BANDIANA MILITARY AREA

PFAS ONGOING MONITORING PLAN

March 2025

ACKNOWLEDGEMENT OF COUNTRY

Defence acknowledges the Traditional Custodians of Country throughout Australia. Defence recognises their continuing connection to traditional lands and waters and would like to pay respect to their Elders both past and present. Defence would also like to pay respect to the Aboriginal and Torres Strait Islander peoples who have contributed to the defence of Australia in times of peace and war

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GLOSSARY

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
ASC NEPM	*National Environment Protection (Assessment of Site Contamination) Measure 1999*, as amended 2013
ASO	Army School of Ordnance
AST	Above Ground Storage Tank
Base	Bandiana Military Area
CSM	Conceptual Site Model
CSR	[Defence] Contaminated Sites Record
DQI	Data Quality Indicators
DQO	Data Quality Objectives
DSI	Detailed Site Investigation
EDMS	Environmental Data Management System
EPA	Environment Protection Authority Victoria
HHERA	Human Health and Ecological Risk Assessment
LOR	Limit of Reporting
mbgs	Metres Below Ground Surface
NATA	National Association of Testing Authorities
OMP	Ongoing Monitoring Plan
OMR	Ongoing Monitoring Reports
PFAS	Per- and polyfluoroalkyl Substances
PFAS Management Area	The geographical area subject to Defence risk management actions. May include private or Defence owned detached properties beyond the boundaries of the Base
PFAS NEMP	PFAS National Environmental Management Plan
PFHxS	Perfluorohexane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
POL	Petroleum, Oils and Lubricants
QA	Quality Assurance
QC	Quality Control
RAP	Remediation Action Plan
Risk management actions	Remediation and management actions to address potential risks to receptors from PFAS contamination.

ROA	Remediation Options Assessment
Risk assessment	The HHERA
SAQP	Sampling and Analysis Quality Plan
SFARP	So Far as Reasonably Practicable
SWLs	Standing Water Levels
WTP	Water Treatment Plant

1 INTRODUCTION

1.1 Background

In 2025 Defence prepared a revised PFAS Management Area Plan (PMAP) for managing risks to human health and the environment from per- and poly-fluoroalkyl substances (PFAS) contamination associated with Bandiana Military Area (the Base) and surrounding areas (the 2025 PMAP). One of the requirements of the PMAP is to undertake ongoing monitoring of PFAS in the environment and to assess for changes in risks to human and ecological receptors from PFAS originating from the Base.

This Ongoing Monitoring Plan (OMP) replaces the November 2020 OMP (the 2020 OMP).

1.2 Purpose

The OMP sets out requirements for the collection of adequate data to identify and evaluate:

- spatial, and temporal (including seasonal) variability of PFAS in the environment
- changes to sources, transport pathways and/or receptors, described as a Conceptual Site Model (CSM) for the Base
- whether risks to human and ecological receptors require review
- the influence that risk management activities at the Base, as outlined in the 2025 PMAP have had on PFAS in the environment, and
- whether the identified changes trigger an action and/or review.

The data collected may be used to inform where new risk management actions may be required, or to support a determination that remediation has been completed so far as reasonably practicable (SFARP).

1.3 Supporting information

The OMP is based on information from a range of different site investigations, a human health and ecological risk assessment (HHERA), and a PFAS mass flux study. Details of these reports are provided in Appendix A.

In developing the OMP, reference has been made to the PFAS National Environmental Management Plan (PFAS NEMP), the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM, as amended 2013) and Defence estate, environmental and PFAS-specific strategies and guidance, and other information as provided in the References section of this document.

1.4 Constraints and assumptions

This OMP has been prepared based on information available at the time of writing and relies on the findings of the Detailed Site Investigation (DSI), (Golder 2018), the HHERA (Golder 2020), the DSI Addendum (JBS&G 2024a), the PFAS Mass Flux Study (JBS&G 2024b), ongoing monitoring program data, and management of risks documented in the 2025 PMAP. Defence recognises that there may still be gaps in information, and if required these will be progressively addressed while impacted parts of the Base are being managed.

This document has been developed based on the following assumptions:

- The current government issued guidelines, advisories and policies may change, and as a result may trigger a review of the OMP
- The state of knowledge presented within the reports listed within Appendix A
- The monitoring locations are based on the data collected to date, and may be further refined as proposed management/remediation actions are implemented
- Potential future infrastructure development within the Base, and access constraints at the time of this report
- Access to off-Base private properties will be granted, where required
- Surface water sampling is dependent on correct weather conditions.

2 BASE SETTING

2.1 Base description

The PFAS Management Area comprises Bandiana Military Area and surrounding area, as shown on Figure 1 in Appendix B.

Bandiana Military Area, that is the subject of this work, is located adjacent to the New South Wales (NSW) – Victorian State border, south east of Wodonga, Victoria. Bandiana Military Area itself comprises three areas:

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

Bandiana Military Area is primarily used by Defence for administration, accommodation, training, and logistics. Storage and maintenance of military vehicles also occurs. North and South Bandiana also include on-Base residential areas for Defence personnel, a community facility on North Bandiana, and a Victorian State Government Primary School (Bandiana Primary School) on South Bandiana. Sheep grazing is licensed in a portion of South Bandiana along the base of Bears Hill and a portion of North Bandiana to the south-east of the Unnamed Creek.

The land uses surrounding North, South and East Bandiana are summarised in Table 1.

Table 1. Surrounding Land Uses

Area	Direction	Description
North Bandiana	North	• Huon Hill is currently used for grazing and as a recreation space (walking and picnicking).
	South	• South Bandiana is located to the south across Anzac Parade and the Murray Valley Highway • A concrete pipe manufacturing facility, and the former Wodonga Stockyards are located to the south. Upper Middle Creek is located beyond the former stockyards.
	East	• A residential development, with the Kiewa River floodplain and Kiewa River beyond • The Unnamed Creek flows east through the residential development.
	West	• A residential development, with the Wodonga township beyond.

Area	Direction	Description
South Bandiana	North	• North Bandiana, and residential development • A small number of commercial properties.
	South	• A rural grazing property is located adjacent to the southern boundary • A mix of rural grazing properties and new residential developments are further south beyond Bears Hill.
	East	• A concrete pipe manufacturing facility across the Kiewa Valley Highway • Rural grazing properties south across Tooles Road.
	West	• Residential developments • A recreational reserve (Jack Perry Reserve) adjacent to the north western boundary • Jack in the Box Creek flows to the north-western boundary towards Wodonga Creek.
East Bandiana	North	• A residential development (Killara).
	South	• Middle Creek flows in a west to east direction along the southern boundary of the Base with Baranduda Water Treatment Plant (WTP) located beyond Middle Creek.
	East	• The residential suburb of Killara • Pastoral grazing land within the Kiewa River floodplain. This is broken up into Northern, Central and Southern Pastoral Areas, as shown in Figure 6 • The Kiewa River and associated floodplain including ox-bow lakes.
	West	• The former Wodonga Stockyard is across Whytes Road.

2.2 Base and PFAS Management Area setting

North, South and East Bandiana were acquired in 1942 as part of the war efforts during World War II and at the time primarily consisted of tank and equipment workshops and administrative and warehousing facilities. Since the early 1960s, many of the World War II buildings at the three portions of the Base have been demolished to make way for new constructions such as training, administration and accommodation facilities.

The surrounding land uses comprise the semi-rural and developed settlements of Bandiana, Killara and Wodonga. Residential properties are located to the north, east and west of the Base and to a lesser extent commercial and industrial properties to the south of North Bandiana and north of South Bandiana.

A summary of the environmental setting of the PFAS Management Area, which is well documented in the DSI (Golder 2018) and DSI Addendum (JBS&G 2024a) as listed in Appendix A, is as follows:

- The area experiences average low temperatures around 12 °C in July and maximum average temperatures of around 32 °C in January
- The highest monthly rainfall generally occurs during July (averaging approximately 82 mm), with the lowest rainfall in February (averaging approximately 38 mm). Annual rainfall is approximately 710 mm

- Bandiana Military Area is predominantly located in the saddle and plain between Huon Hill to the north and Bears Hill to the south, with the Base having an elevation ranging between 180 m Australian Height Datum (AHD) and 200 m AHD. There is a topographic divide that runs north-south through South Bandiana dividing the Base into two catchments: west sloping towards Jack in the Box Creek to the north west of the Base, and east sloping towards the Kiewa River to the east of the Base
- The geology of the Bandiana Military Area and the PFAS Management Area comprises Quaternary aged deposits of sand, silt and clay identified as the Shepparton Formation and the Coonambigdal Formation overlying Ordovician-aged schist with intrusions of granite and gneiss identified as the Omeo-Metamorphic Complex
- The Base is surrounded by interconnected networks of drains and swales, and creeks and rivers. The major elements of the regional surface water drainage network include:
    - Jack in the Box Creek is located to the north west of the Base. It receives surface water from the western portion of East Bandiana and flows north through Wodonga before discharging into Wodonga Creek
    - Kiewa River is located to the east of the Base. It receives surface water from North and East Bandiana, along with the eastern portion of South Bandiana and flows in a northern direction before discharging into the Murray River. The river floodplain is characterised by ox-bow lake features
- The primary aquifer units of the PFAS Management Area are the Shepparton Fluvium and Colluvium and, to a lesser extent, the Coonambigdal Fluvium. Significant investigation of the Shepparton Fluvium has occurred across East Bandiana and in immediately adjacent off-Base areas, with multiple interconnected aquifers being present in the upper 20 m of the Shepparton Fluvium profile within this portion of the Base. The groundwater wells sampled as part of this OMP are present in multiple aquifers including the shallow aquifer of the Shepparton Colluvium (located across South Bandiana and a portion of North Bandiana), and the shallow, intermediate and deeper aquifers of the Shepparton and Coonambigdal Fluvium (located across East Bandiana and a portion of North Bandiana). There is a groundwater divide which occurs through central South Bandiana and appears to be generally consistent with topography.

No significant changes have been identified in land use since the 2020 OMP, although additional minor residential development has occurred to the east and west of the Base.

3 EXTENT OF PFAS CONTAMINATION

This section provides an outline of the PFAS sources, pathways for migration of PFAS from a Source Area, and potential exposures to people and the environment that may occur.

This information is described as a Conceptual Site Model, which is provided as a visual representation as Figure 5 in Appendix B.

3.1 Source Areas

Fifteen PFAS Source Areas were identified in the initial investigation that occurred in 2018 and comprised of areas of PFAS contamination where aqueous film forming foam (AFFF) were used or stored. These Source Area were described in full in the 2020 PMAP and the current status of which has been summarised in Table 2, while a summary of current PFAS results have been provided in Table 3. The Source Areas that have been shown on a map in Figure 2 in Appendix B.

Table 2. Current status of Source Areas

Source Area ID.	CSR Number	Source Area description	Current Status
South Bandiana			
SA1	CSR_VIC_000353	Petroleum Platoon – Former Fire Training Ground	• Investigations identified elevated concentrations in surface water and groundwater originating from this Source Area, with elevated concentrations in soil as well as in specific areas where training had occurred across the Source Area • Based on the results of the further investigation, targeted remediation of soil within specific areas of the Source Area will be undertaken to reduce the migration of PFAS through the surface water pathway, along with PFAS infiltration into groundwater • Remediation works are likely to commence in mid-2025, with details of proposed works provided in the PMAP.
SA2	CSR_VIC_000478	Base Fire Services (BFS) – Former Fire Training Ground.	• Investigations identified elevated concentrations in soil originating from this Source Area, with lower-level concentrations in groundwater and surface water • During 2022, approximately 1,344 m^3 of soil was spread over the surface of this Source Area effectively capping previously elevated PFAS concentrations in surface soils in this Source Area and reducing the migration of PFAS through the surface water pathway • Based on the findings of previous investigations and the remediation work completed, no additional investigation or remediation work is planned to be conducted in Source Area 2.
SA3	*No Current CSR*	Potential Disposal Burial Ground	• Investigations identified low level PFAS concentrations in soil within the Source Area, which were not shown to contribute significantly to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on the findings of previous investigations, no additional investigation or remediation work is planned to be conducted in Source Area 3.
SA4	*No Current CSR*	Former 25 m Firing Range	• Investigations have not identified PFAS concentrations in any media within the Source Area. Furthermore, the area was not shown to contribute to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on the findings of previous investigations, no additional investigation or remediation work is planned to be conducted in Source Area 4.

Source Area ID.	CSR Number	Source Area description	Current Status
SA5	CSR_VIC_000365	Petroleum Platoon – Fuel Handling Facility	• Investigations identified elevated PFAS concentrations within surface soils at the Source Area, and surface water which is leaving the Source Area. Low level PFAS was identified in groundwater • Studies into the movement of the PFAS in surface water identified that water from this Source Area is at the top of the hydrological catchment, and by the time the water flows off the Bandiana Military Area, PFAS concentrations within the water have reduced to a point where they present a low risk to the general public • Based on the findings of previous investigation, no additional investigation or remediation work is planned to be conducted in Source Area 5.
SA6	CSR_VIC_000350	Former Fire Training Area, Building 600	• It should be noted that this Source Area was formally identified as the Current Fire Training Area, however the facility has since been replaced, and its description has been changed for the purpose of this document • Investigation identified PFAS contaminated infrastructure within this facility, along with PFAS in soil which causes PFAS runoff in surface water during rain events • Demolition and remediation works for this Source Area is currently being developed and is expected to commence in mid-2025, with details of proposed works provided in the PMAP.
SA7	CSR_VIC_000357	Old Fire Station, Building 421	• Investigations identified elevated PFAS concentrations in surface water and groundwater originating from this Source Area. Subsequent investigation within the Source Area during Q3 2024 as a result of these findings also identified elevated PFAS concentrations within soil • Based on the results of the further investigation, remediation of soil within a portion of this Source Area will be undertaken to reduce the migration of PFAS through the surface water pathway, along with PFAS infiltration into groundwater • Remediation works are likely to commence in mid-2025, with details of proposed works provided in the PMAP.
SA8	*No Current CSR*	Original Fire Station – Corner of Anderson Road and Donegon Road.	• Investigations identified low level PFAS concentrations in soil and groundwater within the Source Area, which were not shown to contribute significantly to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on the findings of previous investigations, no additional investigation or remediation work is planned to be conducted in Source Area 8.

Source Area ID.	CSR Number	Source Area description	Current Status
SA9	CSR_VIC_000374	Petroleum, Oils and Lubricants, Building 490	• Investigations identified low level PFAS concentrations in soil and perched groundwater within the Source Area, which were not shown to contribute significantly to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on the findings of previous investigations, no additional investigation or remediation work is planned to be conducted in Source Area 8.
Diffuse Source (DS)	*No Current CSR*	Building 895 – Former Vehicle/Truck Wash	• Investigations have shown that these DS do not contribute significantly to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on these findings, no additional investigation or remediation work is planned to be conducted within these DSs.
DS	*No Current CSR*	Building 495 – Vehicle Wash Bays	
DS	*No Current CSR*	Building 644 – Former Vehicle Wash	
DS	*No Current CSR*	Building 348/350 0 Former Q-Store	
North Bandiana			
SA10	CSR_VIC_000479	Former Unit Training Area, between Warehouse 1 and 2.	• Investigations identified low level PFAS concentrations in soil, groundwater and surface water within the Source Area, which were not shown to contribute significantly to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on the findings of previous investigations, no additional investigation or remediation work is planned to be conducted in Source Area 10.
SA11	CSR_VIC_000480	Fire Extinguisher Disposal – Warehouse 13.	• Investigations identified low level PFAS concentrations in soil, groundwater and surface water within the Source Area, which were not shown to contribute significantly to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on the findings of previous investigations, no additional investigation or remediation work is planned to be conducted in Source Area 11.

Source Area ID.	CSR Number	Source Area description	Current Status
SA12	CSR_VIC_000483	Armoured Vehicle Maintenance Training, Building 100.	• Investigation identified low level PFAS concentrations in soil and surface water within the Source Area, and elevated PFAS concentrations in groundwater immediately down gradient of the Source Area • Groundwater has been characterised within this portion of the Base and is not fast-moving owing to the clayey nature of the soil, and as such, the elevated PFAS concentrations have been shown not to have migrated far from the Source Area. The plume will continue to be monitored into the future • Based on the findings of previous investigations, no additional remediation work is planned to be conducted in Source Area 12.
DS	CSR_VIC_000367	Building 441 – Q-Store	• Investigations have shown that these DS do not contribute significantly to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on these findings, no additional investigation or remediation work is planned to be conducted within these DSs.
DS	CSR_VIC_000369	Building 67 – Warehouse 28 – Chemical, Paint and Extinguisher Storage	
East Bandiana			
SA13	CSR_VIC_000383	Fire Station – Current	• Investigations identified elevated PFAS concentrations in both soil and groundwater within this Source Area • Furthermore, groundwater investigations across East Bandiana identified that the PFAS was moving in groundwater within a sand layer at depths of 8 to 12 metres, which allowed the PFAS to readily move off the Bandiana Military Area • Based on the results of the further investigation, remediation of soil within the source area and management of the groundwater pathway will be undertaken. This will reduce PFAS migration in both the surface water and groundwater pathways • Remediation works are likely to commence in mid-2025, with details of proposed works provided in the PMAP.
SA14	CSR_VIC_000481	Former Unit Training, Building 592.	• Investigations have identified low level PFAS concentrations in soil across the Source Area, although elevated PFAS concentrations in groundwater were identified to have migrated to

Source Area ID.	CSR Number	Source Area description	Current Status
			this Source Area from Source Area 13 along the previously mentioned sand layer between 8 and 12 metres • Based on the results of the further investigation, management of the groundwater pathway will be undertaken to reduce PFAS migrating off-Base, which will be undertaken as part of remediating Source Area 13 • No additional remediation work is planned to be conducted in Source Area 14.
SA15	CSR_VIC_000482	Former Unit Training, Football Field.	• Investigations have identified low level PFAS concentrations in soil across the Source Area, although elevated PFAS concentrations in groundwater were identified to have migrated to this Source Area from Source Area 13 along the previously mentioned sand layer between 8 and 12 metres • Based on the results of the further investigation, management of the groundwater pathway will be undertaken to reduce PFAS migrating off-Base, which will be undertaken as part of remediating Source Area 13 • No additional remediation work is planned to be conducted in Source Area 15.
DS	CSR_VIC_000130	Building 605 - Steam Clean Bay	• Investigations identified low level PFAS concentrations in soil in some of the DSs, while others did not identify PFAS in the sample locations installed • Investigations have shown that these DS do not contribute significantly to the Base-wide PFAS movement through the surface water or groundwater pathways • Based on these findings, no additional investigation or remediation work is planned to be conducted within these DSs.
DS	CSR_VIC_000130	Building 910	
DS	CSR_VIC_000130	Building 853, 912, 913 – POL Storage	
DS	CSR_VIC_000130	Building 854 – Truck Dyno Facility and CSR_VIC_000130 - Building 42 – Engine Test House	

Table 3. Summary of PFOS + PFHxS Results

Area	PFOS + PFHxS in Soil (mg/kg)		PFOS + PFHxS in Sediment (mg/kg)		PFOS + PFHxS in Surface Water (µg/L)		PFOS + PFHxS in Groundwater (µg/L)	
	Max	Exceedance	Max	Exceedance	Max	Exceedance	Max	Exceedance
South Bandiana (On-Base)								
SA1	4.53	Open space	Dry: 0.549, Wet: 0.0028	-	7.09	Drinking and recreational water	950	Drinking and recreational water
SA2	1.23	Open space	Dry: 13.3	-	0.25	None	0.05	None
SA3	0.0012	None	Sampling not included in investigation scope to date.		Sampling not included in investigation scope to date.		No groundwater wells installed to date	
SA4	ND	None	Sampling not included in investigation scope to date.		Sampling not included in investigation scope to date.		No groundwater wells installed to date	
SA5	12.5	Open space	Dry: 0.305, Wet: 0.179	-	6.8	Drinking and recreational water	0.42	None
SA6	5.83	Open space	Dry: 0.0317	-	19.6	Drinking and recreational water	0.29	None
SA7	7.97	Open space	Dry: 0.0055	-	0.45	Drinking water	1,180	Drinking and recreational water
SA8	0.001	None	Sampling not included in investigation scope to date.		Sampling not included in investigation scope to date.		ND	None
SA9	ND	None	Sampling not included in investigation scope to date.		Sampling not included in investigation scope to date.		1.71	Drinking

Area	PFOS + PFHxS in Soil (mg/kg)		PFOS + PFHxS in Sediment (mg/kg)		PFOS + PFHxS in Surface Water (µg/L)		PFOS + PFHxS in Groundwater (µg/L)	
	Max	Exceedance	Max	Exceedance	Max	Exceedance	Max	Exceedance
North Bandiana (On-Base)								
SA10	0.014	None	Dry: 0.001	-	Not sampled (dry)		ND	None
SA11	0.0041	None	Wet: 0.0021	-	0.0895	Drinking water	ND	None
SA12	0.0123	None	Sampling not included in investigation scope to date.		Sampling not included in investigation scope to date.		13.5	Drinking and recreational water
East Bandiana (On-Base)								
SA13	6.29	Open space	Dry: 0.0177	-	0.902	Drinking	214	Drinking and recreational water
SA14	0.0023	None	Dry: 0.0027	-	Not sampled (dry)		32	Drinking and recreational water
SA15	0.016	None	Sampling not included in investigation scope to date.		Sampling not included in investigation scope to date.		0.38	Drinking Water
Diffuse Sources (All)	0.029	None	Sampling not included in investigation scope to date.		Sampling not included in investigation scope to date.		Refer to on-Base non-source areas	
On-Base, non-source Areas	0.301	None	Dry: 0.0884, Wet: 0.0596	-	0.164	Drinking water	18.8	Drinking water and recreational water
Off-Base – Jack in the Box Creek Catchment								
Residential estate adjoining South Bandiana	Sediment collected only		Dry: 0.0003	-	2.1	Drinking and recreational water	0.02	None

Area	PFOS + PFHxS in Soil (mg/kg)		PFOS + PFHxS in Sediment (mg/kg)		PFOS + PFHxS in Surface Water (µg/L)		PFOS + PFHxS in Groundwater (µg/L)	
	Max	Exceedance	Max	Exceedance	Max	Exceedance	Max	Exceedance
Jack in the Box Creek	0.0104	None	Dry: 0.001, Wet: 0.016	-	4.14	Drinking and recreational water	0.30	Drinking water
Wodonga Creek	Sediment collected only		ND	-	0.007	None	Surface water collected only	
Off-Base – Kiewa River Catchment								
Residential Estate northwest of North Bandiana	0.0023	None	Wet: 0.0031, Dry: 0.0003	-	0.155	Drinking	0.024	None
Unnamed Creek	Sediment collected only		Wet: 0.0075	-	0.42	Drinking	Surface Water collected only	
Kiewa River including Middle Creek (and floodplains)	Sediment collected only		Wet:0.0527	-	13.3	Drinking and recreational water	11.7	Drinking water and recreational water
Murray River	Sediment collected only		ND	-	0.0026	None	Surface Water collected only	

Notes: Area shown in the table were defined in the DSI (Golder 2018). Cells highlighted green did not exceed the screening guidance values defined in the DSI (Golder 2018). Cells highlighted grey had at least one sample which exceeded screening guidance values defined in the DSI (Golder 2018), noting the National Health and Medical Research Council (NHMRC released updated recreational water screening guidance values in August 2019, after the release of the DSI (Golder 2018). The screening above has been adjusted to the 2019 updated recreational water criteria of 2 µg/L. Furthermore, in addition to the screening criteria adopted as part of the DSI (Golder 2018), further assessment of on and off-Base risk was addressed as part of the HHERA (Golder 2020). 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 criteria as part of this table.

3.2 Transport pathways

PFAS can travel from a Source Area to off-Base areas where exposure to people and the environment can occur. This can happen via surface water and groundwater pathways. A detailed assessment of how PFAS moves in the areas was completed during 2024 and has been documented in the PFAS Mass Flux Study (JBS&G 2024c). The findings were as follows:

Table 4. Transport pathways

Area	Surface Water	Groundwater	Mass Flux Study Finding
South Bandiana	The primary PFAS transport pathway from South Bandiana is through surface water. Surface water in the western portion of the Base flows primarily through swales and road side drainage channels in a north west direction, before flowing off-Base towards Jack in the Box Creek. The eastern portion of South Bandiana flows primarily through below ground stormwater infrastructure in a north east direction, before flowing off-Base towards the Kiewa River.	The migration of PFAS through groundwater at South Bandiana is a secondary pathway compared to surface water. Groundwater across South Bandiana flows in a west to north west direction within the shallow Shepparton Colluvium aquifer towards Jack in the Box Creek, however owing to the clayey nature of the soil in this portion of the Base, the groundwater movement, along with the associated PFAS migration is very slow.	Based on the calculations completed as part of the Mass Flux Study, it was estimated that approximately 434 g/year of PFAS was migrating off South Bandiana through the surface water pathway, while <1 g/year of PFAS was migrating off South Bandiana through the groundwater pathway.
North Bandiana	The primary PFAS transport pathway from South Bandiana is via surface water. Surface water flows onto North Bandiana from South Bandiana, with additional flow collected from North Bandiana before it exists the Base from the eastern boundary. Stormwater flows through a combination of below ground infrastructure and above ground swales and drains.	The migration of PFAS through groundwater at North Bandiana is a secondary pathway compared to surface water. Groundwater across North Bandiana flows in an east direction through the shallow Shepparton and Coonambigdal Fluvium and in a west direction through the shallow Shepparton Colluvium. The hydrogeological divide runs approximately through the centre of the Base. Owing to the clayey nature of the soil in this portion of the Base, the groundwater movement, along with the associated PFAS migration is very slow.	Based on the calculations completed as part of the Mass Flux Study, it was estimated that approximately 461 g/year of PFAS was migrating off North Bandiana through the surface water pathway, while 1 g/year of PFAS was migrating off North Bandiana through the groundwater pathway.
East Bandiana	PFAS transport via surface water is a secondary pathway for East Bandiana. All surface water from the Base is collected by below ground stormwater infrastructure	The primary PFAS transport pathway from East Bandiana is via groundwater. In this portion of the Base, there are three aquifers in the Shepparton and	Based on the calculations completed as part of the Mass Flux Study, it was estimated that approximately 93 g/year of PFAS was migrating

Area	Surface Water	Groundwater	Mass Flux Study Finding
	which discharges it from two primary stormwater outlets along the northern boundary of East Bandiana. This water eventually reaches the Kiewa River.	Coonambigdal Fluvium aquifer within the top 20 m of the soil profile. These are known as the shallow, intermediate and deeper aquifers, with groundwater in each moving towards the north east. The intermediate aquifer is a continuous sand layer between 8 to 12 metres below ground level and forms a complete pathway from Source Area 13 to the off-Base oxbow lakes in the Kiewa River floodplain.	off East Bandiana through the groundwater pathway, while 4 g/year of PFAS was migrating off East Bandiana through the surface water pathway.

3.3 Receptors and risks

The HHERA (Golder 2020) concluded that the human health risks to both on-Base and off-Base receptors, under the 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.

Based on information collected during the DSI (Golder 2018), HHERA (Golder 2020) and DSI Addendum (JBS&G 2024a), several key potential exposure scenarios were identified including the potential for maintenance or construction workers to be exposed to PFAS. The current and realised exposure pathways are:

- Incidental ingestion or direct contact with soil, sediment, surface water or groundwater.
- Inhalation of dust arising from soil or sediment.

The HHERA (Golder 2020) concluded that the risks were low and acceptable, under current exposure conditions but management is required to ensure exposure remains low through the implementation of task appropriate work health and safety controls. As such, the reader's attention is drawn to the Commonwealth Work Health and Safety Regulations (2011), and the Defence Safety Manual (SafetyMan) (Defence 2024), which provides safety policy and procedures with electronic links to corporate tools, services and expert advice to address the management of activities where people are exposed to potential hazards.

The reader's attention is also drawn to the Defence PFAS Construction and Maintenance Framework (Defence 2021), as referenced in Appendix A. The PFAS Construction and Maintenance Framework provides guidance on the management of PFAS during construction and maintenance projects. Therefore, in accordance with the PFAS Response Management Strategy (Defence 2018), the risks associated with general maintenance or construction activities are not assessed further within this PMAP Revision.

The following elevated risks associated with potential future scenarios (i.e., unrealised scenarios) were identified as part of the HHERA (Golder 2020):

- Risk ID#1: On-Base Field Training Activities

- Risk ID#2: Use of groundwater as drinking water, and/or stock watering
- Risk ID#3: Use of surface water and groundwater on the Kiewa River floodplain east of East Bandiana, including the Southern Pastoral Area
- Risk ID#4: Consumption of carp from the Unnamed Creek and a section of the Kiewa River
- Risk ID#5: Exposure of terrestrial ecological receptors to on-Base impacted soils
- Risk ID#6: Exposure of ecological receptors in surface water, and exposure of higher order avian and mammalian predators.

Potential elevated risks and potential risk sources, precluded Environmental Values and the potential consequences if the risks were to be realised in the future, have been further summarised in the HHERA (Golder 2020).

4 ONGOING MONITORING PLAN

This section sets out the data quality objectives, monitoring scope and assessment requirements. Changes made to the 2020 OMP are summarised in the following sections, and supporting rationale is provided in Table 14 and Appendix D.

4.1 Sampling, Analysis and Quality Plan

A Sampling, Analysis and Quality Plan (SAQP) will be developed prior to implementation of the OMP. The SAQP provides information on data quality assurance procedures and measures including data quality indicators (DQI), sampling methodologies and analytical methods. The SAQP will be updated as required.

4.2 Data Quality Objectives

The Data Quality Objective (DQO) process is an iterative planning approach used to define the type, quantity and quality of data that is needed to inform decisions relating to the environmental condition of a site. The seven-step DQO process:

- clarifies the study objective
- defines the most appropriate collection of data as relevant to the study objective
- determines the conditions from which to collect data
- specifies tolerable limits on decision errors, which will be used as the basis for establishing the quantity and quality of data, needed to support the decision.

The DQOs for monitoring are presented in Table 5. They have been prepared in line with the DQO process outlined in the ASC NEPM (Schedule B2).

Table 5. Data Quality Objectives

Process	Description
Step 1: State the problem	Previous investigations have identified that PFAS associated with the use, storage and disposal of AFFF at Bandiana Military Area have impacted soil, surface water, groundwater, sewage, sediment, pore water and biota within the PFAS Management Area. Based on the HHERA (Golder 2020) the concentrations in the various media represent a low and acceptable risk to on-Base and off-Base receptors for all realised scenarios. The only potentially unacceptable human health risks were associated with unrealised scenarios. Ongoing monitoring is required to be undertaken as part of the Bandiana Military Area PMAP to assess potential changes in receptor exposure conditions, specifically those that relate to surface water and groundwater. These include the assessment of changes related to relevant environmental values.
Step 2: Identify the decision/goal of the study	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 PFAS 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 CSM), and whether the OMP needs to be amended (e.g., increasing concentrations may require increased monitoring locations and/or

Process	Description
	frequencies or decreasing concentrations may warrant a decrease in the frequency or number of locations).
Step 3: Identify the information inputs	The following information inputs will apply to the OMP: • Objectives and scope of works of this OMP • Findings from the previous investigations and reports listed in Appendix A, including Ongoing Monitoring Reports (OMRs) under the 2020 OMP • CSM, including potential sources, pathways, and receptors • Potential contaminants of concern (PFAS) • Field methods, such as sampling, sample storage and preservation, laboratory methods, quality control (QC) and quality assurance (QA) • Media to be sampled (including surface water and groundwater), and location of samples (on/off-Base, up/down-hydraulic gradient, up/down-stream) • Adopted assessment criteria will be from the PFAS NEMP Version 3.0 (HEPA 2025 or as amended) where available • Field data (including water quality parameters and visual/olfactory observations) and results from the laboratory analysis • Data from other sources (Defence's Environmental Data Management System (EDMS) such as data collected for the design or assessment of remediation activities.
Step 4: Define the boundaries of the study	The OMP comprises sampling locations at Bandiana Military Area and surrounds to assess variation in PFAS concentrations over time and provide supporting data for assessment of potential management actions. The sampling will include surface water and groundwater, including locations both on and off-Base, up/down-hydraulic gradient and up and down-stream. The vertical boundary of the investigation will be the depth of the groundwater aquifers being monitored. The temporal boundary is ongoing from the date of publishing this OMP for a three-year period, after which time a review will be completed to assess what level of ongoing monitoring may be appropriate.
Step 5: Develop the analytical approach/decision rules	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 decision rules can be defined as: • All samples analysed for the PFAS suite (Appendix E, as amended) and suitability of data assessed to ensure the laboratory Quality Assurance/Quality Control (QA/QC) is within acceptable ranges • Comparison of PFAS concentrations in surface water and groundwater against the applicable regulator endorsed guideline values (as amended) for both human and ecological receptors

Process	Description
	• Comparison of PFAS concentrations in surface water and groundwater against previous results to determine any temporal or spatial trends or variations in concentrations. Assessment of any trends (such as temporal or seasonal trends) may inform decision making to consider whether further monitoring may be reduced or continued. Note, specific triggers for action and review of monitoring data and monitoring locations are detailed in Section 7, including triggers for resampling where PFAS is detected for the first time, or is detected above relevant guidance values. The decision on the acceptance of the analytical data should be made on the basis of the Data Quality Indicators (DQIs) as follows: • **Precision**: A quantitative measure of the variability (or reproducibility) of data • **Accuracy**: A quantitative measure of the closeness of reported data to the "true" value • **Representativeness**: The confidence (expressed qualitatively) that data are representative of each media present on Base • **Completeness**: A measure of the amount of useable data from a data collection activity • **Comparability**: The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event.
Step 6: Specify performance or acceptance criteria	The key acceptance criteria for the OMP are: • The acceptable limits on field and laboratory data collected for works undertaken under this OMP will be in accordance with ASC NEPM, and PFAS NEMP (2025, or as amended) and must be detailed in the SAQP. A review of the data quality is to be undertaken and documented to minimise the potential for decision errors • The adopted guideline values will be in accordance with the PFAS NEMP (2025, or as amended) 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.
Step 7: Develop the plan for obtaining data	The scope and methodology for the assessment to gather data is defined within this OMP document. The SAQP to be developed specific to implementing this OMP will define the manner in which data will be collected to achieve the study goals defined above. It should be noted that sediment data will no longer form part of the OMP. Further discussion regarding the discontinuation of these locations has been provided in the sections below and in Appendix D.

4.3 Proposed monitoring intervals

The proposed monitoring intervals for surface water and groundwater are detailed in Table 6. These monitoring intervals aim to assess potential variability in the sampled media conditions due to rainfall (if any) and other climatic factors, with sampling during the drier portion of the year (summer) and the

wetter portion of the year (winter). The monitoring data will be incorporated into a process to update the CSM (as presented in the PMAP), if required.

Monitoring intervals of media is the same as that provided in the 2020 OMP, with the exception of several specific sampling locations which is further discussed in Appendix D.

The geological units and the target aquifers for each of the groundwater monitoring wells have been identified in Figures 4a and 4b, Appendix B, and within the Table 13 in Appendix C.

Table 6. Proposed monitoring intervals

Media	Locations	Frequency
Surface water	Permanent water bodies, non-permanent water bodies and select drainage channels	Biannual. Given that surface water is the primary pathway for PFAS which results in exposure to human and ecological receptors, establishment of potential trends during low and high flow periods should confirm the exposure scenarios considered within the HHERA (Golder 2020). Surface water sampling should be conducted after a reasonable rain event (i.e., 25 mm of rain over a 4 day period) if possible, as many of the water bodies targeted by the OMP are ephemeral. Re-mobilisation for surface water sampling from ephemeral water bodies after a reasonable rain event will only occur if it is within 4 weeks of the original OMP sampling event and within the same season.
Groundwater	Omeo-Metamorphic Complex and Shepparton Colluvium	The majority of sample locations are sampled annually during the August to October period for groundwater wells installed in the Omeo-Metamorphic Complex or Shepparton Colluvium as groundwater in these units was deep (greater than 12 m below ground surface) and low hydraulic conductivities were observed.
	Shepparton Fluvium and Coonambigdal Fluvium	The majority of sample locations are sampled annually. While these units generally exhibited higher concentrations of PFAS and are the primary pathway for PFAS from East Bandiana, as identified in the DSI Addendum (JBS&G 2024a) and the Mass Flux Study (JBS&G 2024b), this sampling has been changed from biannual sampling as part of this OMP. The reason for this is the introduction of new sample locations in down-gradient off-Base areas to monitor known PFAS contamination, and the remediation of the East Bandiana aquifer which is to occur during 2025.

4.4 Monitoring locations

The monitoring locations selected within the PFAS Management Area are detailed in the sections below. The locations are separated into on-Base, off-Base public and off-Base private. Off-Base monitoring locations require the agreement of the landholder/leaseholder. A stakeholder engagement plan has been prepared to manage this process.

It should be noted that the monitoring locations have been revised since the 2020 OMP. The changes relate to the addition or removal of sampling locations or a changed monitoring frequency for existing sampling locations. These changes relate to the findings of recent OMP events, evaluation of previous results or further investigations works (i.e., the DSI Addendum (JBS&G 2024a) and Mass Flux Study (JBS&G 2024b)) completed across Bandiana Military Area and the PFAS Management Area since the 2020 OMP was written. Changes to the OMP sampling locations have been discussed in the sections below and in Appendix D.

It should be noted that sediment sampling, which was included in the 2020 OMP, has been discontinued as part of the 2025 OMP. Sediment locations were previously included to monitor concentrations in this media at key surface water flow locations. The understanding of PFAS migration through the surface water pathway has greatly improved with the completion of the Mass Flux Study (JBS&G 2024b), which has enabled Defence to identify key Source Areas for further investigation and remediation. Furthermore, review of the sediment results from the previous three years of monitoring as part of the OMP has not identified significant temporal trends, limiting the value of continued collection of this data, particularly in light of surface water and groundwater being the primary pathways for potential receptor exposure scenarios.

4.4.1 Surface Water

Surface water is a primary pathway for off-Base migration of PFAS. The proposed surface water monitoring locations are identified in Table 7. The surface water sampling locations are shown on Figures 3a and 3b, Appendix B.

No changes in the surface water sampling locations have occurred since the 2020 OMP.

4.4.2 Groundwater

Groundwater is also a primary pathway for off-Base migration of PFAS. The proposed groundwater monitoring locations are identified in Table 7 and shown on Figures 4a and 4b, Appendix B. Groundwater is to be monitored annually or biannually in general accordance with the well position either being on- or off-Base (refer to Table 6). Groundwater monitoring well locations, including which geological unit and aquifer each well targets, are presented in Appendix C.

Several changes to the sampling network or frequency have been made since the 2020 OMP. These generally fall into the following categories:

- Inclusion of new groundwater wells to inform the understanding of known groundwater aquifer impacts and/or characterising known pathways
- Replacement of existing groundwater wells which have been damaged or removed
- Reducing the frequency of groundwater well sampling within on-Base areas owing to the introduction of new off-Base sampling locations and East Bandiana aquifer remediation scheduled for 2025.

Changes to OMP groundwater sampling from the 2020 OMP have been discussed in Table 7 below, and further detailed in Appendix D.

Table 7. OMP Monitoring Locations

Catchment	Surface Water	Groundwater		Target Area	Justification
	Biannual	Biannual	Annual		
On-Base Locations					
Jack in the Box Creek	SW302 SW307 SW310	-	MW315 MW317 MW318	South Bandiana, On-Base, Source Area 2	Locations target surface water and groundwater within and down-gradient of the Source Area. Also important sample locations to establish sub-catchment concentrations up-gradient of Source Area 1, which is known to significantly contribute to surface water PFAS concentrations.
	SW311 SW313 SW316 SW321	-	MW304 MW305 MW307 MW311	South Bandiana, On-Base, Source Area 1	Locations target surface water and groundwater within and down-gradient of the Source Area. SW311 and MW304 are particularly important as they generally represent the off-Base discharge into Jack in the Box Creek. MW305 is a newly incorporated location and has been included to better define and potentially delineate known groundwater impacts associated with Source Area 1.
	SW322	-	MW312	South Bandiana, On-Base	SW322 and MW312 are located where surface water and groundwater discharges off-Base into Jack in the Box Creek. SW322 is also at the confluence of surface water drainage from Source Area 1 and 2 and Source Area 5, 6 and 7.
	SW323	-	-	South Bandiana, On-Base	This point represents the confluence of drainage from Source Area 5, 6 and 7 prior to discharging off-Base.
	SW324 SW326 SW332 SW336	-	MW051 MW323 MW416	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. It should be noted that MW326, which was identified in the 2020 OMP, was damaged and replaced by new well MW416. MW051 was previously identified as MW04 in the 2020 OMP.
	SW333 SW338	-	MW329		Locations target surface water and groundwater discharge from Source Area 5. SW333 targets discharge to the Jack in the Box Creek catchment,

Catchment	Surface Water	Groundwater		Target Area	Justification
	Biannual	Biannual	Annual		
Kiewa River	SW340	-	-	South Bandiana, On-Base, Source Area 5	SW338 is the large pond within the Source Area. SW340 targets discharge to the Kiewa River catchment.
Jack in the Box Creek	SW448	-	MW319 MW321	South Bandiana, On-Base, Source Area 7	Locations target surface water and groundwater discharges from Source Area 7.
Kiewa River	SW346 SW349 SW355	-	MW056	South Bandiana, On-Base, Source Area 9, and stormwater ponds (wetlands)	MW056 targets a perched groundwater layer identified within Source Area 9. Surface water locations are targeting discharge into, within and from the South Bandiana Stormwater Ponds. MW056 was previously identified as BH111 in the 2020 OMP.
	SW370 SW374 SW375	-	MW342 MW343 MW344 MW345 MW346	North Bandiana, On-Base, Source Area 10, 11 and 12	SW370 is within the Unnamed Creek, targeting contributions from Source Area 10, 11 and 12. MW342 targets Source Area 12. MW345 is within the shallow Shepparton and Coonambigdal Fluvium aquifer where potential groundwater/surface water interactions maybe occurring. SW375 and MW346 is the point of discharge from the Base. MW343 and MW344 are newly incorporated locations and are installed within the shallow Shepparton Colluvium aquifer and shallow Shepparton and Coonambigdal Fluvium aquifer respectively, down-gradient of Source Area 10 and 11. These wells have been included to assist in calculation of groundwater flow in North Bandiana, and to better define the extent of the PFAS plume from Source Area 12. The sampling frequency for monitoring wells MW345 and MW346 has been reduced as monitoring well MW447 has been introduced to the program to investigate the potential migration of PFAS impacted groundwater from North Bandiana towards the residential areas of Killara.
	SW379 SW380	-	MW009 MW012	East Bandiana, On-Base, Source	Locations are targeting surface water discharge from Source Area 13. The groundwater locations are targeting the East Bandiana groundwater plume within the shallow, intermediate and deeper Shepparton and

Catchment	Surface Water	Groundwater		Target Area	Justification
	Biannual	Biannual	Annual		
			MW016 MW018 MW020 MW029 MW034 MW035 MW042 MW043 MW046_I MW046_D MW052 MW350_S MW350_D MW352 MW353 MW354 MW403 MW404	Areas 13, 14 and 15	Coonambigdal Fluvium aquifers, which is emanating from Source Area 13 and discharging off-Base across the eastern Base boundary. Sampling frequency of all wells has been reduced from biannual to annual for this OMP owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025. MW052, MW403, MW404 and MW46_I were formally identified as MW06-a, BH1, BH2 and MW47 respectively in the 2020 OMP.
	SW382 SW387 SW388	-	MW351	East Bandiana, On-Base	Locations are targeting surface water discharge points from East Bandiana into the Kiewa River, and Kiewa River floodplain. MW351 targets the down-gradient boundary adjacent to the residential properties. Sampling frequency has been reduced from biannual to annual for this OMP owing to the East Bandiana aquifer remediation scheduled for 2025.
Off-Base Locations					
Jack in the Box Creek	SW424	-	MW302	Upper Jack in the Box Creek	Locations are targeting publicly accessibly open space land use areas where yabby trapping occurs. The maximum concentrations within Jack in

Catchment	Surface Water	Groundwater		Target Area	Justification
	Biannual	Biannual	Annual		
	SW463		MW303 MW313		the Box Creek were reported at these locations. MW302 and MW303 are newly incorporated locations into the OMP and have been included to better define and potentially delineate known groundwater impacts associated with Source Area 1. Groundwater monitoring locations MW303 and MW313 are directly adjacent to residential developments, with concentrations assisting in identifying potential human health exposure to adjacent receptors.
	SW427	MW360	-	Lower Jack in the Box Creek	SW427 is located where the creek passes near sensitive land use areas (i.e., a childcare centre) where sensitive receptors such as children could be exposed. MW360 is located within the shallow Shepparton Colluvium aquifer where elevated concentrations and where potential groundwater/surface water interactions maybe occurring.
	SW430	MW361	-	Lower Jack in the Box Creek	MW361 is located within the shallow Shepparton Colluvium aquifer where elevated concentrations have been reported. SW430 is in proximity to groundwater well MW361 to allow assessment of groundwater/surface water interactions.
	SW431	-	-	Lower Jack in the Box Creek	SW431 is located where flood diversion structures are located, and if the equipment is used, may result in the release of water from Jack in the Box Creek into Wodonga Creek upgradient of the North East Water abstraction point.
	SW432	-	-	Lower Jack in the Box Creek	SW432 is located down-gradient of several off-Base sources identified during investigations.
	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 most down-stream point of monitoring within the PFAS Management Area within the Jack in the Box Creek catchment.

Catchment	Surface Water	Groundwater		Target Area	Justification
	Biannual	Biannual	Annual		
Kiewa River	SW409	MW447	-	Unnamed Creek	SW409 is located where the 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. MW447 is a newly incorporated groundwater location recently installed off-Base to investigate the potential migration of PFAS impacted groundwater into off-Base areas.
	SW403 SW405 SW412 SW462	MW357	-	Unnamed Creek and Kiewa River ox-bows	Locations SW403 and SW405 are ox-bow lakes within the Central Pastoral Area, and SW412 and SW462 are where the 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.
	SW395 SW396[1] SW397[1] SW400[1] SW401[1] SW470 SW471[1] SW487[1]	OTH019[2] MW411[1] MW412[1] MW413[1] MW414[1] MW415[1]	-	Kiewa River ox-bows	Surface water locations are ox-bow lakes located on the Kiewa River floodplain within the Southern Pastoral Area. SW487 is targeting seepage water, where groundwater seeps were identified on the terrace separating the upper and lower Kiewa River floodplain. MW356 targets groundwater/surface water interactions with Kiewa River. OTH019 is a point of use sample, where bore water is used for irrigation of home grown produce and drinking water for chickens. MW411 through MW415 are newly incorporated groundwater locations on private property directly east of the East Bandiana boundary. They have been included to monitor the known PFAS groundwater plume in this area.
	SW390	-	-	Kiewa River – main channel	SW390 is the Kiewa River background location and represents conditions upstream of the Baranduda Water Treatment Plant (WPT) and Middle Creek.

Catchment	Surface Water	Groundwater		Target Area	Justification
	Biannual	Biannual	Annual		
	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 risk associated with the consumption of carp from within the Middle Creek.
	SW398 SW404	MW356	-	Kiewa River – main channel	Locations are located within the Kiewa River main channel and represent conditions down-gradient of the on-Base discharges, and where recreational activities commonly occur within the river. MW356 targets the groundwater/surface water interactions with 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, is located and where recreational activities commonly occur within the river and represents the most down-stream point of monitoring within the PFAS Management Area within the Kiewa River catchment.

Table notes:

1. Indicates private property.
2. Indicates private property point of use. Location not shown on figures.
3. Standard limits of reporting apply for the whole table including 0.01 microgram per litre (µg/L) for water.

In addition to the sampling identified above, all groundwater monitoring wells to be sampled during an OMP sampling event will be gauged to measure the depth to groundwater. A gauging round of all wells will be completed prior to the commencement of sampling.

4.5 Sample analysis

Samples will be analysed by a National Association of Testing Authorities (NATA) accredited laboratory for a suite of PFAS as outlined in Appendix E, using NATA accredited methods.

Laboratory LORs must be selected to achieve the OMP purpose (Section 1.2) and the DQO's. The rationale for selecting LORs below the standard LOR must be provided.

Quality control and quality assurance measures will be outlined within the SAQP.

In addition to PFAS, field measurement of water quality parameters such as pH, electrical conductivity, redox potential, dissolved oxygen and temperature will be undertaken on all surface and groundwater samples.

5 OTHER ASPECTS

To achieve the OMP purpose (Section 1.2), inform the CSM and allow assessment of the site risk profile, a review of other aspects will also be undertaken, including (but not limited to) water use surveys, registered bore searches, change in land zoning, changes in land use on/off-Base, development works, remediation works.

The aspects review requirements are included in Table 8.

Table 8. Other aspects review

Aspect	Review requirements
Information sources	The OMP will consider other sources of information, such as: • Data obtained from works associated with PMAP implementation, namely further characterisation of Source Areas or areas of interest (i.e. catchments), PFAS Mass Flux Studies and remedial actions • Changes that may result from the specific or cumulative impact of remediation or containment actions, existing transportation trends, or changes to hydrogeology • Investigations associated with estate planning or works. Other remediation works (non-PFAS) which may also result in changes to existing transportation trends or changes to hydrogeology.
Development works or changes in on-Base land use	The OMP will consider development works and/or changes in on-Base land use that may have the potential to impact the nature and/or extent of PFAS including: • Projects planned for the next 12-month monitoring period, particularly where works relate to identified Source Areas • A significant change of land use in Source Areas may require review of the OMP, and whether additional monitoring will be required (actions may include installing new monitoring wells or adding new surface water locations). This information will be gathered by the project team having regular meetings and ongoing liaison with Base staff and other relevant stakeholders actively planning or completing work on-Base.
Development works or changes in off-Base land use	The OMP will consider development works and/or changes in off-Base land use that may have the potential to impact the nature and/or extent of PFAS including: • A significant change of land use within the PFAS Management Area or adjoining land may require review of the OMP, and whether additional monitoring will be required (actions may include installing new monitoring wells or adding new surface water locations). This information will be gathered by periodic review of surrounding land uses by means of aerial imagery, land zoning, registered bore reviews and community engagement, including water use surveys distribution.

Aspect	Review requirements
Significant weather events	Significant weather events could include prolonged wet weather or long dry periods, where rainfall is significantly greater or lower than the monthly averages for the area. Review of these aspects will include: • Potential for variability on PFAS concentrations • Potential for surface water or groundwater interaction with Source Areas could become a significant contributor. This information will be gathered from publicly available Bureau of Meteorology records, and reviewed as part of annual reporting of the OMP.
Water use surveys	The OMP will consider any data collected through the completion of water use surveys to identify any changes in water use or land use activities which may impact the respective risk profiles.
Changes in EPA Victoria Precautionary Advice	The OMP will consider any changes made by EPA Victoria to the geographical extents of the existing Management Area associated with the Precautionary Advice relating to carp.
Changes in nationally endorsed PFAS screening criteria	The OMP will consider any changes to the current human health and ecological screening criteria for PFAS as presented in the PFAS NEMP Version 3.0 (HEPA, 2025).

6 PFAS SCREENING CRITERIA

The adopted screening criteria references the PFAS NEMP (2025), Defence estate and environmental strategies, and Defence PFAS-specific strategies and guidance. At the time of preparing this OMP, a number of guidance documents were available in Australia and referred to including:

- HEPA, 2025. PFAS NEMP Version 3.0. March 2025
- Department of Health (DoH), April 2017. *Health Based Guidance Values for PFAS for use in site investigations in Australia*. This document is based on the works undertaken by FSANZ in 2017 (FSANZ 2017)
- National Health and Medical Research Council (NHMRC), 2019. *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*. August 2019 (NHMRC 2019)
- *National Environment Protection (Assessment of Site Contamination) Measure 1999*, Schedule B1, as amended in 2013 (ASC NEPM 2013).

The adopted PFAS screening criteria to assess the data collected as part of the monitoring are presented in Table 9 and Table 10.

Table 9. PFAS Water Criteria Summary – Human Health

Media	Pathway	Compound	Criteria	Comment / Reference
Groundwater	Drinking Water	PFOS+ PFHxS	0.07 µg/L	The values presented in the PFAS NEMP, 2025 are from DoH 2017, which published final health-based guidance values for PFAS for use in site investigations in Australia. DoH utilised the TDI for PFOS and PFOA from FSANZ, 2017 and the methodology described in Chapter 6.3.3 of the National Health and Medical Research Council's (NHMRC) Australian Drinking Water Guidelines (ADWG), 2022 to determine drinking water values. For PFHxS, DoH 2017 noted that *'FSANZ concluded that there was not enough toxicological and epidemiological information to justify establishing a tolerable daily intake. However, as a precaution, and for the purposes of site investigations, the PFOS tolerable daily intake should apply to PFHxS. In practice, this means that the level of PFHxS exposure should be added to the level of PFOS exposure; and this combined level be compared to the tolerable daily intake for PFOS'*.
		PFOA	0.56 µg/L	

Media	Pathway	Compound	Criteria	Comment / Reference
Surface Water and Groundwater	Recreational use	PFOS+ PFHxS	2 µg/L	The values presented in the PFAS NEMP Version 3.0 (2025) are from NHMRC (2019) and are based on applying the TDIs for PFOS and PFOA using an ingestion rate of 30 L per year (based on an ingestion rates of 0.2 L of water per event and an event frequency of 150 events per year).
		PFOA	10 µg/L	

Table 10. PFAS Water Criteria Summary – Ecological

Media	Pathway	Compound	Criteria	Comment / Reference
Surface Water and Groundwater	Freshwater (99% species protection)	PFOS	0.00023 µg/L	The values are from the PFAS NEMP Version 3.0 (HEPA 2025) which endorsed the Australian and New Zealand Guidelines for Fresh and Marine Water Quality – technical draft default guideline values. It is understood that these guidelines are currently being reviewed and may be subject to future revision. The 99% level of protection has been applied for slightly to moderately disturbed ecosystems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. The 95% level of protection has been provided for reference. It is proposed that the laboratory LOR is adopted for the purposes of preliminary screening of analytical water results, rather than sole use of the criteria value.
		PFOA	19 µg/L	
	Freshwater (95% species protection)	PFOS	0.13 µg/L	
		PFOA	220 µg/L	

Defence has focussed on PFOA, PFOS and PFOS+PFHxS, the PFAS compounds for which there is available criteria to assess either human health and/or ecological risks.

7 TRIGGERS FOR ACTION AND REVIEW

Updates to the OMP may be required for several reasons.

Data on changes in the distribution, concentration, transport (pathways and flow rates) and transformation of the contaminants, as well as assessment against appropriate guideline values provides an evidence base for targeted and effective risk management of PFAS contamination to protect human and environmental receptors currently impacted.

Data collected during the implementation of the OMP is reviewed against historical concentrations after each sampling event, and annually, to support an assessment for potential changes in the factors outlined above. Changes in the understanding of these risks, triggered by this data assessment may provide an early warning that additional management of PFAS contamination may be warranted in areas not currently affected by PFAS. Changes detected through the implementation of the OMP may inform a number of risk-management decisions including:

- additional investigations or consideration of the requirement for additional sampling
- one or more remediation or risk management actions
- changing risk management actions at receptor level (e.g., provision or cessation of precautionary advice).

Performance measures designed to monitor the environmental impacts to groundwater and surface water have been assigned on the basis of the following definitions:

- **Screening criteria**: a water quality standard that is identified as being appropriate to a contaminant in order to assess the overall impact on water quality for an exposure pathway
- **Trigger level**: a specific screening criterion applied to a contaminant to assess whether there have been possible adverse trends in environmental monitoring data. A trigger level is used as a tool to alert stakeholders and Regulators of these changes. The trigger levels and responses are described in Table 11.

It is noted that prior to considering any trigger responses outlined in Table 11, the following is initially confirmed:

- Analytical results have met appropriate quality assurance and quality control requirements as outlined in Step 5 of the Data Quality Objectives (Section 4.2)
- In the case of first-time detections, initial exceedances of screening criteria or new maximum concentrations, the analytical laboratory has been contacted to verify the result. If discrepancies are found, then either re-analysis of the sample (if sufficient is still available) or re-sampling will be considered.

If results pass these initial checks, then trigger levels and responses are considered as outlined in the following Table 11. Trigger data should take into account and consider a range of factors prior to action being undertaken:

Trigger Point – Action Considerations

1. The existing data available for relevant media, quantum of relative change identified and screening criteria set out in Section 6
2. Data point (sample) location, relevant pathways and potential linkage to human or ecological receptors, as set out in the CSM
3. Planned activities, such as Source Areas that may be flagged for future remediation.

Table 11. Trigger levels and responses

Trigger	Response
First time detection of PFAS in groundwater/surface water	**On-Base** • Review CSM to assess groundwater and surface water pathways and the potential for migration to off-Base receptors • If receptors are identified on-Base, evaluate potential completeness of exposure pathways identified through CSM • Where considered complete, identify further monitoring (i.e., increased frequency) or controls based on identified potential receptor exposure. **Off-Base** • Evaluate potential off-Base migration of PFAS via groundwater/surface water pathways as identified in the CSM • Consider additional monitoring of off-Base wells or surface water bodies to assess potential receptor exposure.
First time exceedance of the drinking water guideline in groundwater	**On-Base** • Calculate the rolling average over a three-year period (where available) for sample results from the same location and compare with the drinking water screening criteria • Evaluate groundwater flow direction and velocity to assess the potential for PFAS migration towards off-Base receptors. **Off-Base** • Conduct off-Base monitoring at point of use (if possible) if a drinking water receptor is in the potential migration pathway • If PFAS is detected off-Base above drinking water guidelines, notify relevant stakeholders (e.g., regulators, property owners) and consider management measures commensurate with potential receptor exposure or more frequent monitoring to monitor risk.
First time exceedance of the recreational water guideline in surface water	**On-Base** • Calculate the rolling average over a three-year period (where available) for sample results from the same location and compare with the recreational water screening criteria • Evaluate groundwater flow direction and velocity to assess the potential for PFAS migration towards off-Base receptors **Off-Base** • Assess potential migration pathways to off-Base recreational water bodies based on CSM • Calculate rolling average over the three most recent sample results (where available) from the same location and compare with the recreational water screening criteria. • Review risk profile for identified potential receptors including confirmation of exposure pathways based on consideration of CSM.

Trigger	Response
First time exceedance of adopted ecological screening criteria in surface water.	**On-Base and Off-Base** • Calculate the rolling average over a three-year period for sample results (where available) from the same location and compare with the relevant ecological screening criteria for adopted for a particular portion of the Base or off-Base area • Compare with historic results and assess degree of change with reference to current understanding of HHERA (Golder 2020) where available.
Increasing PFAS trends	**On-Base** • Conduct further assessment to determine whether the CSM and risk profile require updating, focusing on migration pathways • Investigate potential sources or environmental conditions contributing to the trend (e.g., legacy contamination, leaching from soil) • Evaluate the need for additional control measures if migration towards sensitive on-Base receptors (e.g. accommodation areas, Bandiana Primary School) is identified. **Off-Base** • Assess off-Base receptor risks based on the current CSM and known surface water or groundwater pathway. Monitor trend and risk in subsequent rounds • Consider expanding off-Base monitoring programs if increasing trends indicate a migration toward sensitive receptors such as residential areas or areas where water use is known.
Decreasing PFAS trends	**On-Base** • Assess whether reduced risks warrant changes to on-Base controls (e.g., frequency of monitoring, groundwater/surface water use restrictions) • Consider reducing on-Base monitoring frequency or locations if the trend is stable. **Off-Base** • If decreasing trends are observed off-Base, assess whether further monitoring of off-Base receptors is necessary. If risks have sufficiently reduced, recommend scaling back monitoring efforts in the next OMP review.
Detection of new maximum concentrations (On or Off-Base)	**On-Base** • Review historical data trends to understand if the increase is part of a longer-term trend or a temporary anomaly • Review concentration against HHERA (Golder 2020) reassessing potential risks in the context of the CSM to on-Base receptors (e.g., workers, visitors, ecosystems) • Evaluate whether the new maximum concentration requires additional mitigation measures on-Base (e.g., precautionary advice or restricting access/use). **Off-Base**

Trigger	Response
	• Assess whether the new maximum concentration is indicative of PFAS migration towards off-Base receptors (e.g., surface water bodies, known groundwater extraction wells, ecological receptors) • Consider modification to off-Base monitoring if necessary to assess further migration • Communicate findings to affected stakeholders, if necessary, based on CSM and understanding of risk based on HHERA (Golder 2020) • Evaluate and implement off-Base mitigation measures if required, such as precautionary advice or restricting access to contaminated areas.
Development works or changes in land use	**On-Base and Off-Base** Review change in land use and assess for any proposed changes in activity that may introduce additional receptors. Consider linkage with Source Areas proposed land use and likely PFAS concentrations in environmental media that may be present. Consider preceding Trigger Point Action Considerations – points 1 – 3, prior to engaging with stakeholders relevant to the works to identify actions (where appropriate) to mitigate potential exposure risk.
Water Use Surveys	**On-site and Off-site** Consider data collected through any new water use survey or other information that may indicate a change of surface water or groundwater use, location of that use and likelihood of that water being: • Already PFAS affected • Abstraction changing potential migration pathways for PFAS in surface water or groundwater • Future migration of PFAS from identified Source Areas. Consider preceding Trigger Point Action Considerations – points 1 – 3, prior to engaging with stakeholders that may be linked to the identified potential change in risk of harm to identify actions (where appropriate) to mitigate potential exposure risk.
Changes in EPA Victoria Precautionary Advice	EPA may modify the geographical extents of the existing Management Area associated with the Precautionary Advice relating to carp consumption from portions of the Kiewa River. In the event that this occurs, review available data for different media and assess relevance and changes to potential existing management measures that are already in place to manage this risk. Consider preceding Trigger Point Action Considerations – points 1 – 3, prior to engaging with EPA and other relevant stakeholders to identify actions (where appropriate) to mitigate potential exposure risk.

An update to the OMP may also be triggered by policy changes or through stakeholder engagement activities including:

- changes to State advice on types of exposure-minimisation behaviours (e.g., consumption of home produce)
- changes to State advice on boundaries of a designated management area
- changes or refinements to the monitoring network, frequency and parameters
- feedback and information received as a result of ongoing community consultation
- any significant changes of land use which may occur in the area within the PFAS Management Area or adjoining land
- changes to Defence's strategic approach to managing PFAS contamination.

8 REPORTING REQUIREMENTS

8.1 Reporting

After each monitoring event, information, field and laboratory data will be documented in a factual report.

At the end of a specified monitoring period (typically 12 months but may vary) the whole data set (including the current and historic data) will be reviewed, and an Ongoing Monitoring Report prepared.

The Ongoing Monitoring Report will report on the objectives of the OMP, which are to identify and evaluate:

- spatial, and temporal (including seasonal) variability of PFAS in the environment
- changes to sources, transport pathways or receptors, described as a CSM for the Base
- changes in risks to human and environmental receptors
- the influence that risk management activities at the Base, as outlined in the 2025 PMAP have had on PFAS in the environment, and
- whether the identified changes trigger a prescribed action and/or review (Section 7).

8.2 Stakeholder engagement

Engagement with a range of stakeholders, such as EPA, Councils, other agencies, and the community will be undertaken. A stakeholder engagement plan has been prepared and will be updated to manage the engagement process.

Where off-Base monitoring is undertaken on private property a separate letter will be provided to the stakeholder presenting the results of the monitoring event.

The OMP will be published on the Defence website, along with the current PMAP and Ongoing Monitoring Report.

APPENDIX A REFERENCES

Key documents

Golder, 2013. Stage 2 Environmental Investigation (TCE Contamination), East Bandiana, Albury-Wodonga Military Area. Report Number 117623117-027-R-Rev0. 7 August 2013.

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

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

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JBS&G, 2024d. Ongoing Monitoring Report – 2021, 2022 and 2023, Bandiana Military Area, Document 61395/162,111 (Rev 0). 11 March 2025.

Other References

CRC CARE, 2017. Assessment, management and remediation guidance for perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) – Part 4: application of HSLs and ESLs, CRC CARE Technical Report no. 38. CRC for Contamination Assessment and Remediation of the Environment, Newcastle, Australia.

Defence, 2018. Defence PFAS Response Management Strategy 2018.

Defence, 2021. Defence PFAS Construction and Maintenance Framework - Guidance for managing the risks of PFAS contamination for works on the Defence Estate. Department of Defence. Version 3.0, August 2021.

Defence, 2024. Stakeholder and Community Engagement Plan, Bandiana Military Area. 9 February 2024.

Environment Protection and Biodiversity Conservation Act 1999 (Cth).

Environmental Protection Act 2017 (Victoria).

Environmental Reference Standard No. 245 26 May 2021 (Victoria).

HEPA, 2025. PFAS National Environmental Management Plan Version 3.0, Heads of EPA Australia and New Zealand (HEPA), dated March 2025, accessed 11 March 2025, www.dcceew.gov.au/environment/protection/publications/pfas-nemp-3.

National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013. (NEPM 2013).

APPENDIX B FIGURES

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Figure 3a: Jack In The Box Creek Catchment Surface Water Monitoring Locations

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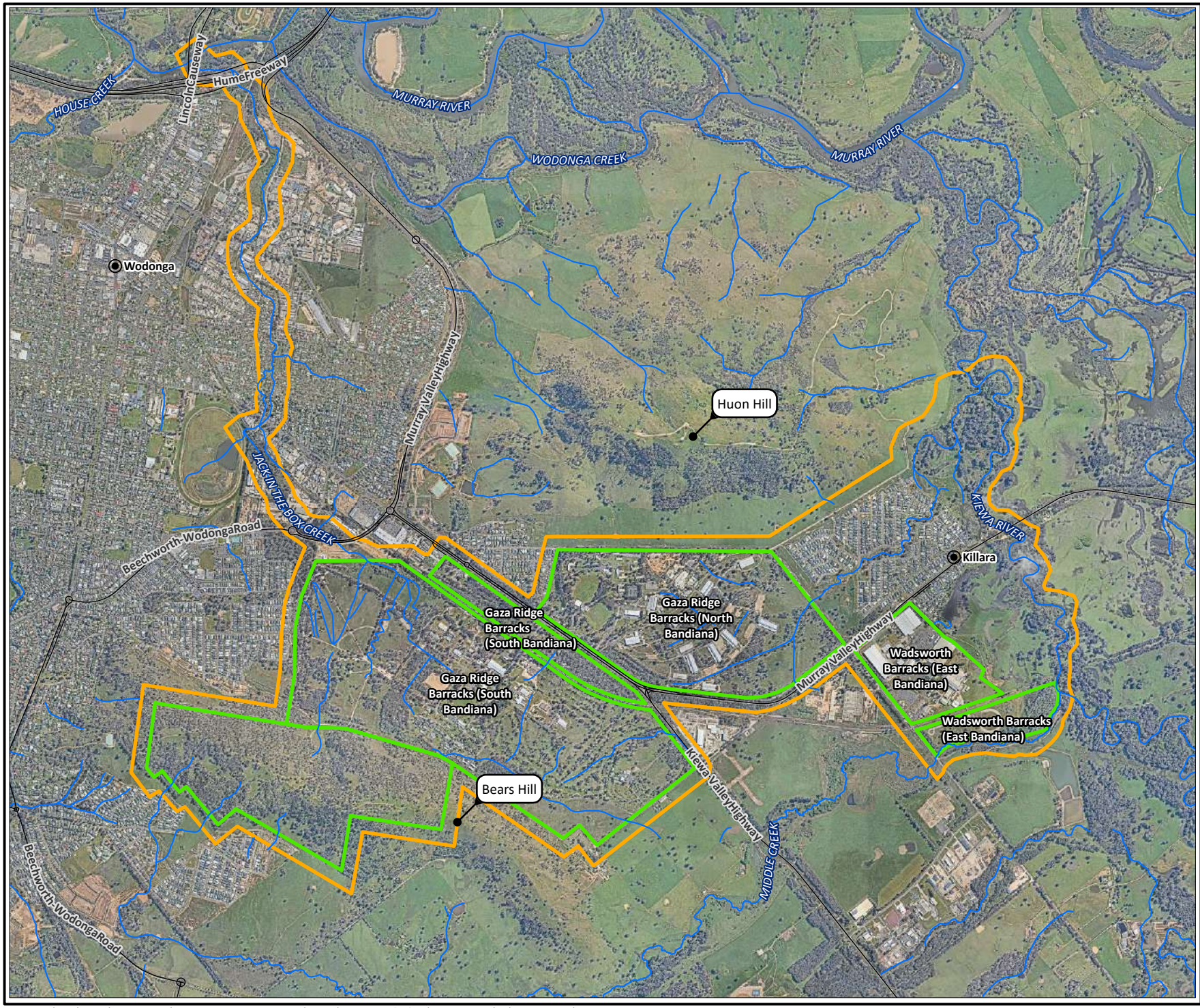
Figure 4b: Kiewa River Catchment Groundwater Monitoring Locations

Figure 5: Conceptual Site Model

Figure 6: Pastoral Areas



Legend

- Management Area
- Bandiana Military Area
- Watercourse
- Roads
- Town

JBS&G

Job No: 61395

Client: Department of Defence

Version: Final	Date: 11-Mar-2025
Drawn By: JStrauss	Checked By: JS

Scale 1:35,000

0 500 1,000

metres

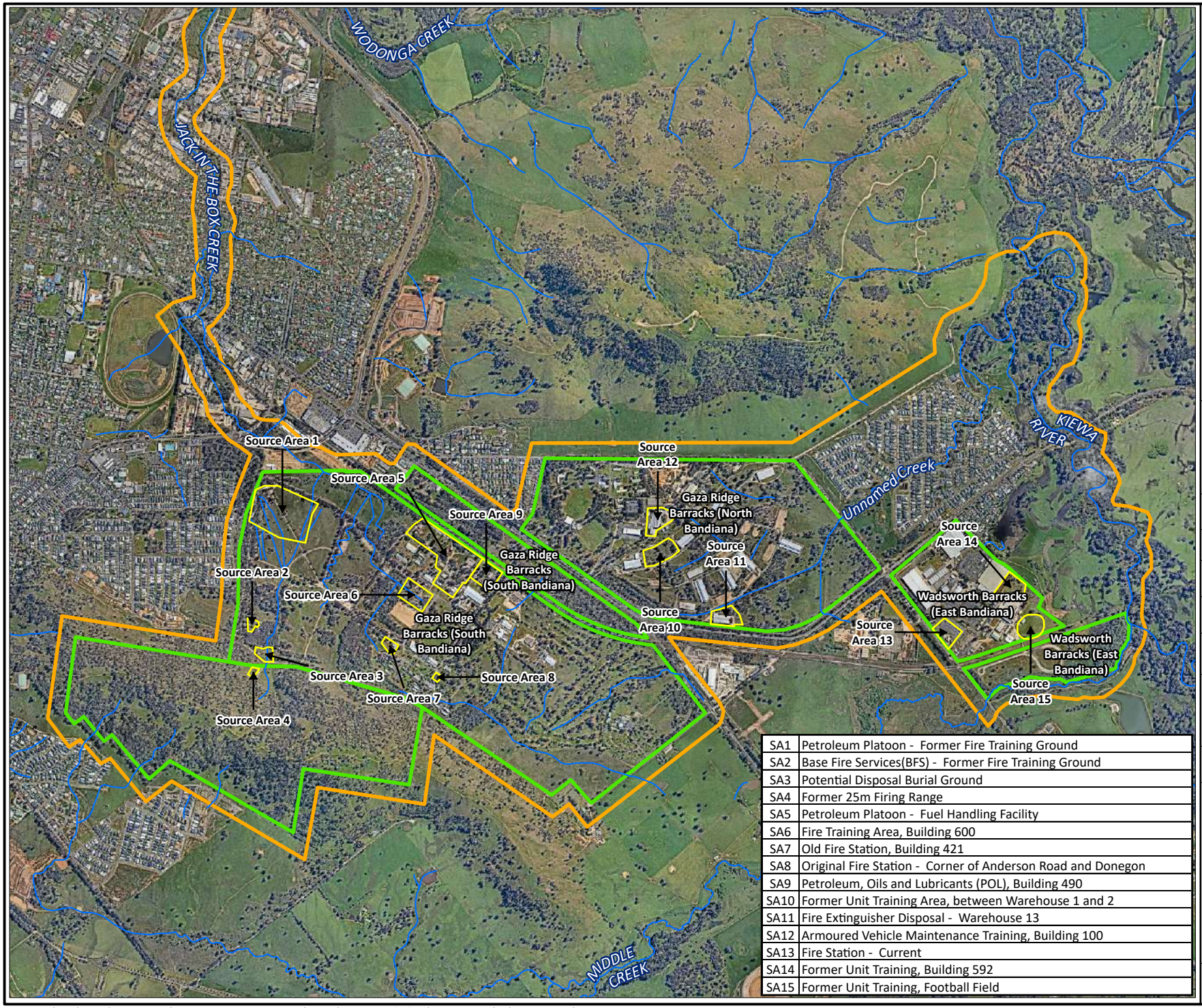
Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

SITE LOCATION PLAN

FIGURE 1

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\61395_Bandiana\GIS\02_MapProjects\61395_DoD_Bandiana OMP Revision.aprx; Name:61395_01_Site_Location_Plan
Reference: www.nearmap.com - Imagery Date: 09/10/2023



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
- Source Areas
- Watercourse

JBS&G

Job No: 61395

Client: Department of Defence

Version: Final	Date: 11-Mar-2025
Drawn By: JStrauss	Checked By: JS

Scale 1:30,000

0 500 1,000

metres

Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

SOURCE AREAS

FIGURE 2

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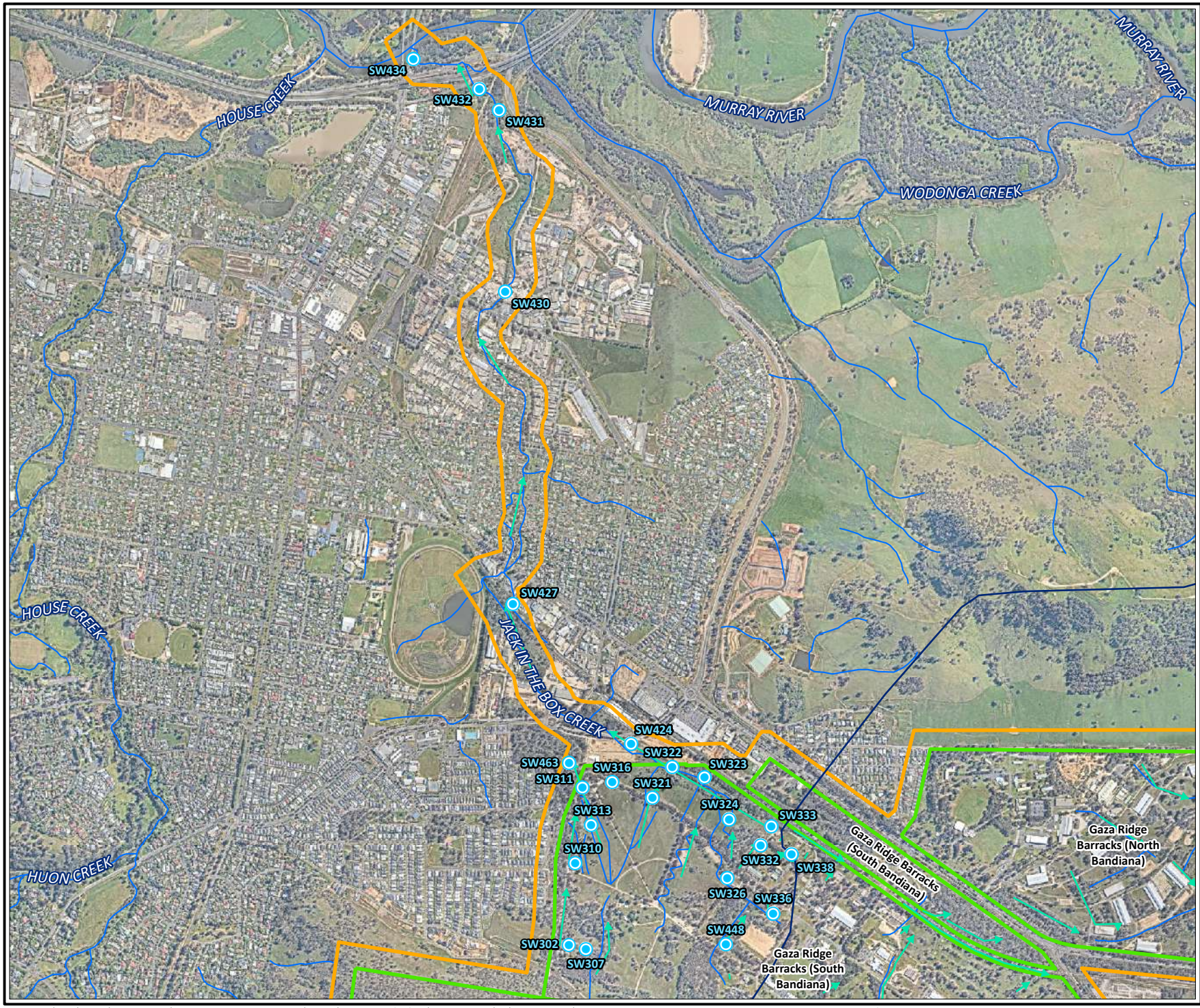


Legend

- Management Area
- Bandiana Military Area
- Drainage Channel
- Stormwater Divide
- Watercourse
- Surface Water

JBS&G

Job No: 61395

Client: Department of Defence

Version: Final	Date: 11-Mar-2025
Drawn By: JS	Checked By: JS

Scale 1:24,500

0 450 900

metres

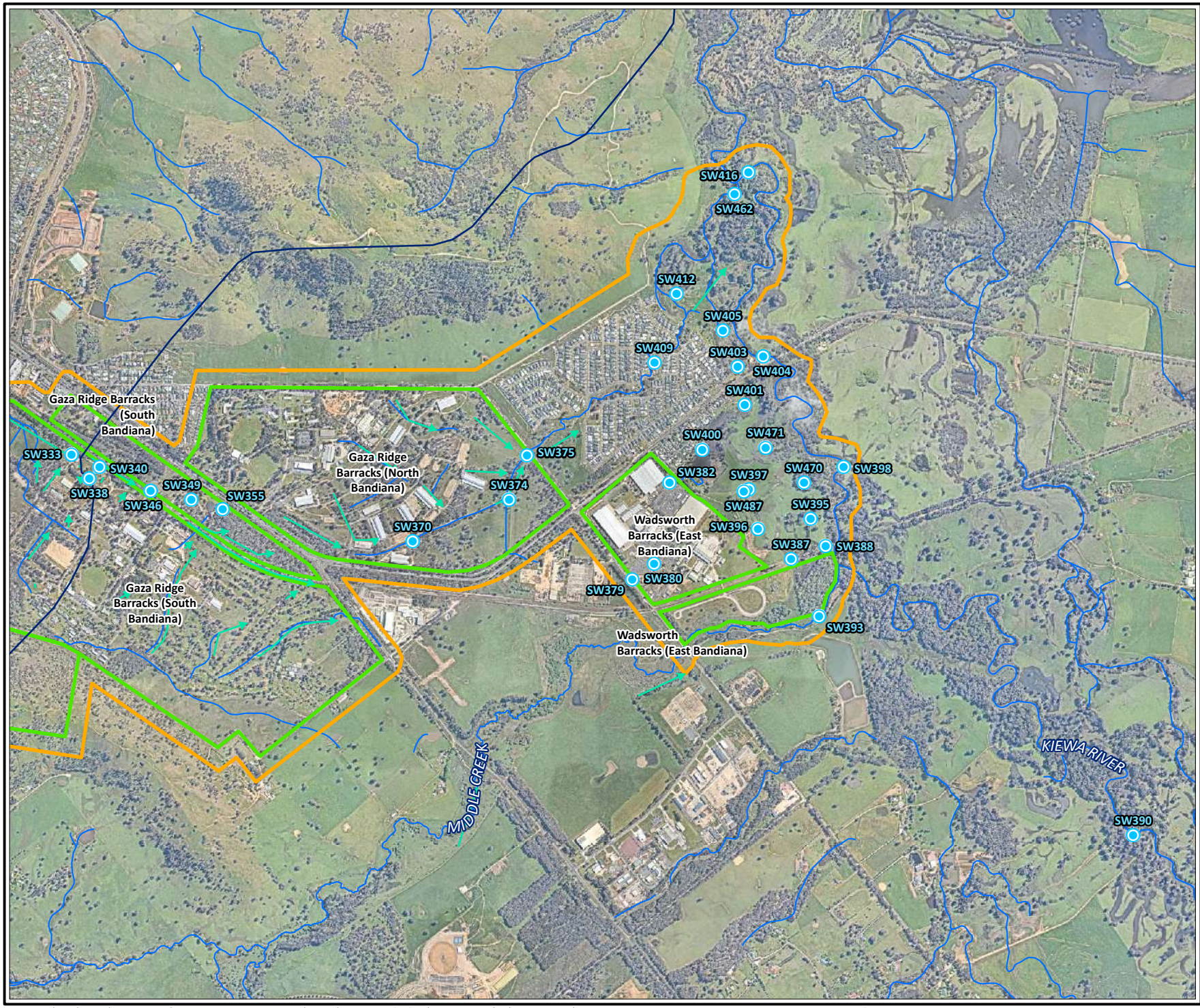
Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

JACK IN THE BOX CREEK CATCHMENT SURFACE WATER MONITORING LOCATIONS

FIGURE 3A

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\61395_Bandiana\GIS\02_MapProjects\61395_DoD_Bandiana OMP Revision.aprx; Name:61395_05a_Jack In The Box Surface Water and Sediment Monitoring Locations
Reference: ESRI Topographic Basemap - Accessed Imagery: 11/07/2024 & www.nearmap.com - Imagery Date: 10/12/2023



Legend

- Management Area
- Bandiana Military Area
- Drainage Channel
- Stormwater Divide
- Watercourse
- Surface Water

JBS&G

Job No: 61395

Client: Department of Defence

Version: Final	Date: 11-Mar-2025
Drawn By: JS	Checked By: JS

Scale 1:28,000

0 500 1,000

metres

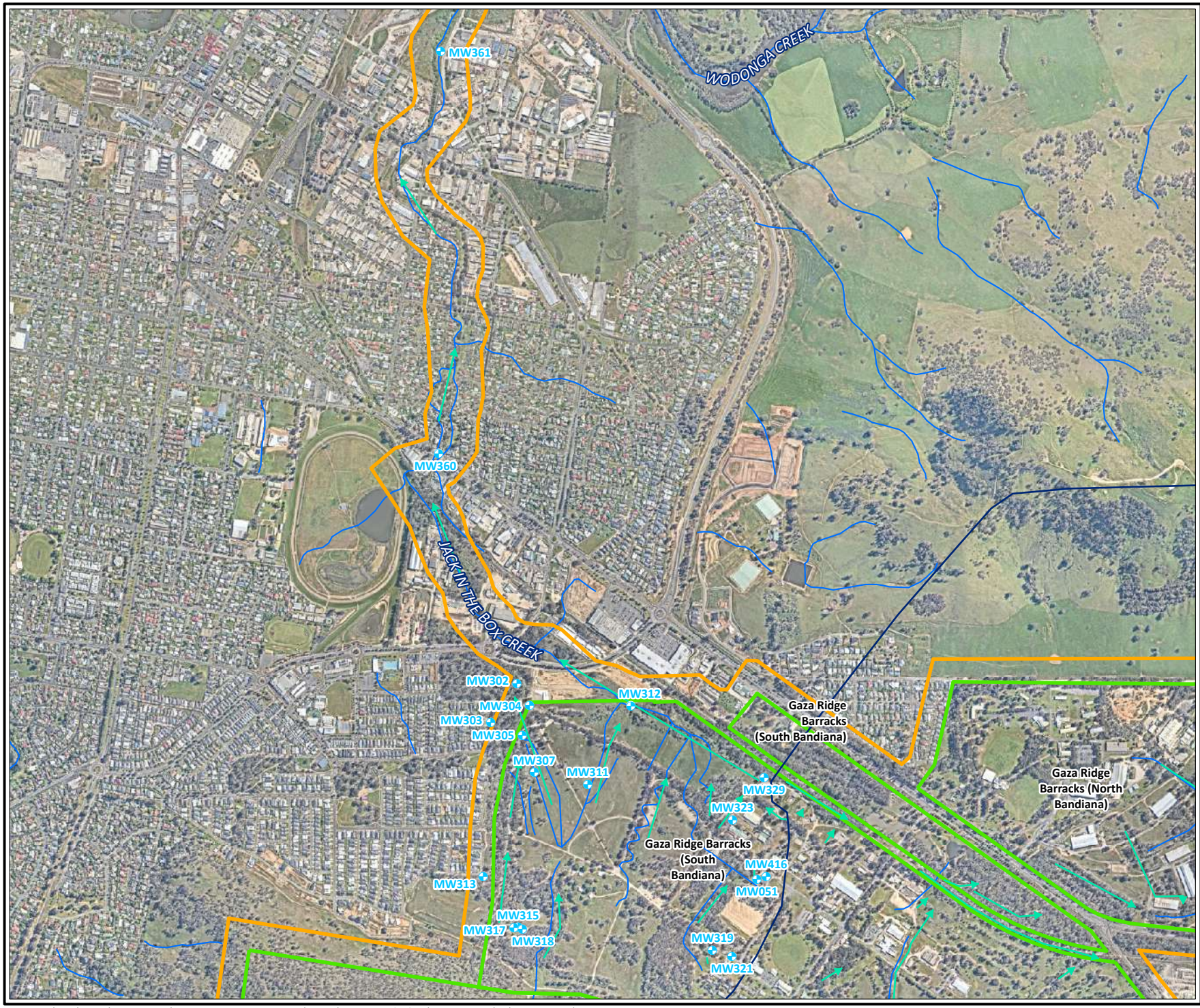
Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

KIEWA RIVER CATCHMENT SURFACE WATER MONITORING LOCATIONS

FIGURE 3B

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\61395_Bandiana\GIS\02_MapProjects\61395_DoD_Bandiana OMP Revision.aprx; Name:61395_05b_Kiewa River Surface Water and Sediment Monitoring Locations
Reference: ESRI Topographic Basemap - Accessed Imagery: 11/07/2024 & www.nearmap.com - Imagery Date: 10/12/2023



Legend

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

JBS&G

Job No: 61395

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Version: Final	Date: 11-Mar-2025
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Scale 1:20,000

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metres

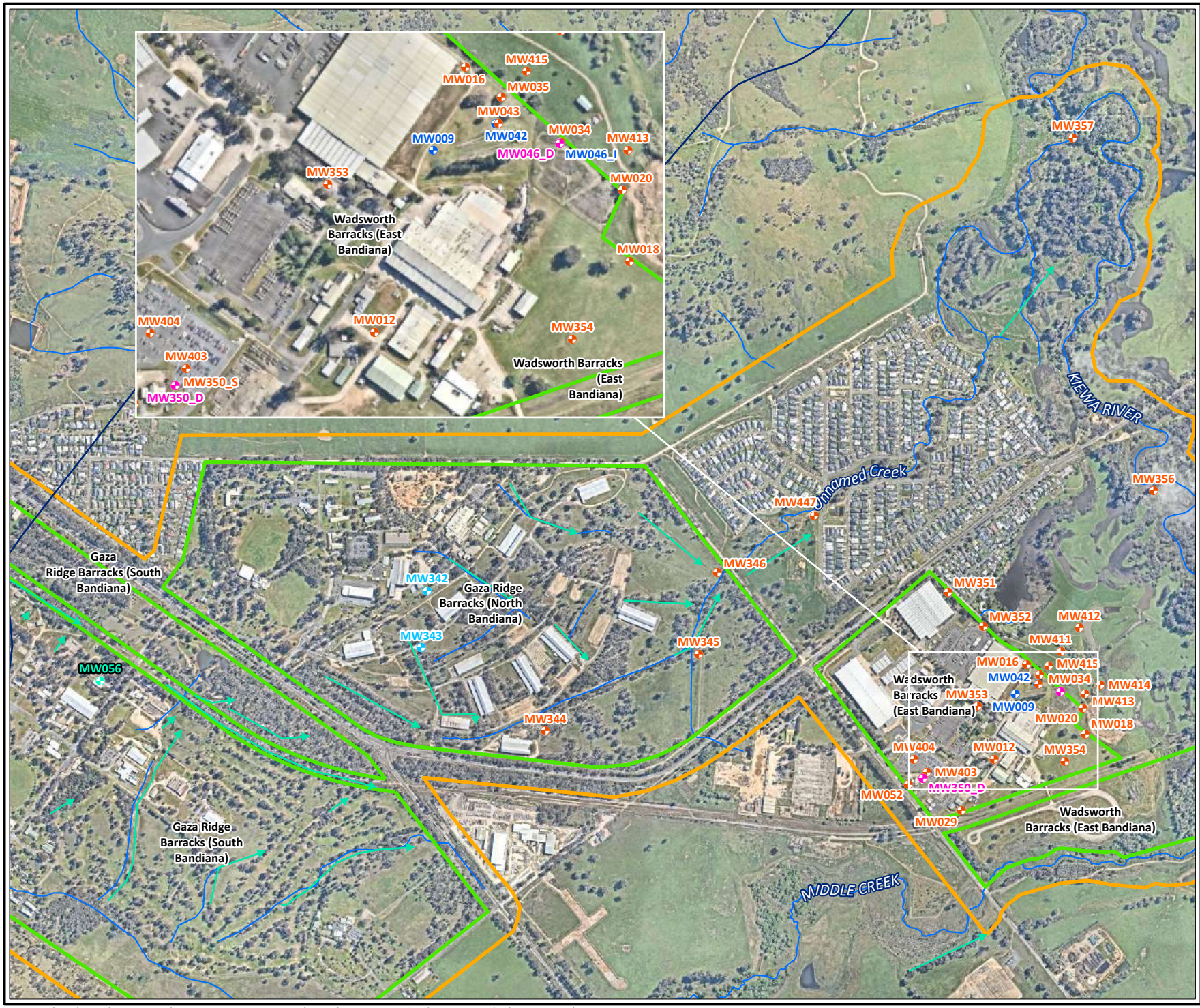
Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

JACK IN THE BOX CREEK CATCHMENT GROUNDWATER MONITORING LOCATIONS

FIGURE 4A

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\61395_Bandiana\GIS\02_MapProjects\61395_DoD_Bandiana OMP Revision.aprx; Name:61395_04a_Jack In The Box Jack In The Box Groundwater Monitoring Locations
Reference: ESRI Topographic Basemap - Accessed Imagery: 08/11/2024 & www.nearmap.com - Imagery Date: 10/12/2023



Legend

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

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Job No: 61395

Client: Department of Defence

Version: Final	Date: 11-Mar-2025
Drawn By: JS	Checked By: JS

Scale 1:17,000

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metres

Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

KIEWA RIVER CATCHMENT GROUNDWATER MONITORING LOCATIONS

FIGURE 4B

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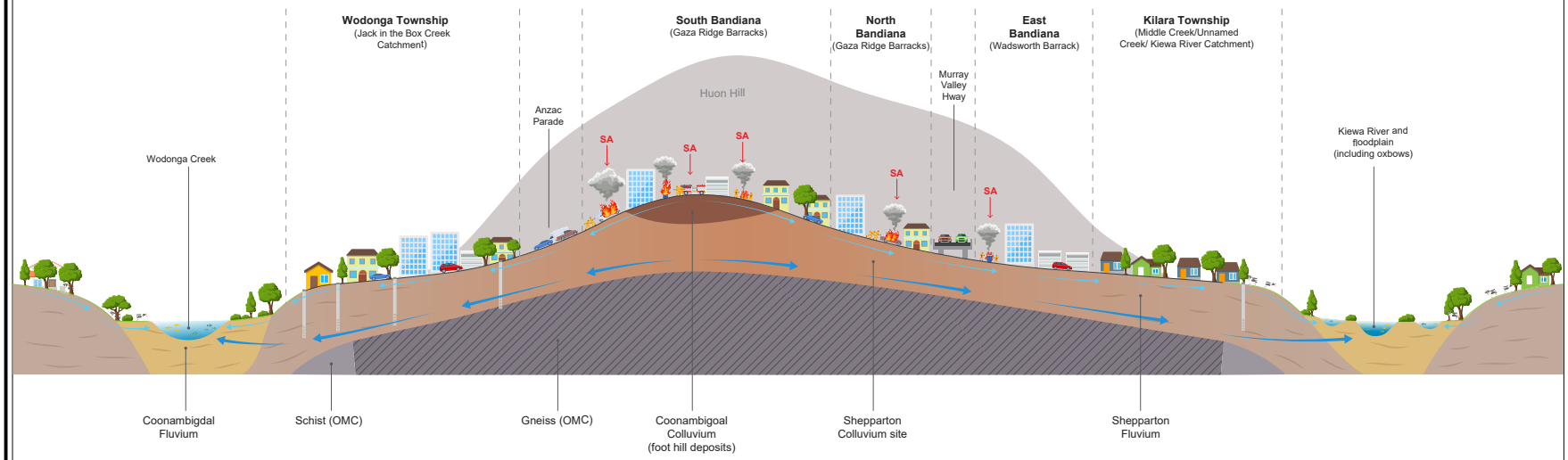


Legend

- Gneiss (OMC)
- Coonambigoal Colluvium (foot hill deposits)
- Shepparton Colluvium site
- Shepparton Fluvium
- Coonambigdal Fluvium
- Schist (OMC)
- SA — PFAS Source Area
- Surface water flow
- Groundwater flow
- Groundwater bore extraction

JBS&G

Job No: 61395

Client: Department of Defence

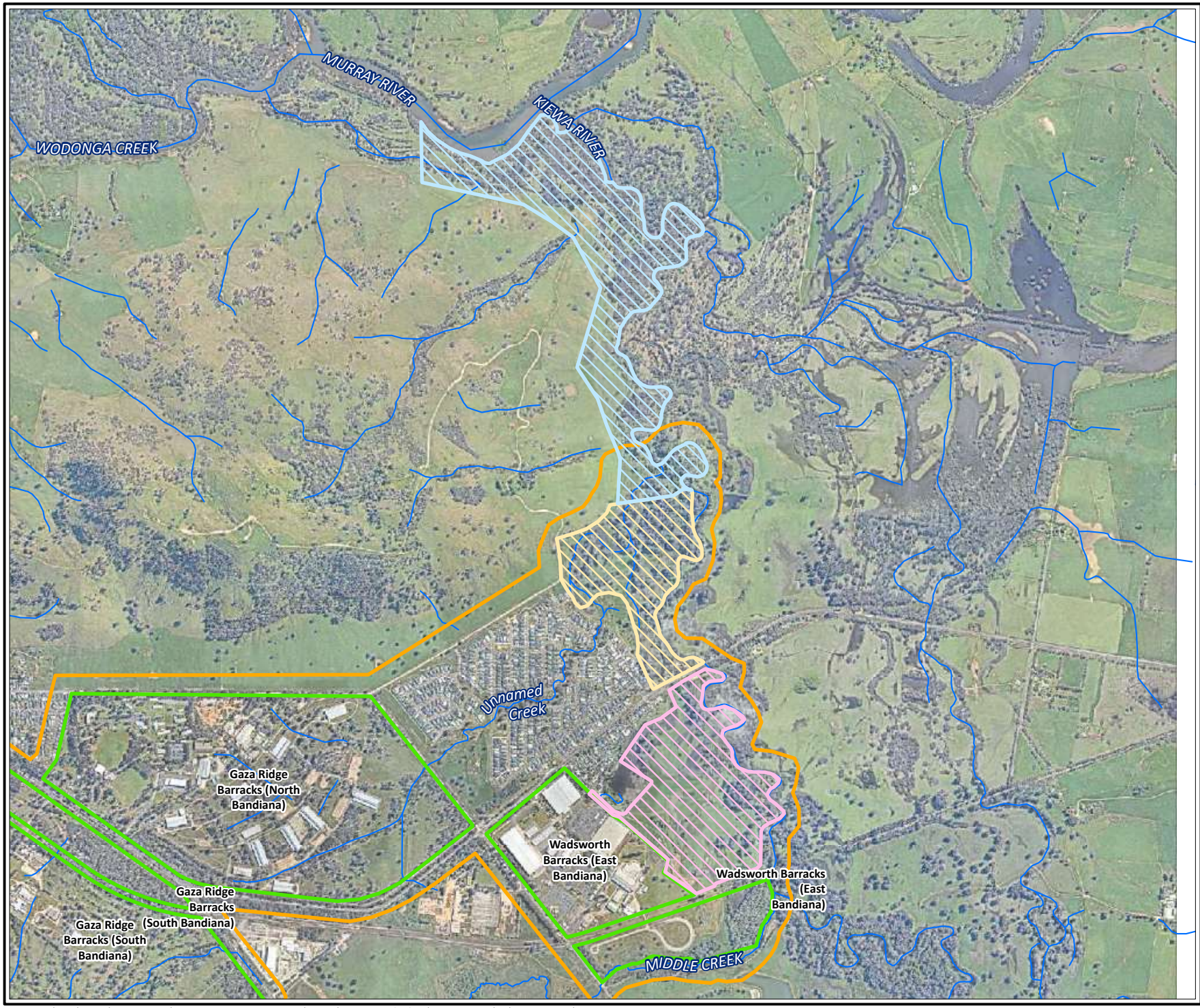
Version: Final	Date: 11-Mar-2025
Drawn By: MG	Checked By: JS

Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

CONCEPTUAL SITE MODEL (CSM)

FIGURE 5



Legend

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

JBS&G

Job No: 61395

Client: Department of Defence

Version: Final	Date: 11-Mar-2025
Drawn By: JS	Checked By: JS

Scale 1:25,000

0 500 1,000

metres

Coord. Sys. GDA 1994 MGA Zone 55

Bandiana Military Area

PASTORAL AREA

FIGURE 6

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\61395_Bandiana\GIS\02_MapProjects\61395_DoD_Bandiana OMP Revision.aprx; Name:61395_06_Pastoral Area
Reference: ESRI Topographic Basemap - Accessed Imagery: 13/11/2024 & www.nearmap.com - Imagery Date: 10/12/2023

APPENDIX C SAMPLE LOCATION INFORMATION

Table 12 Surface Water Sampling Locations for Bandiana Military Area and PFAS Management Area

Sample ID	Property	Easting	Northing
SW302	On-Base	491217.00	5999668.00
SW307	On-Base	491296.00	5999663.00
SW310	On-Base	491245.00	6000071.00
SW311	On-Base	491280.00	6000430.00
SW313	On-Base	491321.00	6000251.00
SW316	On-Base	491421.00	6000456.00
SW321	On-Base	491612.00	6000381.00
SW322	On-Base	491706.00	6000527.00
SW323	On-Base	491860.00	6000478.00
SW324	On-Base	491976.00	6000279.00
SW326	On-Base	491968.00	5999998.00
SW332	On-Base	492126.00	6000156.00
SW333	On-Base	492177.00	6000246.00
SW336	On-Base	492186.00	5999832.00
SW338	On-Base	492273.00	6000114.00
SW340	On-Base	492352.00	6000181.00
SW346	On-Base	492606.00	6000048.00
SW349	On-Base	492827.00	5999999.00
SW355	On-Base	492997.00	5999947.00
SW370	On-Base	494029.00	5999774.00
SW374	On-Base	494552.00	6000001.00
SW375	On-Base	494650.00	6000239.00
SW379	On-Base	495222.00	5999565.00
SW380	On-Base	495340.00	5999652.00
SW382	On-Base	495424.00	6000092.00
SW387	On-Base	496084.00	5999677.00
SW388	On-Base	496272.00	5999749.00
SW390	Off-Base	497942.00	5998177.00
SW393	Off-Base	496236.00	5999368.00
SW395	Off-Base – Private Property	-	-
SW396	Off-Base – Private Property	-	-
SW397	Off-Base – Private Property	-	-

Sample ID	Property	Easting	Northing
SW398	Off-Base	496369.00	6000178.00
SW400	Off-Base – Private Property	-	-
SW401	Off-Base – Private Property	-	-
SW403	Off-Base	495794.00	6000721.00
SW404	Off-Base	495932.00	6000777.00
SW405	Off-Base	495713.70	6000917.23
SW409	Off-Base	495342.00	6000744.00
SW412	Off-Base	495462.23	6001117.47
SW416	Off-Base	495852.00	6001776.00
SW424	Off-Base	491511.00	6000639.00
SW427	Off-Base	490948.72	6001301.83
SW430	Off-Base	490913.00	6002786.00
SW431	Off-Base	490883.28	6003648.07
SW432	Off-Base	490789.00	6003749.00
SW434	Off-Base	490476.00	6003891.00
SW448	On-Base	491960.62	5999684.39
SW462	Off-Base	495777.32	6001658.16
SW463	Off-Base	491216.27	6000546.54
SW470	Off-Base – Private Property	-	-
SW471	Off-Base – Private Property	-	-
SW487	Off-Base	495826.91	6000046.42

Table 13 Groundwater Sampling Locations for Bandiana Military Area and PFAS Management Area

Sample ID	Property	Easting	Northing	Top of casing (mAHD)	Target Aquifer Unit
MW009	On-Base	495603.37	5999848.02	166.28	Shepparton and Coonambigdal Fluvium - Intermediate Aquifer
MW012	On-Base	495534.14	5999634.04	167.36	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW016	On-Base	495641.49	5999946.12	166.16	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW018	On-Base	495834.70	5999717.39	165.43	Shepparton and Coonambigdal Fluvium - Shallow Aquifer

Sample ID	Property	Easting	Northing	Top of casing (mAHD)	Target Aquifer Unit
MW020	On-Base	495826.29	5999801.50	165.41	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW029	On-Base	495426.45	5999463.69	168.11	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW034	On-Base	495753.66	5999858.29	166.63	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW035	On-Base	495683.72	5999911.25	166.22	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW042	On-Base	495677.04	5999879.86	166.62	Shepparton and Coonambigdal Fluvium - Intermediate Aquifer
MW043	On-Base	495680.27	5999879.94	166.55	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW046_D	On-Base	495752.45	5999855.99	166.49	Shepparton and Coonambigdal Fluvium - Deep Aquifer
MW046_I	On-Base	495752.45	5999855.99	166.48	Shepparton and Coonambigdal Fluvium - Intermediate Aquifer
MW051	On-Base	492170.69	5999846.02	187.95	Shepparton Colluvium - Shallow Aquifer
MW052	Off-Base	495251.08	5999549.74	168.49	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW056	On-Base	492586.60	5999892.65	183.59	Perched Water
MW302	Off-Base	491239.56	6000606.77	174.04	Shepparton Colluvium - Shallow Aquifer
MW303	Off-Base	491137.80	6000454.67	177.01	Shepparton Colluvium - Shallow Aquifer
MW304	On-Base	491289.32	6000521.98	176.131	Shepparton Colluvium - Shallow Aquifer
MW305	On-Base	491273.23	6000414.20	176.96	Shepparton Colluvium - Shallow Aquifer
MW307	On-Base	491307.09	6000261.17	181.086	Shepparton Colluvium - Shallow Aquifer
MW311	On-Base	491514.62	6000214.45	182.452	Shepparton Colluvium - Shallow Aquifer
MW312	Off-Base	491682.00	6000520.00	175.841	Shepparton Colluvium - Shallow Aquifer

Sample ID	Property	Easting	Northing	Top of casing (mAHD)	Target Aquifer Unit
MW313	On-Base	491109.26	5999857.37	193.128	Shepparton Colluvium - Shallow Aquifer
MW315	On-Base	491244.00	5999661.00	204.875	Shepparton Colluvium - Shallow Aquifer
MW317	On-Base	491231.00	5999650.00	204.364	Shepparton Colluvium - Shallow Aquifer
MW318	On-Base	491261.00	5999655.00	205.965	Shepparton Colluvium - Shallow Aquifer
MW319	On-Base	491998.00	5999572.00	199.524	Shepparton Colluvium - Shallow Aquifer
MW321	On-Base	492074.00	5999548.00	200.815	Shepparton Colluvium - Shallow Aquifer
MW323	On-Base	492076.00	6000078.00	184.472	Shepparton Colluvium - Shallow Aquifer
MW326	On-Base	492206.39	5999854.17	188.915	Shepparton Colluvium - Shallow Aquifer
MW329	On-Base	492199.00	6000242.00	181.435	Shepparton Colluvium - Shallow Aquifer
MW342	On-Base	493664.00	6000189.00	180.605	Shepparton Colluvium - Shallow Aquifer
MW343	On-Base	493638.90	5999998.16	174.80	Shepparton Colluvium - Shallow Aquifer
MW344	On-Base	494053.68	5999737.93	170.51	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW345	On-Base	494560.00	5999979.00	168.316	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW346	On-Base	494621.00	6000250.00	166.944	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW350_D	On-Base	495299.30	5999571.30	168.229	Shepparton and Coonambigdal Fluvium - Deep Aquifer
MW350_S	On-Base	495299.30	5999571.30	168.233	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW351	On-Base	495382.00	6000184.00	164.79	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW352	On-Base	495498.59	6000070.77	164.493	Shepparton and Coonambigdal Fluvium - Shallow Aquifer

Sample ID	Property	Easting	Northing	Top of casing (mAHD)	Target Aquifer Unit
MW353	On-Base	495479.00	5999808.00	166.625	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW354	On-Base	495767.20	5999625.80	166.142	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW356	Off-Base	496059.80	6000518.40	156.882	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW357	Off-Base	495793.41	6001682.22	156.243	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW360	Off-Base	490936.64	6001498.75	164.89	Shepparton Colluvium - Shallow Aquifer
MW361	Off-Base	490943.84	6003056.80	153.716	Shepparton Colluvium - Shallow Aquifer
MW403	On-Base	495312.20	5999591.49	166.926	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW404	On-Base	495269.66	5999632.70	166.617	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW411	Off-Base – Private Property	-	-	-	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW412	Off-Base – Private Property	-	-	-	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW413	Off-Base – Private Property	-	-	-	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW414	Off-Base – Private Property	-	-	-	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW415	Off-Base – Private Property	-	-	-	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
MW416	On-Base	492206.45	5999857.15	187.720	Shepparton Colluvium - Shallow Aquifer
MW447	Off-Base	494984.45	6000428.20	164.37	Shepparton and Coonambigdal Fluvium - Shallow Aquifer
OTH019	Off-Base	-	-	-	*Construction details of this bore are not currently known*

APPENDIX D OMP REVIEW

Table 14 OMP monitoring location and frequency review

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW009	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW012	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW016	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW018	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW020	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW029	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW034	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
						East Bandiana aquifer remediation scheduled for 2025.
MW035	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW042	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW043	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW046_I	Yes	Yes	No	No	Well ID change	MW046_I is the current Defence well ID for former well MW047.
MW046_I	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW046_D	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW051	Yes	Yes	No	No	Well ID change	MW051 is the current Defence well ID for former well MW04.
MW052	Yes	Yes	No	No	Well ID change	MW052 is the current Defence well ID for former well MW06-a.
MW052	Yes	Yes	No	No	Reduction in sampling	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
					frequency from biannual to annual	gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW056	Yes	Yes	No	No	Well ID change	MW056 is the current Defence well ID for former well BH111.
MW302	Yes	Yes	Yes	No	Add location to the OMP	Location has been provided to better define and potentially delineate known groundwater impacts associated with Source Area 1.
MW303	Yes	Yes	Yes	No	Add location to the OMP	Location has been provided to better define and potentially delineate known groundwater impacts associated with Source Area 1.
MW305	Yes	Yes	No	No	Add location to the OMP	Location has been provided to better define and potentially delineate known groundwater impacts associated with Source Area 1.
MW326	Yes	Yes	No	No	Remove location from the OMP	Location in Source Area 6 was damaged and could no longer be monitored.
MW343	Yes	Yes	No	No	Add location to the OMP	Location has been provided to assist in calculation of groundwater flow in North

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
						Bandiana, and to better define the extent of the PFAS plume from Source Area 12.
MW344	Yes	Yes	No	No	Add location to the OMP	Location has been provided to assist in calculation of groundwater flow in North Bandiana, and to better define the extent of the PFAS plume from Source Area 12.
MW345	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency for monitoring well has been reduced as monitoring well MW447 has been introduced to the program to investigate the potential migration of PFAS impacted groundwater from North Bandiana towards the residential areas of Killara.
MW346	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency for monitoring well has been reduced as monitoring well MW447 has been introduced to the program to investigate the potential migration of PFAS impacted groundwater from North Bandiana towards the residential areas of Killara.
MW350_S	Yes	Yes	No	No	Reduction in sampling	Sampling frequency has been reduced owing to the

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
					frequency from biannual to annual	introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW350_D	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW351	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the East Bandiana aquifer remediation scheduled for 2025.
MW352	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW353	Yes	Yes	No	No	Reduction in sampling	Sampling frequency has been reduced owing to the introduction of new off-Base

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
					frequency from biannual to annual	sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW354	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW403	Yes	Yes	No	No	Well ID change	MW403 is the current Defence well ID for former well BH1.
MW403	Yes	Yes	No	No	Reduction in sampling frequency from biannual to annual	Sampling frequency has been reduced owing to the introduction of new off-Base sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW404	Yes	Yes	No	No	Well ID change	MW404 is the current Defence well ID for former well BH2.
MW404	Yes	Yes	No	No	Reduction in sampling	Sampling frequency has been reduced owing to the introduction of new off-Base

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
					frequency from biannual to annual	sampling locations down gradient of the plume and the East Bandiana aquifer remediation scheduled for 2025.
MW411	Yes	Yes	Yes	No	Add location to the OMP	Location has been provided to monitor the known East Bandiana PFAS groundwater plume in an off-Base area.
MW412	Yes	Yes	Yes	No	Add location to the OMP	Location has been provided to monitor the known East Bandiana PFAS groundwater plume in an off-Base area.
MW413	Yes	Yes	Yes	No	Add location to the OMP	Location has been provided to monitor the known East Bandiana PFAS groundwater plume in an off-Base area.
MW414	Yes	Yes	Yes	No	Add location to the OMP	Location has been provided to monitor the known East Bandiana PFAS groundwater plume in an off-Base area.
MW415	Yes	Yes	Yes	No	Add location to the OMP	Location has been provided to monitor the known East Bandiana PFAS groundwater plume in an off-Base area.

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW416	Yes	Yes	No	No	Add location to the OMP	Location was installed to replace damaged MW326 in Source Area 6.
MW447	Yes	Yes	Yes	No	Add location to the OMP	New groundwater well installed off-Base to investigate the potential migration of PFAS impacted groundwater into off-Base areas.
SD323	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD346	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD355	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD375	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD382	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.

Location	Does the location inform the nature of PFAS at the Base	Does the location inform the extent of PFAS at the Base	Does the location inform the risk profile at the Base	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
SD395	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD396	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD397	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD400	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD412	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD424	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.
SD463	No	No	No	No	Sample location removed from OMP	Sediment data has been shown to have limited value to the OMP.

APPENDIX E PFAS ANALYTICAL SUITE

Target analytes	
Perfluoroalkane sulfonic acids	
PFBS	Perfluorobutane sulfonic acid
PFPeS	Perfluoropentane sulfonic acid
PFHxS	Perfluorohexane sulfonic acid
PFHpS	Perfluoroheptane sulfonic acid
PFOS	Perfluorooctane sulfonic acid
PFDS	Perfluorodecane sulfonic acid
Perfluoroalkyl carboxylic acids	
PFBA	Perfluorobutanoic acid
PFPeA	Perfluoropentanoic acid
PFHxA	Perfluorohexanoic acid
PFHpA	Perfluoroheptanoic acid
PFOA	Perfluorooctanoic acid
PFNA	Perfluorononanoic acid
PFDA	Perfluorodecanoic acid
PFUnDA	Perfluoroundecanoic acid
PFDoDA	Perfluorododecanoic acid
PFTrDA	Perfluorotridecanoic acid
PFTeDA	Perfluorotetradecanoic acid
Perfluoroalkyl sulfonamides	
FOSA	Perfluorooctane sulfonamide
MeFOSA	N-Methyl perfluorooctane sulfonamide
EtFOSA	N-Ethyl perfluorooctane sulfonamide
MeFOSE	N-Methyl perfluorooctane sulfonamidoethanol
EtFOSE	N-Ethyl perfluorooctane sulfonamidoethanol
MeFOSAA	N-Methyl perfluorooctane sulfonamidoacetic acid
EtFOSAA	N-Ethyl perfluorooctane sulfonamidoacetic acid
(n:2) Fluorotelomer sulfonic acids	
4:2 FTS	4:2 Fluorotelomer sulfonic acid
6:2 FTS	6:2 Fluorotelomer sulfonic acid
8:2 FTS	8:2 Fluorotelomer sulfonic acid
10:2 FTS	10:2 Fluorotelomer sulfonic acid