and Coonambigdal Fluvium - Intermediate Aquifer	20	15.0-17.0	17.0	12.83	7.955	4.875	7.474	16.0
MW043	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	9.8-12.3	12.3	12.83	7.874	4.956	7.390	11.3
MW046_D	Shepparton and Coonambigdal Fluvium - Deep Aquifer	Undefined - likely >1.80	18.0-21.0	21.0	22.40	8.745	13.655	8.062	20.0
MW046_I	Shepparton and Coonambigdal Fluvium - Intermediate Aquifer	20	11.0-13.4	13.4	14.07	7.950	6.120	7.512	13.0
MW051	Shepparton Colluvium - Shallow Aquifer	0.05	28.2-31.2	31.2	30.50	24.285	6.215	24.283	30.0
MW052	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	Undefined - likely >1.80	6.1-11.1	11.1	9.78	8.345	1.435	7.573	10.0
MW056	Perched Water	0.05	Unknown	Unknown	3.68	2.255	1.420	Not sampled	Not sampled
MW304	Shepparton Colluvium - Shallow Aquifer	0.05	18.0-21.0	21.0	22.00	15.797	6.203	15.757	20.0
MW307	Shepparton Colluvium - Shallow Aquifer	0.05	23.5-26.5	26.5	27.81	19.770	8.038	19.705	26.3
MW311	Shepparton Colluvium - Shallow Aquifer	0.05	19.0-22.0	22.0	22.94	20.340	2.600	20.451	21.9
MW312	Shepparton Colluvium - Shallow Aquifer	0.05	14.0-17.0	17.0	17.67	11.363	6.307	11.175	16.6
MW313	Shepparton Colluvium - Shallow Aquifer	0.05	31.0-34.0	34.0	34.20	30.100	4.100	Data Lost	33.0
MW315	Shepparton Colluvium - Shallow Aquifer	0.05	39.0-41.0	41.0	43.30	41.402	1.898	Dry	Dry
MW317	Shepparton Colluvium - Shallow Aquifer	0.05	34.0-38.0	38.0	40.00	37.885	2.115	Dry	Dry
MW318	Shepparton Colluvium - Shallow Aquifer	0.05	37.0-40.0	40.0	42.13	Dry	Dry	Dry	Dry
MW319	Shepparton Colluvium - Shallow Aquifer	0.05	38.0-41.0	41.0	43.00	35.174	7.826	35.120	41.0
MW321	Shepparton Colluvium - Shallow Aquifer	0.05	35.0-38.0	38.0	40.00	36.285	3.715	36.401	38.0
MW323	Shepparton Colluvium - Shallow Aquifer	0.05	19.0-22.0	22.0	23.00	19.455	3.545	19.396	21.8
MW329	Shepparton Colluvium - Shallow Aquifer	0.05	16.0-19.0	19.0	20.00	15.050	4.950	14.750	18.6
MW342	Shepparton Colluvium - Shallow Aquifer	0.05	13.0-17.0	17.0	17.40	13.272	4.128	13.144	16.5
MW345	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	4.0-7.0	7.0	5.57	5.321	0.249	3.884	5.4
MW346	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	6.0-9.0	9.0	8.91	3.429	5.481	1.916	8.8
MW350_D	Shepparton and Coonambigdal Fluvium - Deep Aquifer	Undefined - likely >1.80	17.5-19.5	19.5	20.55	8.395	12.155	7.695	19.0
MW350_S	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	6.5-9.5	9.5	10.00	8.437	1.563	7.735	9.0
MW351	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	5.0-8.0	8.0	8.94	6.120	2.820	5.401	7.8
MW352	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	6.0-9.0	9.0	9.83	5.831	3.999	5.283	8.8
MW353	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	6.0-9.0	9.0	7.90	7.600	0.300	7.101	7.7
MW354	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	7.0-10.0	10.0	11.07	7.455	3.615	6.886	9.0
MW356	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	1.0-3.0	3.0	3.82	2.439	1.381	1.313	9.2 ⁵
MW357	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	2.5-5.5	5.5	5.24	3.319	1.921	2.174	5.0
MW360	Shepparton Colluvium - Shallow Aquifer	0.05	10.7-12.7	12.7	12.91	8.030	4.880	7.509	11.0
MW361	Shepparton Colluvium - Shallow Aquifer	0.05	3.5-6.5	6.5	6.34	2.200	4.140	1.772	4.0
MW403	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	7.0-10.0	10.0	9.89	7.155	2.735	6.515	9.0
MW404	Shepparton and Coonambigdal Fluvium - Shallow Aquifer	1.81	7.0-10.0	10.0	10.18	7.040	3.140	6.382	9.0
MW416	Shepparton Colluvium - Shallow Aquifer	0.05	25.5-30.0	30.0	30.00	23.515	6.485	23.497	29.0

Notes:

1: Hydraulic conductivity values for each aquifer were calculated as part of the PFAS Mass Flux Study, and are presented here as an indication of estimated flow rate. It is noted that the hydraulic conductivity has not previously been determined for the Shepparton and Coonambigdal Fluvium - Deep Aquifer, however an indication of the flow rate has been provided based on the sandy nature of this layer.

2: Well screen and depth as per installation logs or Defence Esdat Database

3: Measurement as per the April 2024 OMP

4: Measurement as per the October 2023 OMP (HydraSleeve deployment depth information not recorded in April 2024 OMP Factual Report)

5: Given this measurement is significantly deeper than the well installation depth, it is considered to be a reporting error.

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Sydney

Gadigal Country | Level 1,
50 Margaret Street, Sydney, NSW 2000
T: 02 8245 0300

Wollongong

Dharawal Country | Suite 1A, 280 - 286
Keira Street, Wollongong, NSW 2500
T: 02 4225 2647

Appendix C OMP Groundwater Well Details



Table C.1: OMP Groundwater Well Details

Well ID	Top of Case (TOC) (mAHD)	Well Depth (mbgl)	Well Screen (mbgl)	Aquifer Unit
South Bandiana				
MW056 ¹	183.590	3.7	Unknown	Perched Water
MW304	176.131	21.0	18.0-21.0	Shepparton Colluvium - Shallow
MW307	181.086	26.5	23.5-26.5	Shepparton Colluvium - Shallow
MW311	182.452	22.0	19.0-22.0	Shepparton Colluvium - Shallow
MW312	175.841	17.0	14.0-17.0	Shepparton Colluvium - Shallow
MW315	204.875	41.0	39.0-41.0	Shepparton Colluvium - Shallow
MW317	204.364	38.0	34.0-38.0	Shepparton Colluvium - Shallow
MW318	205.965	40.0	37.0-40.0	Shepparton Colluvium - Shallow
MW319	199.524	41.0	38.0-41.0	Shepparton Colluvium - Shallow
MW321	200.815	38.0	35.0-38.0	Shepparton Colluvium - Shallow
MW323	184.472	22.0	19.0-22.0	Shepparton Colluvium - Shallow
MW416	187.720	30.0	25.5-30.0	Shepparton Colluvium - Shallow
North Bandiana				
MW329	181.435	19.0	16.0-19.0	Shepparton Colluvium - Shallow
MW342	180.605	17.0	13.0-17.0	Shepparton Colluvium - Shallow
MW345	168.316	7.0	4.0-7.0	Shepparton and Coonambidgal Fluvium - Shallow
East Bandiana				
MW009	166.280	11.6	8.6-11.6	Shepparton and Coonambidgal Fluvium - Intermediate
MW012	167.360	10.2	7.2-10.2	Shepparton and Coonambidgal Fluvium - Shallow
MW016	166.160	9.8	6.8-9.8	Shepparton and Coonambidgal Fluvium - Shallow
MW018	165.430	9.3	6.3-9.3	Shepparton and Coonambidgal Fluvium - Shallow
MW020	165.410	8.5	5.5-8.5	Shepparton and Coonambidgal Fluvium - Shallow
MW029	168.110	10.0	7.0-10.0	Shepparton and Coonambidgal Fluvium - Shallow
MW034	166.630	10.0	7.0-10.0	Shepparton and Coonambidgal Fluvium - Shallow
MW035	166.220	10.2	7.2-10.2	Shepparton and Coonambidgal Fluvium - Shallow
MW042	166.620	17.0	15.0-17.0	Shepparton and Coonambidgal Fluvium - Intermediate
MW043	166.550	12.3	9.8-12.3	Shepparton and Coonambidgal Fluvium - Shallow
MW046_D	166.490	21.0	18.0-21.0	Shepparton and Coonambidgal Fluvium - Deep
MW046_I	166.480	13.4	11-13.4	Shepparton and Coonambidgal Fluvium - Intermediate
MW051	187.950	31.2	28.2-31.2	Shepparton Colluvium - Shallow
MW052	168.490	11.1	6.1-11.1	Shepparton and Coonambidgal Fluvium - Shallow
MW346	166.944	9.0	6.0-9.0	Shepparton and Coonambidgal Fluvium - Shallow
MW350_D	168.229	19.5	17.5-19.5	Shepparton and Coonambidgal Fluvium - Deep
MW350_S	168.233	9.5	6.5-9.5	Shepparton and Coonambidgal Fluvium - Shallow
MW351	164.790	8.0	5.0-8.0	Shepparton and Coonambidgal Fluvium - Shallow

MW352	164.493	9.0	6.0-9.0	Shepparton and Coonambidgal Fluvium - Shallow
MW353	166.625	9.0	6.0-9.0	Shepparton and Coonambidgal Fluvium - Shallow
MW354	166.625	10.0	7.0-10.0	Shepparton and Coonambidgal Fluvium - Shallow
MW403	166.926	10.0	7.0-10.0	Shepparton and Coonambidgal Fluvium - Shallow
MW404	166.617	10.0	7.0-10.0	Shepparton and Coonambidgal Fluvium - Shallow
Off-base				
MW313	193.128	34.0	31.0-34.0	Shepparton Colluvium - Shallow
MW356	156.882	3.0	1.0-3.0	Shepparton and Coonambidgal Fluvium - Shallow
MW357	156.243	5.5	2.5-5.5	Shepparton and Coonambidgal Fluvium - Shallow
MW360	164.890	12.7	10.7-12.7	Shepparton Colluvium - Shallow
MW361	153.716	6.5	3.5-6.5	Shepparton Colluvium - Shallow

Notes:

1. A groundwater log and well installation information from the Defence Esdat database for MW056 is not available. Well depth obtained from OMP field records.
2. mAHD = Metres Australian Height Datum.



Adelaide

Kaurna Country | 100 Hutt St,
Adelaide, SA 5000
T: 08 8431 7113

Brisbane

Turrbal/Yuggera Country | Level 37,
123 Eagle Street, Brisbane, QLD 4000
T: 07 3211 5350

Bunbury

Wardandi Country | 177 Spencer
Street Bunbury, WA 6230
T: 08 9792 4797

Canberra

Ngunnawal Country | Level 1, The Realm
18 National Circuit Barton, ACT 2600
T: 02 6198 3278

Darwin

Larrakia Country | Suite G1, Level 1,
48-50 Smith Street, Darwin NT 0800
T: 08 8943 0600

Hobart

Muwununa/Nuenon Country | L2, 137
Liverpool Street, Hobart TAS 7000
T: 03 6208 3700

Melbourne

Wurundjeri Country | Level 19,
31 Queen Street, Melbourne VIC 3000
T: 03 9642 0599

Newcastle

Awabakal/Worimi Country | 61 / 63
Parry Street Newcastle West, NSW 2302
T: 02 8245 0300

Perth

Whadjuk Country | Allendale Square,
Level 9, 77 St Georges Terrace, WA 6000
T: 08 9380 3100

Sydney

Gadigal Country | Level 1,
50 Margaret Street, Sydney, NSW 2000
T: 02 8245 0300

Wollongong

Dharawal Country | Suite 1A, 280 - 286
Keira Street, Wollongong, NSW 2500
T: 02 4225 2647