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PFAS INVESTIGATION AND MANAGEMENT PROGRAM

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RAAF WILLIAMS, LAVERTON AND RAAF BASE POINT COOK

PFAS ONGOING MONITORING PLAN

24 April 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
AS	Australian Standard
ASC NEPM	*National Environment Protection (Assessment of Site Contamination) Measure 1999*, as amended 2013
Base	RAAF Williams, Laverton and RAAF Base Point Cook
BOM	Bureau of Meteorology
CSM	Conceptual Site Model
CSR	[Defence] Contaminated Sites Record
DQI	Data Quality Indicators
DQO	Data Quality Objectives
DSI	Detailed Site Investigation
EPA	Environment Protection Authority (or relevant state/territory jurisdiction)
ERA	Ecological Risk Assessment
FTA	Fire Training Compound
FTC	Fire Training Area
GEMS	General Engineering and Maintenance Store
HHERA	Human Health and Ecological Risk Assessment
HHRA	Human Health Risk Assessment
LOR	Limit of Reporting
m bgl	Metres Below Ground Level
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.
NATA	National Association of Testing Authorities
OMP	Ongoing Monitoring Plan
OMR	Ongoing Monitoring Report
PFAS	Per- and polyfluoroalkyl Substances
PFAS NEMP	PFAS National Environmental Management Plan
PFHxS	Perfluorohexane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
QA	Quality Assurance
QC	Quality Control

Risk management actions	Remediation and management actions to address potential risks to receptors from PFAS contamination
RAAF	Royal Australian Air Force
SAQP	Sampling and Analysis Quality Plan
SFARP	So Far as Reasonably Practicable
Source	A source can be primary or secondary. Primary sources are generally areas where AFFF was used or stored. Secondary sources may be an accumulation of contamination in the environment, such as in soil, sediments, or surface water bodies.
STP	Sewage Treatment Plan

1 INTRODUCTION

1.1 Background

In August 2022, Defence prepared a PFAS Management Area Plan (2022 PMAP) (Defence, 2022) for managing risks to human health and the environment from per- and poly-fluoroalkyl substances (PFAS) contamination associated with RAAF Williams, Laverton and surrounding areas. An important requirement 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 August 2022 OMP for RAAF Williams, Laverton (Defence. 2022). In conjunction with RAAF Williams, Laverton, Defence is also managing PFAS contamination at RAAF Base Point Cook. As both RAAF Williams, Laverton and RAAF Base Point Cook fall under the RAAF Williams operational region, this OMP revision sets out the updated and consolidated plan to manage risks to human health and the environment from exposure to PFAS contamination for both bases.

1.2 Purpose

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

- spatial, and temporal (including seasonal) variability of PFAS in the environment;
- changes to sources, migration pathways and/or receptors, described as a conceptual site model (CSM) for the bases;
- whether risks to human and ecological receptors require review;
- the influence that risk management activities at the bases, as outlined in the August 2022 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

This OMP is based on information from a range of different investigations, human health and ecological risk assessments, other assessments and remediation activities. Details of these reports are provided in Appendix A.

In developing this 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 Preliminary Site Investigations (PSIs), Detailed Site Investigations (DSIs), risk assessments, ongoing monitoring program data, and management of risks documented in the December 2022 PMAP.

Defence recognises that there may still be gaps in information, and if required these will be progressively addressed while affected sites are being managed.

In developing this document, the following has been taken into account:

- The state of knowledge presented within the reports listed within Appendix A.
- Due to data gaps in the current state of knowledge, the PFAS risk associated with RAAF Base Point Cook is being refined. The data gaps are related to limited spatial and temporal monitoring data for key environmental media (including surface water, soil, sediment, pore water and groundwater) and the absence of biota data. Acknowledging existing data gaps and uncertainties in the PFAS risk assessment, it is essential to consider that the broader receiving environment, particularly Port Phillip Bay, is also subjected to potential PFAS contamination and industrial pollution from multiple other sources
- In addition to the point above, there is uncertainty in the understanding of PFAS mass migrating from RAAF Williams, Laverton and RAAF Base Point Cook, the relative contributions of the different source areas, the surface water and groundwater discharge mechanisms and potential risk to human health and the environment.
- Government issued guidelines, advisories and policies.
- Base infrastructure development and access constraints at the time of writing this report.
- The current and ongoing development associated with Williams Landing within the former extent of RAAF Williams, Laverton.

2 SITE SETTING

2.1 Base Description

The PFAS Management Area comprises RAAF Williams, Laverton and RAAF Base Point Cook and surrounding areas, as shown on Figure 1, Appendix B.

RAAF Williams, Laverton and RAAF Base Point Cook are two separate bases and are located approximately 17 and 20 km to the southwest of the Melbourne central business district (CBD) respectively. The Bases are approximately 6.4 km from each other in a north-south direction.

2.1.1 RAAF Williams, Laverton

RAAF Williams, Laverton is approximately 150 hectares (ha) in size and currently consists of a series of administration and former residential buildings, warehousing, open storage areas and a golf course.

The former extent of the RAAF Williams, Laverton when established by the RAAF in 1921 was approximately 430 ha. Following the closure of the airfield in 1996, the western half of RAAF Williams, Laverton comprising the former airfield was sold and subsequently redeveloped as a mixed use (primarily residential) precinct. The portion of the land that was sold is now known as the suburb of Williams Landing.

The main activities at RAAF Williams, Laverton overtime have included flight training, flight programs, general aircraft maintenance and testing, air surveys and air shows. In recent times, operations at RAAF Williams, Laverton have reduced with the main functions now being related to (non-flight) training facilities, storage, maintenance and administration buildings, temporary accommodation, a childcare centre and sporting facilities.

2.1.2 RAAF Base Point Cook

RAAF Base Point Cook is approximately 341 ha in size and currently consists of accommodation and administration buildings, the former rifle range and sewage treatment plant (STP), a museum, aircraft hangers, an airfield and RAAF Lake, the dunes and foreshore areas.

RAAF Base Point Cook is the oldest continually operated military airfield in the world, is the birthplace of the Australian Flying Corps and Royal Australian Air Force and was included in the National Heritage List in 2007. The base is currently used for aviation training by RAAF, civilian aircraft and commercial tenants including Royal Melbourne Institute of Technology (RMIT) Flight Training Centre and the RAAF Museum.

2.2 Base and PFAS Management Area Setting

2.2.1 RAAF Williams, Laverton

Historically, PFAS-containing aqueous film forming foam (AFFF) was used in emergencies, through fire training and during hot-wheel training and electroplating. Electroplating typically used PFAS as mist suppressants. PFAS has been identified in soils, surface water and groundwater (Quaternary age Newer Volcanics aquifer), both on-base and off-base.

The term 'Management Area' as it applies to RAAF Williams Laverton applies to two distinct areas:

- **On-site Monitoring Area**, which relates to the current extents of RAAF Base Williams, Laverton.

- **Off-site Monitoring Area**, which includes private properties and public land to the west (former base extent), south-west and south of the base, and waterbodies and adjacent land situated hydraulically downgradient of the base, including Skeleton Creek and Sanctuary Lakes. Activities to be implemented in the off-site Monitoring Area will be focussed on ongoing monitoring.

Off-base and on-base and regional water bodies are shown on Figure 3, Appendix B.

A summary of the environmental setting of the RAAF Williams, Laverton PFAS Management Area, which is documented in the Addendum to the DSI (Aurecon 2022a) as listed in Appendix A, is as follows:

- The surrounding land uses include mostly residential suburbs of Laverton to the east, Williams Landing to the west, and Altona Meadows and Seabrook to the south. To the north is the mostly commercial/industrial suburb of North Laverton and Truganina and to the south is a railway corridor, which includes Aircraft railway station, and light industrial areas. Surrounding land uses also include Laurie Emmins Reserve to the north, Skeleton Creek which is approximately 500 m south, and which drains into the Cheetham Wetlands approximately 4 km from the Base, Laverton Creek to the east and a natural wetland know as Laverton RAAF Swamp, along with several other smaller constructed wetlands (Ashcroft, Addison and Kingwell wetlands) to the west.
- Climate data available from 1986-2023 from the nearest station on-Base, at Laverton RAAF (#087031) (Bureau of Meteorology (BOM) 2024) indicates that the area experiences a mean annual maximum temperature of 19.8°C with a range of 13.8°C in July to 25.8°C in January.
- Mean annual rainfall[1] is 534.2 mm, with March generally being the driest month, with an average rainfall of 34.2 mm, while October is on average the wettest month with average rainfall of 56.2 mm.
- RAAF Williams, Laverton ranges in elevation between 8 and 20 m Australian Height Datum (AHD) with a gentle slope to the south-east, in the direction of the coastline (Port Phillip Bay). This general slope to the south-east is reflective of the regional topography.
- The geology of RAAF Williams, Laverton consists of Quaternary-Tertiary aged Newer Volcanics consisting of olivine basalt and olivine labradorite basalt. The Newer Volcanics consist of a stack of up to approximately 50 m of mainly basaltic lava flows and some scoria beds, with the upper 2-8 m exhibiting a weathering profile.
- 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:
    - Doherty's Drain and Laverton Creek both cross the northern boundary of RAAF Williams, Laverton before combining and flowing across the eastern boundary. Both watercourses receive surface water from the northern portion of the Base, and eventually discharge into Port Phillip Bay.

[1] Bureau of Meteorology Monthly Rainfall - 087031 - Bureau of Meteorology (bom.gov.au) last accessed in September 2024.

  - Skeleton Creek is located approximately 800 m south of the Base and receives surface water flow from the southern portion of the Base. Skeleton Creek flows to the southeast, passing through the Cheetham Wetlands prior to discharging into Port Phillip Bay. It is understood that water is also pumped from Skeleton Creek into Sanctuary Lakes to maintain water levels.
  - Williams Landing to the west of RAAF Williams, Laverton has a series of drainage channels, constructed wetlands and a large natural wetland known as Laverton RAAF Swamp.

- The primary aquifer units for RAAF Williams, Laverton is the Newer Volcanics, which is a hydrostratigraphic unit comprising a multi-layered fractured rock system. In some areas the Newer Volcanics aquifer system is semi-confined by the interflow clay layers. Groundwater flow is generally to the south or southeast, and ultimately discharges into Port Phillip Bay.

- The local hydrogeology consists of two basalt units separated by a discontinuous clay aquitard, referred to as the upper and lower aquifers. The thickness of the upper basalt aquifer ranges from 2.7 m to 13.7 m, while the lower basalt aquifer is approximately 12 m thick in the northern portion of the base.
- Depth to groundwater across the base has been measured between 0.65 metres below top of casing (mbTOC) to 10.55 mbTOC in previous investigations. The average depth to groundwater on-base was 5.1 metres below ground level (m bgl), whilst off-site wells downgradient of the base have an average depth of 4.2 m bgl. To the south of Williams Landing, the average groundwater depth was 5.6 m bgl.

No significant changes have been identified in land use since the 2022 OMP.

2.2.2 RAAF Base Point Cook

PFAS-containing AFFF was historically used in emergencies and in fire training at RAAF Base Point Cook. The main fire training area was located on the sand dunes to the east of the airfield within the boundary of the base itself. PFAS have been detected in soils, surface water (drains, RAAF Lake and Port Phillip Bay) and groundwater (Quaternary age sediments), both on-base and off-base.

A Management Area had not previously been developed for RAAF Base Point Cook. The term '**Management Area**', as it applies to RAAF Base Point Cook herein, has been defined by the current extent of monitoring locations in the OMP and can be broken down into two distinct areas:

- **On-site Monitoring Area**, which relates to the current extents of RAAF Base Point Cook.
- **Off-site Monitoring Area**, which includes waterbodies and adjacent land situated hydraulically downgradient of the base to the south and east, including RAAF Lake, and a portion of Port Phillip Bay, and a portion of land managed by Parks Victoria.

At the time of preparing this OMP, further investigations were underway to understand the extent of PFAS across the identified source areas on the base and the potential for offsite migration of PFAS in surface water and groundwater. Once this has been completed, the potential risks to human and ecological health will be refined and evaluated.

A summary of the environmental setting of the RAAF Base Point Cook PFAS Management Area, identified as a result of investigation and associated reports listed in Appendix A, is as follows:

- The surrounding land uses include parkland to the north and east, with the residential suburb of Point Cook being located further north of this. Rural residences and market gardens are located to the west and Port Phillip Bay is located to the south.

- The climatic conditions for RAAF Base Point Cook are similar to those identified previously for RAAF Williams, Laverton.
- RAAF Base Point Cook ranges in elevation between 7.5 m AHD in the northwest to 0 m AHD at the Port Phillip Bay foreshore, consistent with a gentle slope to the south-east towards RAAF Lake or Port Phillip Bay.
- The near-surface geology at RAAF Base Point Cook is split into two distinct profiles; one in the western and central portions of the base dominated by clays and fractured basalt where the Newer Volcanics formation is present, and another in the eastern portion of the base dominated by aeolian sands and silty sands where the Newer Volcanics formation is not present.
- The base contains a network of above and below-ground surface water infrastructure which directs surface water to the east into a water body known as RAAF Lake or south into Port Phillip Bay.
- Generally, groundwater is encountered between 0.5 and 4.0 m bgl on the base and flows in a south to southeast direction towards Port Phillip Bay, with localised radial flow towards RAAF Lake. There are four primary aquifer units across the base detailed below:
    - Shallow Sand Aquifer: an unconfined aquifer present within the sands south of RAAF Lake and along the foreshore of the entire base.
    - Shallow Fractured Rock Aquifer: a potentially semi-confined aquifer hosted within the Newer Volcanics fractured basalt across most of the base.
    - Intermediate Aquifer: a confined aquifer hosted within a coarse layer of the interbedded quaternary aged sediments in the vicinity of the former Fire Training Area (FTA).
    - Deep Aquifer: confined to semi-confined aquifer hosted within the tertiary aged Brighton Group Formation sediments.
- The investigation and assessment undertaken at RAAF Base Point Cook to-date identified different geological and hydrogeological profiles across the base. This can be expressed at the surface by the following land uses (refer to Figure 2B, Appendix B):
    - **Western Portion:** The airfield, hangars and other supporting housing and infrastructure occupy relatively flat land broadly across the western and central portions of the base.
    - **Eastern Portion:** Includes Source Area 1, RAAF Lake and Foreshore to the east.
- The Stage 2 DSI (Senversa, 2020), Aecom HHERA (2022a) and GHD 53V Audit (GHD, 2022) describe the aquifers and their general depths as follows:
    - **Western Portion:** The aquifer consists of Newer Volcanics basalt, with an aquifer thickness of up to 20 m below the existing ground surface. Groundwater in this area is understood to be migrating south/southeast.
    - **Eastern Portion:** The aquifer consists of shallow sand up to 5 m bgl, separated by a clay aquitard from the underlying clayey sand aquifer which extends to the depths up to 20 m.
    - **Across the Base**, the Brighton Group Aquifer, a confined aquifer, is present between 20 and 40 m bgl.

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 receptors such as humans and ecosystems that may be exposed to PFAS from RAAF Williams, Laverton and RAAF Base Point Cook.

Collectively this information is used to develop a Conceptual Site model (CSM) for each base.

3.1 On-Base Source Areas

PFAS source areas can be primary source areas or secondary source areas. Primary source areas are generally areas of PFAS contamination where AFFF was used, stored, or disposed of, for example a fire training area. Secondary source areas contain an accumulation of PFAS contamination in the environment, such as in soil, sediment, groundwater or surface water bodies, which has migrated from a primary source area.

The PFAS source areas identified through previous investigations (Appendix A) for RAAF Williams, Laverton is provided in Table 1, while those for RAAF Base Point Cook is provided in Table 2. Figures showing these source areas are provided as Figure 2A and Figure 2B, Appendix B.

3.1.1 RAAF Williams, Laverton – Source Areas

The DSI (Aurecon, 2020) identified a total of 31 potential PFAS source areas across RAAF Williams, Laverton and the former base extent. Due to the refined understanding of base history, results from field investigations and the geographical overlap of some source areas, these have been consolidated into four potential source areas, as detailed in Table 1.

Table 1. Known Source Areas of PFAS – RAAF Williams, Laverton

Source Area #	Source Areas	Contaminating Activities	Extent of PFAS contamination
SA01	Wet Testing Area (CSR_VIC_000501)	The Wet Testing Area is located on the western boundary and is associated with the former Aircraft Maintenance and Refuelling area. This area was subjected to weekly AFFF usage of fire equipment. Wet testing of equipment involved the discharge of AFFF onto the concrete apron and unsealed ground west of the testing area and hangers. The land to the west of the hardstand has since been divested and developed into residential allotments.	• Soil has been sampled from across SA01, with PFAS concentrations ranging from: PFOS - <0.005-0.5 mg/kg, PFOA - <0.005 mg/kg, PFOS+PFHxS - <0.005-0.515 mg/kg. • Surface water samples have not been collected from this source area. • Nine groundwater monitoring wells are located across SA01 in the upper basalt aquifer, with concentrations ranging from: PFOS - 18-30.8 µg/L, PFOA - 0.55-1.43 µg/L, PFOS+PFHxS - 30-58 µg/L.
SA02	The Western Finger Area (CSR_VIC__000489	The Western Finger Area is located in the south-western portion of the base and consists of a series of source areas which have been grouped together as SA02. On the northern side of the Western Finger Area, the Air Movements Area was subjected to weekly 'hot wheels' incidents, during which fire trucks extinguished or hosed down aircraft wheels to prevent fires. Several known chemical storage areas and buildings are also included in SA02.	• Soil has been sampled from targeted locations across SA02, with PFAS concentrations ranging from: PFOS - <0.005-0.033 mg/kg, PFOA - <0.005 mg/kg, PFOS+PFHxS - <0.005-0.054 mg/kg. • Surface water samples have been collected from one surface water in-flow location and one surface water out-flow location in the source area, with water concentrations ranging from: PFOS – 0.15-1.1 µg/L, PFOA - <0.01-0.01 µg/L, PFOS+PFHxS – 0.15-1.31 µg/L. • Fifty groundwater monitoring wells are located across SA02 within multiple basalt aquifers, with concentrations ranging from: PFOS – <0.01-8.3 µg/L, PFOA - <0.01-0.38 µg/L, PFOS+PFHxS – 0.63-14.9 µg/L.

Source Area #	Source Areas	Contaminating Activities	Extent of PFAS contamination
SA03	Former Secondary Fire Training Area (CSR_VIC_000488)	The former Secondary Fire Training Area on the hillside north of Doherty's Drain and Ornamental Lake was used for monthly fire training exercises from approximately 1974 to 1975, and possibly longer. The DSI (Aurecon, 2020) reported that rubbish in the landfill was set alight and extinguished with AFFF. Landfilling is known to have occurred in this area until 1989, with the filled areas comprising the balance of SA03.	• Soil has been sampled from targeted locations across select landfill areas in SA03, with PFAS concentrations ranging from: PFOS - <0.005-0.054 mg/kg, PFOA - <0.005 mg/kg, PFOS+PFHxS - <0.005-0.054 mg/kg. • Surface water has not been collected from this source area, although regular sampling is undertaken at the neighbouring Doherty's Drain where concentrations are below drinking water and recreational water guidance values. • Two groundwater monitoring wells are located in the upper basalt aquifer within the former Secondary FTA, with concentrations ranging from: PFOS – <0.01-0.09 µg/L, PFOA - <0.01 µg/L, PFOS+PFHxS – 0.04-0.25 µg/L.
SA04	Former General Engineering and Maintenance Store (GEMS) Compound Surrounds (CSR_VIC_000487)	The former GEMS Compound was divested in the mid-1990s. It was the location of a range of vehicle and equipment maintenance activities, including repair, painting and fuel and chemical storage. The main workshop was used for fire truck maintenance and was reportedly the location of ad-hoc fire training and a potential area for AFFF disposal or handheld extinguisher use.	• Soil has been sampled from the on-base area immediately surrounding the former GEMS Compound, with PFAS concentrations ranging from: PFOS - <0.005-8.1 mg/kg, PFOA - <0.005-0.051 mg/kg, PFOS+PFHxS - <0.005-8.26 mg/kg. • Surface water samples have not been collected from this source area. • Two groundwater monitoring wells in the upper basalt aquifer are located in close proximity to the Former GEMS Compound boundary, with PFAS concentrations ranging from: PFOS – 3.6-49 µg/L, PFOA - 0.16-3.51 µg/L, PFOS+PFHxS – 8.1-171 µg/L.

Historic divestment of the area to the west of the current base extent at RAAF Williams, Laverton occurred over the period from the mid-1990s to 2014. The land formerly contained runways, a primary fire training area and a firepower demonstration area (refer to Figure 2C). The land is now occupied by the suburb of Williams Landing.

Areas of Williams Landing that were divested and redeveloped were subject to a series of six environmental audits by several environmental auditors from when the base was divested in 1996 until 2014.

While fire training was acknowledged as a former base use in the audits, AFFF chemicals and PFAS were not tested as part of these audits, as PFAS was not identified as a group of potential contaminants of concern at that time. However, further investigations have identified PFAS in the shallow groundwater aquifer (Newer Volcanics) that likely originated from historical fire training practices in the local area. The PFAS identified in this area is not related to PFAS sources on RAAF Williams, Laverton. The primary fire training infrastructure was removed during development of the area.

Subsequent to completion of the environmental audits, risk associated with PFAS has been evaluated in stages of the development linked to historic fire training activities. The assessment was undertaken by the same environmental auditor and human health risk assessment support team that prepared three of the previous six audit reports (SLR, 2018). Based on the assessments undertaken, the risk associated with PFAS was considered to be low and acceptable.

Ongoing monitoring of surface water and groundwater across Williams Landing are included in this OMP to monitor legacy PFAS sources and any change in understanding the risk profile and CSM while the mass flux investigation is in progress.

3.1.2 RAAF Base Point Cook – Source Areas

Previous investigations at RAAF Base Point Cook, including the DSI (Senversa, 2020) identified 10 PFAS source areas. These source areas have been summarised in Table 2.

Table 2. Known Source Areas of PFAS – RAAF Base Point Cook

Source Area #	Source Areas Descriptor and CSR Numbers	Contaminating Activities	Primary/Secondary Source
SA01	Former Fire Training Area (FTA) (CSR_VIC_000125, CSR_VIC_000126, CSR_VIC_000127, CSR_VIC_000128, CSR_VIC_000129, CSR_VIC_000242, CSR_VIC_000459, CSR_VIC_000469).	Located in the south-eastern corner of RAAF Base Point Cook, the former fire training area consisted of six former burn pits, where various liquid fuels where lit and extinguished for training. Due to the significant contamination identified in the area a voluntary environmental audit commenced in 2012.Subsequent soil and groundwater remediation works focused on chlorinated hydrocarbon contamination were completed in 2016. PFAS mass was likely to have been removed during the remediation works.	• Soil sampled from SA01 identified PFAS concentrations ranging from: PFOS - 0.0054-0.47 mg/kg, PFOA - <0.005-0.0067 mg/kg, PFOS+PFHxS - 0.0054-0.518 mg/kg. • Surface water samples have not been collected from this source area. • 45 groundwater monitoring wells have been installed in this area including into the shallow Quaternary Aquifer and Brighton Group Aquifer with PFAS concentrations ranging from: PFOS – <0.01-554 µg/L, PFOA - <0.01-19.4 µg/L, PFOS+PFHxS – <0.01-753 µg/L.
SA02	Fire Training Compound (FTC) (CSR_VIC_000456, CSR_VIC_000457, CSR_VIC_000470)	Encompassing Building 104, the former Fire Station, along with the concrete pads and grass areas east of Building 104, where AFFF products were stored, and fire training activities occurred.	• Soil has been sampled from across the building and storage area footprint, along with around the boundary of the Horizontal Tank, with PFAS concentrations ranging from: PFOS - <0.005-4.2 mg/kg, PFOA - <0.005-0.16 mg/kg, PFOS+PFHxS - <0.005-4.268 mg/kg. • Surface water samples have not been collected from this source area. • Four groundwater wells are located in the Quaternary aquifer within the building and storage area footprint, with PFAS concentrations ranging from: PFOS – 150-230 µg/L, PFOA - 9.6-26 µg/L, PFOS+PFHxS – 249-400 µg/L.
SA03	Fire Fighting Practice Areas *No current CSR assigned*	Practice area PS30 is a small concrete pad located immediately north of Building 161, while practice area PS31 is a small open area located to the west and southwest of Building 87. Anecdotal evidence suggests that training was completed in these areas by Defence fire services and other agencies.	• Soil has been sampled from across both SP30 and SP31 of the source area, with all PFAS concentrations being below the laboratory detection limit (LOR). • Surface water samples have not been collected from this source area. • Two groundwater wells are located in, or in the immediate vicinity, of both SP30 and SP31, in the Newer Volcanics aquifer, with PFAS concentrations ranging from: PFOS – <0.01-0.07 µg/L, PFOA - <0.01 µg/L, PFOS+PFHxS – 0.02-0.19 µg/L.

Source Area #	Source Areas Descriptor and CSR Numbers	Contaminating Activities	Primary/Secondary Source
SA04	Fire Fighting Practice Area C (CSR_VIC_000458)	This practice area is the concrete pad/apron located southeast of Building 188, where anecdotal evidence suggested that training was completed by the Defence fire services.	• Soil has been sampled along the northern boundary only of the source area, with PFAS concentrations ranging from: PFOS - 0.0058-0.52 mg/kg, PFOA - <0.005 mg/kg, PFOS+PFHxS - 0.0058-0.530 mg/kg. • Surface water samples have not been collected from this source area. • One groundwater monitoring well is located along the northern boundary of the source area, in the Newer Volcanics aquifer, with the PFAS concentrations being: PFOS - 960 µg/L, PFOA - 24 µg/L, PFOS+PFHxS – 1,260 µg/L.
SA05	The Fuel Farm (CSR_VIC_000266)	As a bulk fuel storage facility, it is likely that AFFF was stored and potentially used here. The PSI (Senversa 2017) noted anecdotal evidence of a burst pipe and subsequent spill on the eastern side of the fuel farm in the early 1990s, however, the use of AFFF in response to the incident was not noted.	• Soil and surface water within this source area have not been assessed for PFAS. • One groundwater monitoring well is located in the central portion of the source area, in the Newer Volcanics aquifer, with the PFAS concentrations being: PFOS – 6.1 µg/L, PFOA – 1.6 µg/L, PFOS+PFHxS – 55.1 µg/L.
SA06	Old Hangers, Aircraft Parking, Refuelling & Maintenance (CSR_VIC_000119, CSR_VIC_000267, CSR_VIC_000268, CSR_VIC_000269, CSR_VIC_000274)	Aircraft have been maintained, refuelled and parked in this area since 1951, hence multiple accidental spills are likely to have occurred. It is inferred that these would have included AFFF.	• Soil has been sampled from targeted areas of this source area, particularly in the vicinity of the hangers, with PFAS concentrations ranging from: PFOS - <0.005-140 mg/kg, PFOA - <0.005-1.7 mg/kg, PFOS+PFHxS - <0.005-186 mg/kg. • Surface water samples have not been collected from this source area. • Five groundwater monitoring wells are located in the vicinity of the hangers, in the Newer Volcanics aquifer, with PFAS concentrations ranging from: PFOS - 13-86 µg/L, PFOA - 0.29-4.5 µg/L, PFOS+PFHxS – 17.5-107 µg/L.
SA07	The Airfield (CSR_VIC_000460, CSR_VIC_000461, CSR_VIC_000465)	The airfield was used for training activities, particularly at the end of the runways, and in areas where various crashes occurred, likely involved the application of AFFF as part of firefighting or emergency response activities.	• Soil has been sampled across this source area, with PFAS concentrations ranging from: PFOS - <0.005-0.73 mg/kg, PFOA - <0.005 mg/kg, PFOS+PFHxS - <0.005-0.778 mg/kg. • Surface water has been collected and sampled from various surface drains across the source area, with PFAS concentrations ranging from: PFOS - 0.24-120 µg/L, PFOA - 0.02-2.7 µg/L, PFOS+PFHxS - 0.36-153 µg/L. • Three groundwater monitoring wells are located around the boundary of the airfield, in the Newer Volcanics aquifer, with PFAS concentrations ranging from: PFOS - 1.1-160 µg/L, PFOA - 0.04-5 µg/L, PFOS+PFHxS – 2.3-239 µg/L.

Source Area #	Source Areas Descriptor and CSR Numbers	Contaminating Activities	Primary/Secondary Source
SA08	STP and Rifle Range, Munitions / Sludge Dump (CSR_VIC_000118, CSR_VIC_000120, CSR_VIC_000123)	An STP operates in the southwest corner of RAAF Base Point Cook, with treated effluent discharging to Port Phillip Bay. Residual bio-solids were historically spread to the south of the STP, and the area between the STP and Port Phillip Bay was historically referred to as the "Waste Transit Area". This area was used for dumping of general waste and sewage sludge. AFFF could be potentially associated with the STP, biosolids and sludge.	• Soil has been sampled across the STP and Sludge Dump portions of this source area, with PFAS concentrations ranging from: PFOS - <0.005-0.83 mg/kg, PFOA - <0.005-0.013 mg/kg, PFOS+PFHxS - <0.005-0.899 mg/kg. • Surface water samples have not been collected from this source area. • Four groundwater monitoring wells have been installed across the STP and Sludge Dumps portions of this source area, in the Quaternary and Newer Volcanics aquifers, with PFAS concentrations ranging from: PFOS - 0.01-0.42 µg/L, PFOA - <0.01-0.05 µg/L, PFOS+PFHxS - 0.04-0.87 µg/L.
SA09	RAAF Lake and storm water discharge channels (CSR_VIC_000124)	The investigations did not identify evidence of a direct release or disposal of AFFF into RAAF Lake or the storm water network. However, RAAF Lake receives PFAS affected surface water from the airfield is therefore likely acting as a basin for PFAS impacts. Consequently, the lake and associated surface water discharge channels may act as secondary sources, contributing to off-base discharge.	• Soil has been sampled around the edge of RAAF Lake, with PFAS concentrations ranging from: PFOS - 0.031-10.0 mg/kg, PFOA - <0.005-0.078 mg/kg, PFOS+PFHxS - 0.031-10.55 mg/kg. • Surface water has also been sampled around the edge of RAAF Lake, with PFAS concentrations ranging from: PFOS - 1.1-19 µg/L, PFOA - 0.01-0.32 µg/L, PFOS+PFHxS - 1.39-27.2 µg/L. • No groundwater monitoring wells have been installed in this source area.
SA10	Army & Air Force Canteen Service (AAFCANS) Service Station and Car Wash *No current CSR assigned*	The former service station included multiple underground tanks and a car wash and was decommissioned in the 1990s. Historical information did not indicate evidence of direct release or disposal of AFFF in the area. However, as a former bulk fuel facility, AFFF was likely stored and potentially used in this area.	• Soils and surface water within this source area have not been assessed for PFAS. • One groundwater monitoring well is located in the source area, in the Newer Volcanics aquifer, with the PFAS concentrations being: PFOS – 2.4 µg/L, PFOA – 0.04 µg/L, PFOS+PFHxS – 3.26 µg/L.

3.2 Migration Pathways

PFAS can travel from a source to human or environmental receptors via migration pathways, such as surface water and groundwater. The migration pathways identified at, and surrounding RAAF Williams, Laverton and RAAF Base Point Cook are summarised in the sections below.

3.2.1 RAAF Williams, Laverton – Migration Pathways

The surface water drainage infrastructure across RAAF Williams, Laverton comprises a series of concrete drains and pipes along with vegetated swales and culverts, which direct surface run off from buildings, road, 'hard stand' and grassed areas. Surface water is either directed north into Doherty's Drain and Laverton Creek, which flow through the northern portion of the base, or south towards Skeleton Creek, approximately 700 m to the south of the base. The area north of Doherty's Drain, including SA04, consists of southerly overland surface water flow, largely without drainage infrastructure, towards the creek. Surface water from the concrete hardstand areas and buildings in the south-western portion of the base, including SA01 and SA02, largely flow to the south.

On a regional level, Doherty's Drain and Laverton Creek capture surface water from the suburbs north of the base and converge on-base. Laverton Creek and Skeleton Creek both flow southeast, ultimately discharging into Port Phillip Bay. Skeleton Creek flows through the Cheetham Wetlands prior to discharging into the bay. Additionally, it is understood that water is pumped from Skeleton Creek into Sanctuary Lakes to maintain water levels.

Local hydrogeology is broadly defined by the presence of Newer Volcanics aquifer which consists of at least two basalt flows separated by intervening clay-rich layers. In the southern part of the base, the basalt layers are referred to as the upper and lower basalts. These vary from unconfined to semi-confined units, with the semi-confined conditions created by the intervening clay-rich aquitards. Groundwater flow in both the upper and lower basalt aquifers is generally towards the south and southeast towards Port Phillip Bay, with the upper aquifer likely discharging to Skeleton Creek. PFAS affected groundwater has been identified, primarily relating to infiltration of PFAS from affected soils within the identified source areas. PFAS was identified in both the upper and lower basalt aquifers, with concentrations reported higher in the upper aquifer.

3.2.2 RAAF Base Point Cook – Migration Pathways

The current drainage network at RAAF Base Point Cook, consisting of both above and below ground infrastructure, allows movement of surface water from the operational areas of the base, primarily in the northwest and central portions, towards RAAF Lake to the east, and Port Phillip Bay to the south. Connections with identified PFAS source areas provide potential preferential pathways for PFAS affected sediment and surface water to be transported from the source areas to these water bodies (receptors). Drainage pathways understood to flow into RAAF Lake are likely SA03, SA04, SA05, SA06, SA07 and SA10. The remaining source areas, SA01, SA02, SA08 and SA09, discharge to Port Phillip Bay, either through surface water infrastructure or via overland flow.

With regard to aquifers, there are four key geological units that comprise major aquifers beneath RAAF Base Point Cook:

- the shallow fractured rock aquifer, located across the majority of the western and central portions of the base
- the shallow sand and Quaternary clayey sand aquifers (two separate aquifers) across the eastern portion of the base

- the Brighton Group aquifer which underlies three aquifers.

Groundwater in the shallow fractured rock, and Brighton Group aquifer, flows south to southeast, while groundwater in the shallow sand and Quaternary clayey sand aquifers flows to the east. PFAS affected groundwater has been identified in all aquifers, with the exception of the Brighton Group aquifer where it has only been identified beneath SA01 – the Former Fire Training Area. PFAS identified in groundwater is linked to infiltration from affected soils within the identified source areas.

3.3 Receptors and Risks

3.3.1 RAAF Williams, Laverton

Based on information collected from stakeholders during consultation within the DSI (Aurecon, 2020), DSI Addendum (Aurecon, 2022a), HHRAs (enRiskS, 2022a and enRiskS, 2022b) and ERA (Aurecon, 2022b), several key potential exposure scenarios were identified as currently being realised within the Management Area, including the following:

- Human receptors:
    - Residents or visitors who consume home grown produce (vegetables) and poultry eggs at the base childcare centre and within the former base extents.
    - Recreational users (e.g. swimming, boating) within the Skeleton Creek and Sanctuary Lakes[2]
    - Consumption of fish and eels recreationally caught from Skeleton Creek.
- Ecological receptors:
    - Mammalian and avian consumers of terrestrial invertebrates in RAAF Swamp.
    - Direct exposure for ecological receptors to surface water at Laverton RAAF Swamp and the southern ponds of Cheetham Wetlands.
    - Mammalian and avian consumers of fish in all investigated assessment areas.
    - Migratory avian consumers of aquatic invertebrates at RAAF Swamp, Sanctuary Lakes and the southern ponds of Cheetham Wetlands.

The DSI (Aurecon, 2020) concluded that the human health risks to on-base receptors, under the current exposure conditions, are low and acceptable.

The DSI (Aurecon, 2020), HHRAs (enRiskS, 2022a and enRiskS, 2022b) and ERA (Aurecon, 2022b) identified the following elevated risks associated with potential scenarios:

- Risks linked to human receptors

[2] There may be complete Source-Pathway-Receptor linkages for humans accessing surface waters in public open spaces (constructed wetlands) due to exceedances of Tier 1 screening criteria. However, this exposure scenario is considered unlikely and infrequent due to the nature of the surface water bodies.

Risk ID. R01: Consumption of fish and eels from Skeleton Creek.

- Risks linked to ecological receptors

  Risk ID. R02: Exposure of terrestrial ecological receptors to on-base impacted soils.

  Risk ID. R03: Exposure of terrestrial ecological receptors to off-base impacted soils at the Laverton RAAF Swamp.

  Risk ID. R04: Exposure of ecological receptors in surface water, and exposure of higher order avian and mammalian predators in Skeleton Creek, Laverton RAAF Swamp, the southern ponds of Cheetham Wetlands and Sanctuary Lakes.

3.3.2 RAAF Base Point Cook

The DSI (Senversa, 2020) identified PFAS sources, pathways for migration of PFAS from the source areas, and potential receptors, including human and ecosystems, that may be exposed to PFAS. The potential exposure routes include:

- Human Receptors:
  - Incidental ingestion through direct contact with soil, sediment, surface water and/or groundwater.
  - Extractive use of groundwater (currently, no known users on-base or downgradient).
  - Ingestion of marine biota (e.g. recreationally caught seafood e.g. fish and crustaceans).
- Ecological Receptors:
  - Direct contact and uptake from soil, sediment, surface water and/or groundwater by terrestrial and aquatic biota.
  - Indirect contact via bioaccumulation i.e. ingestion of terrestrial and aquatic biota by higher order species.

Current and potential future on-base human receptors based on the draft redevelopment 2040 Zone Plan include Defence personnel, intrusive maintenance workers, contractors, residents, and visitors. Current and potential future off-base receptors include residents at neighbouring properties to the west, recreational users of Port Phillip Bay and RAAF Lake (including the foreshore and coastal park), intrusive maintenance workers, and users of extracted groundwater (stock, domestic and irrigation). Due to its shallow depth and ephemeral nature, the availability of biota within RAAF Lake is considered limited.

The DSI (Senversa, 2020) completed a Tier 1 screening level risk assessment, and a detailed Tier 2 HHRA (Aecom, 2022a) and ERA (Aecom, 2022b) were completed for PFAS impacts within and associated with the former FTA only (SA01). Based on these investigations, the following potential elevated risks were identified:

- Risks linked to human receptors
  - Risk ID. R01: On-base - direct contact (dermal contact and incidental ingestion) with soil.
  - Risk ID. R02: On-base and Off-base – direct contact (dermal contact and incidental ingestion) with surface water.
  - Risk ID. R03: On-base and Off-base – direct contact (dermal contact and incidental ingestion) with shallow (between 0-2 mbgl) groundwater.
  - Risk ID. R04: Off-base – consumption of marine biota (seafood) recreationally caught in Port Phillip Bay.

- Risks linked to ecological receptors
    - Risk ID. R05: On-base and Off-base- direct exposure of ecological receptors to soil, sediment and surface water.
    - Risk ID. R06: On-base and Off-base - indirect exposure of ecological receptors via consumption of lower order species by higher order species.

At the time of preparing this OMP revision, further investigation is underway to understand the extent of PFAS across the identified source areas on the base. Once this has been completed, the potential risk to human and ecological health will be refined and evaluated.

4 ONGOING MONITORING PLAN

This section outlines the data quality objectives, monitoring scope and assessment requirements. Changes made to the 2022 RAAF Williams, Laverton OMP are summarised in the following sections, with supporting rationale is provided in Appendix D.

4.1 Sampling, Analysis and Quality Plan

A Sampling and Analysis Quality Plan (SAQP) will be developed prior to implementation of this OMP. The SAQP outlines data quality assurance procedures and measures including Data Quality Objectives (DQOs), Data Quality Indicators (DQI), sampling methodologies and analytical methods. The SAQP will be updated as required.

4.2 Data Quality Objectives

The 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 achieves the following:

- Clarifies the study objective.
- Defines the most appropriate collection of data as relevant to the study objective.
- Determines the conditions under which the data should be collected.
- Specifies tolerable limits on decision errors, which will be used to establish the quantity and quality of data needed to support the decision.

The DQOs for monitoring are presented Table 3 and have been prepared in line with the DQO process outlined in the ASC NEPM (Schedule B2).

Table 3. Data Quality Objectives

Process	Description
Step 1: State the problem	**RAAF Williams, Laverton** Previous investigations have identified PFAS associated with the use, storage and disposal of AFFF at RAAF Williams, Laverton. This has been identified to affect soil, surface water, groundwater, sediment, pore water and biota within and beyond the Management Area, as presented in Figure 4B, Appendix B. Assessment of human and ecological risk associated with the identified PFAS have been undertaken. Where necessary, the outcome of the risk assessments have been used to identify and implement controls such as precautionary advice and signage along some areas of Skeleton Creek. These areas were associated with potentially elevated risks associated with: • Consumption of fish and eels from Skeleton Creek (to the south of Princes Freeway, M1). • Ecological receptors in surface water and higher-order predators exposed in Skeleton Creek, Laverton RAAF Swamp, Cheetham Wetlands (southern ponds), and Sanctuary Lakes. **RAAF Base Point Cook** Previous investigations have identified that PFAS at RAAF Base Point Cook is associated with the use, storage and disposal of AFFF. This has affected soil, surface water, sediment, pore water and biota and groundwater within the Management Area. A risk assessment of the former FTA (Source Area 1), located on the eastern side of the base, has been undertaken to assess potential human health and ecological risks. This assessment is currently being updated as part of ongoing work at the base. Ongoing surface water and groundwater monitoring is therefore required to be undertaken within the Monitoring Area to assess spatial and temporal variation in PFAS concentrations, and to provide data supporting the assessment of management actions aimed at reducing the PFAS mass in surface water and groundwater. **Problem Statement** Monitoring of the surface water and groundwater at each base is therefore required to assess spatial and temporal variation in PFAS concentrations, monitor associated risks, and provide supporting data for evaluating management actions to manage potential risk associated with PFAS in surface water and groundwater or to support a determination that remediation has been completed so far as reasonably practicable.
Step 2: Identify the decision/goal of the study	The principal study question is: *Do the analytical results and field observations provide sufficient information for the interpretation of the spatial and temporal variation in PFAS concentrations in the Management Areas, and do these trends warrant a re-evaluation of management actions in the PMAP?*

Process	Description
	The alternative actions of the principal study question are: • The analytical results and field observations provide sufficient interpretation of the spatial and temporal variation in PFAS concentrations, and this warrants a re-evaluation of management actions. • The analytical results and field observations provide sufficient interpretation of the spatial and temporal variation in PFAS concentrations, but do not warrant a re-evaluation of management actions.
Step 3: Identify the information inputs	The following information inputs will apply to this OMP: • Findings from the previous investigations and reports listed in Appendix A. • CSM, including potential sources, pathways, and receptors. • Potential contaminants of concern (PFAS). • 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 from the *PFAS National Environmental Management Plan V2.0* (Heads of EPA 2020 or as amended) where available. • Changes in applicable regulatory requirements and other recent advances / updates in the industry. • Field data (including water quality parameters and visual/olfactory observations) and results from the laboratory analysis. • Data from other sources (e.g. ESdat), including data collected for the design or assessment of remediation activities.
Step 4: Define the boundaries of the study	The OMP includes sampling locations at RAAF Williams, Laverton and RAAF Base Point Cook, as well as surrounding areas, 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 downstream. The lateral extent of the study is defined by the Management Areas identified in Figures 2A and 2B, Appendix B for RAAF Williams, Laverton and RAAF Base Point Cook, respectively. The vertical boundary of the investigation will be dependent on the target aquifer at each site, which is described in Sections 2.2.1 and 2.2.2 above.

Process	Description
	For both RAAF Williams, Laverton and RAAF Base Point Cook the temporal boundary is ongoing from the date of publishing this OMP for an initial two- year period, with routine program reviews.
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 are defined as: • All samples analysed for the PFAS suite (Appendix E, as amended) will be assessed for data suitability, ensuring laboratory QA/QC is within acceptable ranges. • PFAS concentrations in surface water and groundwater will be compared against guideline values for both human and ecological receptors (refer to Section 6). • PFAS concentrations in surface water and groundwater will also be compared 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 can be reduced or should continue. Specific triggers for action, review of monitoring data and monitoring locations are detailed in Section 7. These include triggers for resampling where PFAS is detected for the first time or exceeds relevant guidance values. The decision on the acceptance of the analytical data should be made based on the 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	Acceptance limits on field and laboratory data collected for this investigation will be in accordance with ASC NEPM 2013, and PFAS NEMP (2025, as amended). The acceptable limits on decision errors to be applied in the investigation and the manner of addressing possible decision errors have been developed based on the DQIs of precision, accuracy, representativeness, comparability and completeness, and are presented below.

Process	Description
	The potential for major decision errors will be minimised by implementing a robust QA/QC program and ensuring that the investigation includes appropriate sampling and analytical density and sufficient flow measurement accuracy for the purposes of the investigation. To determine potential adverse effects on sensitive receptors and the appropriate response measures, the baseline condition has been established as 'concentrations are above the Tier 1 screening criteria or LOR (whichever is relevant)', while the alternative condition is 'the concentrations are below the Tier 1 screening criteria or LOR (whichever is relevant)'. The statistical hypotheses are then: *H_0: the maximum contaminant concentration in the media sampled is at or above the Tier 1 screening criteria or LOR (whichever is relevant).* *H_1: the maximum contaminant concentration in the media sampled is below the Tier 1 screening criteria or LOR (whichever is relevant).* The acceptable limits on the likelihood of making decision errors are: *Type I error: $\alpha \leq 0.05$ (represents the probability of determining that the media is uncontaminated, when it is in fact contaminated)* *Type II error: $\beta \leq 0.2$ (represents the probability of determining that the media is contaminated, when it is in fact uncontaminated)*
Step 7: Develop the plan for obtaining data	The scope and methodology for data collection 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.

4.3 Proposed Monitoring Intervals

Groundwater and surface water sampling from across the Management Areas of both RAAF Williams, Laverton and RAAF Base Point Cook will be undertaken on a six-monthly basis for an initial period of two years. This approach aims to capture potential variability in groundwater and surface water conditions due to seasonal rainfall (if any), with sampling during both the wetter (winter) and the drier (summer) portions of the year. The monitoring data will be incorporated to update the CSM (as presented in the PMAP), if required.

Following the initial implementation period, this OMP will be reviewed and an extended implementation period of this OMP will be considered. The review will be based on the data collected to date and established trends, the behaviour of the groundwater plume and any changes to the CSM or risk profile. The review will also address the extent of the monitoring network and the frequency of monitoring. The proposed monitoring intervals for the initial implementation period of the OMP is summarised in the following Table 4.

Monitoring intervals of media are consistent with those provided in the 2022 OMP, with the exception of the sampling locations at RAAF Base Point Cook, which are included as part of this OMP.

Table 4. Proposed monitoring intervals – RAAF Williams, Laverton and RAAF Base Point Cook

Matrix	Location	Interval	Monitored parameters
Surface water	Surface water on and off-Base	Biannual: Winter and summer[2]	**Field**: Water quality parameters[1] **Laboratory**: PFAS suite
Groundwater	Groundwater on and off-Base	Biannual: Winter and summer	**Field**: Groundwater level **Field**: Water quality parameters[1] **Laboratory**: PFAS suite

Table note: [1] Water quality parameters include pH, electrical conductivity, DO, temperature and redox potential
[2] Winter and summer, or as close to these seasons as reasonably practicable noting the timing of prior sampling

4.4 Monitoring Locations

The monitoring locations within the PFAS Management Area are detailed in the following sections. The locations are categorised as on-Base and off-Base. Off-Base monitoring locations require the agreement of the landholder or leaseholder. A separate stakeholder engagement plan has been prepared to manage this process.

It should be noted that the monitoring locations have been revised since the 2022 OMP. The changes primarily relate to the addition of RAAF Base Point Cook in this OMP as well as off-Base monitoring wells surrounding RAAF Williams, Laverton. Specific changes to the 2022 OMP sampling locations, along with the rationale for these adjustments, are outlined in the section below and in Appendix D.

4.4.1 RAAF Williams, Laverton – Monitoring Locations

Overall monitoring location rationale

The key PFAS migration pathways were identified in the DSI (Aurecon, 2020) and DSI Addendum (Aurecon, 2022a) as surface water connections from the base and former base areas to Skeleton Creek, along with groundwater discharging to Skeleton Creek. PFAS is then transported via surface water in Skeleton Creek to downstream connected surface water bodies, including Sanctuary Lakes and Cheetham Wetlands. Additionally, the PFAS migration by surface water runoff into Laverton Creek also requires monitoring, though to a lesser extent, to assess any changes in the risk profile.

Surface water monitoring

Long term surface water monitoring will be conducted to provide ongoing information on PFAS concentrations migrating off-base into Skeleton and Laverton Creeks. The sampling objective is to assess spatial and temporal trends in PFAS concentrations at surface water outlets and to evaluate the potential effectiveness of any surface water management measures implemented.

Groundwater monitoring

The groundwater well network will be gauged and monitored in the long term to provide ongoing PFAS concentration data for groundwater, in addition to the groundwater quality parameters.

At RAAF Williams, Laverton select on-base groundwater monitoring wells, along with 11 targeted off-Base groundwater monitoring wells, are proposed to be monitored under this OMP. Groundwater monitoring locations have been determined based on the following criteria:

- Locations that provide sufficient coverage to assess PFAS migration and spatial/temporal variations.
- Locations where groundwater is a known secondary source of PFAS (i.e. contains higher PFAS concentrations).

Groundwater and surface water monitoring locations in and around RAAF Williams, Laverton are detailed in the following Table 5 and shown on Figure 4A, Figure 4B and Figure 4C in Appendix B. The groundwater well table included in Appendix F provides well screen intervals data and information on whether wells target the shallow, intermediate or deep aquifer.

Table 5. Monitoring Locations – RAAF Williams, Laverton

Area	Sampling Locations		Justification
	Surface Water	Groundwater	
On-Base Source Areas			
SA01 – Wet Testing Area	SW034	-	Location targets surface water within the engineered drainage system at and downgradient of the source area.
	-	MW211	Location targets groundwater upgradient of source area.
	-	MW117, MW118, MW163, MW208	Locations target groundwater within and downgradient of the source area migrating towards Skeleton Creek.
	-	MW207	Location targets groundwater downgradient of the source area migrating towards Skeleton Creek.
SA02 – Western Finger Area	-	MW102, MW120	Locations target groundwater upgradient of the source area.
	-	MW155, MW185, MW200	Locations target groundwater within the source area.
	-	MW192	Location targets groundwater downgradient of the source area.
	SW043	-	Location targets surface water discharge from the southern boundary of the base and this source area.
SA03 – Former Secondary FTA	SW005	-	Location targets surface water within Doherty's Drain/Laverton Creek at and downgradient of the source area.
	SW006, SW008	-	Locations target surface water entering the base and upgradient of the source area.
	-	MW115	Location targets groundwater upgradient of the source area and entering the base.
	-	MW217	Location targets groundwater within the source area.
	-	MW144, MW146	Location targets groundwater downgradient of the source area.

Area	Sampling Locations		Justification
	Surface Water	Groundwater	
Southern Base Boundary (SA01, SA02 & partially SA03)	-	MW105, MW107, MW109, MW103, MW152, MW182.	Locations act as a transect to monitor groundwater at the southern base boundary and downgradient of SA01, SA02 and SA03.
SA04 – Former GEMS Compound	-	MW140, MW110	Locations target groundwater upgradient (MW140) and cross-gradient (MW110), of the source area.
	-	MW139	Location targets groundwater within and downgradient of the source area (refer also to off-base location MW229).
	-	MW138	Location targets groundwater upgradient, within and downgradient of the source area (refer also to off-base location MW229).
Off-Base Catchment/Waterway[1]			
Skeleton Creek	SW012, SW013, SW020, SW024, SW049, SW073, SW078	-	Locations target surface water conditions in Skeleton Creek, capturing conditions at point of entry of surface water drainage captured cumulatively from SA01 and SA02, and subsequent points downgradient along the waterway.
	-	MW126, MW228, MW124	Locations target groundwater downgradient of the base, particularly SA01 and SA02.
	-	MW121, MW123	Location targets down gradient groundwater and monitors extent of identified PFAS plume off-base and near point of discharge to Skeleton Creek.
	SW041	-	Location targets surface water upstream of the former base; this serves as a background monitoring point.
Laverton Creek	SW015	-	Location targets surface water in Laverton Creek at the point of discharge from SA03, in an accessible location near the point of migration off-Base.
Downgradient of on-site source – SA04	-	MW229, MW230	Location targets groundwater downgradient of the SA04.
	SW027, SW030	-	Locations target off-base surface water downgradient of historic Primary Fire Training Area on a divested part of the Base.

Area	Sampling Locations		Justification
	Surface Water	Groundwater	
Laverton RAAF Swamp and Former Primary Fire Training Area	SW045		Locations target off-base surface water upgradient of historic Primary Fire training Area.
	SW042	-	Locations target off-base surface water downgradient of RAAF Lake, potential secondary source area.
	-	MW137	Location targets groundwater upgradient of RAAF Swamp and Former Primary Fire Training Area.
	-	MW130, MW131, MW250	Locations target groundwater upgradient of RAAF Swamp and within historic location of Former Primary Fire Training Area in the divested part of the base.
	-	MW252, MW253	Location target groundwater downgradient of RAAF Swamp.
Sanctuary Lakes	SW052, SW085, SW086, SW087, SW088	-	Locations target surface water in a downgradient receptor from on-base source areas.

[1] Off-base monitoring locations will require the agreement of the landholder/leaseholder.

Groundwater gauging

In addition to the measurements of depth to groundwater at each monitoring well location prior to the collection of groundwater samples, a targeted gauging round at selected groundwater locations will be undertaken prior to a sampling event. This will be undertaken at select monitoring wells on and off-base, as it is not necessary to gauge all monitoring well locations to determine regional groundwater flow directions. The groundwater monitoring wells selected for gauging only are shown on Figure 4A, Appendix B and listed in Appendix C.

The groundwater gauging data will be used to evaluate whether there have been any significant changes in the groundwater flow direction, standing water levels or hydraulic gradients to understand whether there has been a change in the CSM and potential for contaminant migration.

4.4.2 RAAF Base Point Cook – Monitoring Locations

Based on the current understanding of the site and PFAS distribution, the key PFAS migration pathways include surface water, primarily via the surface water drainage network that runs across the site.

As for RAAF Williams, Laverton, the overall approach for both surface water and groundwater monitoring is to provide long term monitoring of PFAS concentrations at locations that are upgradient (i.e. background), within the source areas, and downgradient, where possible.

Surface water monitoring

Long term surface water monitoring will be conducted to provide ongoing information on PFAS concentrations migrating to RAAF Lake and off-base into Port Phillip Bay. The sampling objective is to assess the spatial and temporal trends in PFAS concentrations at the surface water outlets and the potential effectiveness of any surface water management measures implemented.

Groundwater gauging and monitoring

The groundwater well network will be gauged and monitored over time to provide ongoing groundwater quality parameters and PFAS concentration data.

A selection of RAAF Base Point Cook on-base groundwater monitoring wells, as well as targeted off-base locations are proposed to be gauged and monitored under this OMP. Groundwater gauging and monitoring locations have been selected based on the following criteria:

- Provide measurements of depth to groundwater at each monitoring well location prior to the collection of groundwater samples. As with the gauging at RAAF Williams, Laverton, it is not necessary to gauge all monitoring well locations to determine regional groundwater flow directions, therefore gauging is undertaken at nominated locations for groundwater sampling. The groundwater gauging data will be used to evaluate whether any significant changes had occurred in the flow direction groundwater.
- Locations that will provide sufficient coverage to assess PFAS migration and spatial/temporal variations.
- Locations where groundwater is a known secondary source of PFAS (i.e. contains higher PFAS concentrations).

Surface water and groundwater monitoring locations proposed for gauging and sampling on and around RAAF Base Point Cook are summarised in Table 6, shown on Figure 5A, Figure 5B, Figure 5C and Figure 5D, Appendix B, with detail of well coordinates provided in Table 11 in Appendix C.

The groundwater well table included in Appendix F provides well screen intervals data and information on whether wells target the shallow, intermediate or deep aquifer.

Table 6 . Proposed ongoing monitoring locations – RAAF Base Point Cook

Area	Gauging and/or Sampling Locations		Justification
	Surface Water	Groundwater	
Targeting On-Base Source Areas			
SA01 – Former Fire Training Area (FTA)	SW001, SW002, SW003, SW004, SW005, SW006, SW215	-	Locations targeting surface water discharging into or towards RAAF Lake from SA01.
	-	MW025, MW038, MW039, MW041, MW042, MW045, MW197, MW198, MW199, MW200, MW208, MW209, and MW210.	Locations targeting shallow groundwater beneath the northern flank of the former FTA to form two well transects to assess groundwater and interaction between SA01 and SA09. MW208 – MW210 are screened in the intermediate aquifer
	-	MW141, MW142, MW154	Locations targeting shallow groundwater beneath the southern flank of the former FTA and Port Phillip Bay.
	-	MW120, MW125	Locations targeting shallow groundwater beneath the eastern flank of the former FTA and discharging off-base towards Point Cook Coastal Park.

Area	Gauging and/or Sampling Locations		Justification
	Surface Water	Groundwater	
	-	MW047, MW129, MW133, MW158	Locations targeting shallow groundwater beneath the western flank of the former FTA and discharging towards Port Phillip Bay.
	-	MW119, MW134, MW160	Locations targeting shallow groundwater beneath the central portion of the Former FTA.
	-	MW044, MW172, MW174, MW179, MW180, MW182, MW183, MW184, MW185	Locations targeting the intermediate aquifer within/beneath the Former FTA.
SA02 – Former Fire Training Compound (FTC) / Former Fire Station / Storage Area / Solid Waste Horizon Tank	SW217	-	Location targeting the surface water discharging from the Former Fire Station area.
	-	MW021, MW022, MW023, MW024, MW034	Locations targeting the shallow groundwater beneath the Former Fire Station area / FTC.
	-	MW107	Location targets groundwater between Former Fire Station / FTC and Port Phillip Bay.
	-	MW201	Location targeting shallow groundwater discharging into Port Phillip Bay from the Solid Waste Horizon Tank.
	SW202, SW203	-	Locations targeting the surface water discharging into Port Phillip Bay from the southern drainage network that captures runoff from SA02

Area	Gauging and/or Sampling Locations		Justification
	Surface Water	Groundwater	
	SW232	-	Location targeting surface water discharge into Port Phillip Bay from the Former Fire Station.
SA03 – Fire Fighting Practice Areas PS30 & PS31	-	MW002 and MW005	Targeting shallow groundwater upgradient of the source areas (PS30 and PS31, respectively).
	-	MW003, MW203	Locations targeting shallow and intermediate groundwater, respectively beneath and in the vicinity of Fire Fighting Practice Areas (PS30).
	-	MW010, MW011, MW202	MW010 and MW011 targeting shallow groundwater beneath and in the near vicinity of Fire Fighting Practice Areas (PS31). MW202 targets the intermediate aquifer in this area.
	-	MW004 and MW026	Targeting shallow groundwater downgradient of the source areas (PS30 and PS31, respectively).
SA04 – Fire Fighting Practice Area	SW222, SW223	-	Locations targeting surface water migrating from SA04
	-	MW018, MW019, MW027, MW204 and MW211	Locations targeting groundwater migrating to and from SA04, with: • MW027 located upgradient • MW018 targeting the shallow aquifer and MW204 and MW211 target the intermediate aquifer within the SA04. • MW019 located downgradient of the source area.
SA05 – The Fuel Farm	-	MW017, MW057, MW205 and MW212	Location MW017 targets the shallow aquifer and MW205 and MW212 target the intermediate aquifer in the footprint of the fuel farm. MW057 is downgradient of the source area.
SA06 – Old Hangers, Aircraft Parking,	SW216, SW219, SW220	-	Locations targeting the surface water runoff from paving in this source area.

Area	Gauging and/or Sampling Locations		Justification
	Surface Water	Groundwater	
Refuelling & Maintenance, Paint Stripping and Waste Collection Pit, West of Building 197 – UST_01 A0506, and West of Building 184 – UST_03 Diesel	-	MW007, MW008, MW054	Locations targeting shallow groundwater cross/upgradient of this source area
	-	MW104, MW061, MW015, MW062, MW016, MW206	Locations targeting shallow groundwater beneath or near vicinity of SA06. MW206 Targeting the intermediate aquifer.
SA07 – The Airfield, Aircraft maintenance areas and aircraft Crash Sites	SW205, SW206	-	Locations target surface water discharging from the airfield to the north into RAAF Lake.
	SW207, SW208, SW210, SW218	-	Locations target surface water discharging from the northern part of the airfield to the east into RAAF Lake.
	-	MW035	Location target groundwater on the eastern flank of the airfield, discharging into RAAF Lake.
	SW213, SW214	-	Locations target surface water discharging into, or towards Port Phillip Bay from this source area.
	-	MW106, MW064	Locations target groundwater on the southern flank of the airfield, discharging towards Port Phillip Bay.
	-	MW207	Location targeting groundwater migrating from SA04 and SA06 to SA02 from these sources towards Port Phillip Bay.
	SW221, SW225	-	Location targeting surface water drainage from the central and southern portions of the Airfield, which ultimately feed into drainage that discharges to Port Phillip Bay. It is noted that SW225 is located in the vicinity of a crash site (PS45).
	SW224	-	Location targeting surface water drainage from the western portion of the Airfield, and down gradient of SA04.

Area	Gauging and/or Sampling Locations		Justification
	Surface Water	Groundwater	
SA08 – STP and Rifle Range, Munitions / Sludge Dump	SW233, SW234	-	Locations targeting the surface water discharges into and from the STP and Munitions / Sludge Dump area
	-	MW033, MW103	Locations up and/or cross-gradient of source area.
	-	MW032	Location targeting shallow groundwater beneath the STP and Munitions / Sludge Dump area
	-	MW112, MW031	Locations target groundwater on southern flank of SA08 towards Port Phillip Bay. MW031 targets the shallow aquifer and MW112 targets the intermediate aquifer.
SA09 – RAAF Lake and storm water discharge channels	SW209, SW212, SW227, SW228, SW229, SW230	-	Locations targeting surface water within RAAF Lake to understand seasonal influence of PFAS concentrations.
SA06 (part), SA07, SA03, SA10	SW260, SW266	-	Locations capturing cumulative surface water drainage directed to the north of the site, that ultimately discharges to RAAF lake via drainage that runs around the northernmost point of the airfield.
SA04, SA05, SA06 (part), SA03	SW264, SW265, SW263	-	Surface water sampling locations capture drainage that receives water from combination of source areas, ultimately discharging in the vicinity of the sampling points to Port Phillip Bay.
Boundary Conditions			
Southern Base Boundary	-	MW020, MW049, MW051, MW105	Locations targeting the shallow groundwater discharging into Port Phillip Bay along southern base boundary.
Eastern Base boundary	-	MW110	Location targets eastern base boundary with Point Cook Coastal Park.

Area	Gauging and/or Sampling Locations		Justification
	Surface Water	Groundwater	
Western Base Boundary	-	MW005, MW013	Targeting groundwater conditions at the eastern base boundary, also upgradient of SA08. Note MW005 also monitors up gradient groundwater conditions at SA03.
Off-Base			
South/southeast of SA01 – FTA	-	MW150[1], MW166[1], MW167[1], MW168[1], MW169[1]	Locations targeting shallow groundwater discharging to Port Phillip Bay beneath Point Cook Coastal Park.

[1] Off-base monitoring locations will require the agreement of the landholder/leaseholder

4.5 Sample Analysis

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

LORs must be selected to achieve the objectives of this OMP (Section 1.2) and the DQOs. The rationale for selecting LORs below the standard LOR must be provided.

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

Field and laboratory quality control and quality assurance measures will be outlined within the SAQP. The field and laboratory quality control and quality assurance measures must include collection and / or review of the following:

- Field: intra-laboratory duplicates, inter-laboratory duplicates, rinsate blanks and trip blanks.
- Laboratory: laboratory duplicate samples, laboratory control samples, surrogate spike recoveries, matrix spike recoveries and method blanks.

In addition to PFAS, field measurement of water quality parameters such as pH, electrical conductivity, redox potential, dissolved oxygen, temperature, total dissolved solids, salinity, and turbidity (where feasible) will be collected on all surface and groundwater samples following the methodology provided in the SAQP.

5 OTHER ASPECTS

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

The aspects review requirements are included in Table 7.

Table 7. 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), Mass Flux Studies and ultimately remedial actions. • Potential changes may result from the specific or cumulative impact of remediation or containment actions, existing transportation trends, changes to hydrogeology. • Investigations associated with estate planning or works as well as 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: • Capture projects planned for the next 12-month monitoring period, particularly if the works are related to source areas. • Significant changes of land use in source areas may require review of this OMP, including whether additional monitoring will be required (such as installing new monitoring wells or adding new surface water locations).
Development works or changes in off-Base land use	For off-base land use, this OMP will consider changes 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 this OMP.
Significant weather events	Significant weather events, such as prolonged wet weather or long dry periods, where rainfall is significantly deviates from 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.
WUSs	The OMP will consider any data collected through WUSs 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 to the geographical extents of the existing Management Area associated with the precautionary advice relating to fish and/or eel consumption from Skeleton Creek.
Changes in nationally endorsed	The OMP will consider any updates to the current human health and ecological screening criteria for PFAS as presented in the PFAS NEMP Version 3.0 (HEPA, 2025).

Aspect	Review requirements
PFAS Screening Criteria	

6 PFAS SCREENING CRITERIA

6.1 Overview

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, 2020. PFAS NEMP Version 3.0. January 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).
- 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).

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

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

6.2 Basis of Groundwater Screening Criteria

In Victoria the quality of groundwater and potential uses are defined by the Environment Reference Standard (Victorian Government 2021), which sets out Environmental Values of groundwater to be protected, according to the natural salinity. Due to the distance separating the different areas of the base, aquifers and associated groundwater quality varies.

For RAAF Williams, Laverton, according to existing reports (DSI (Aurecon 2020) and Addendum to the DSI (Aurecon 2021)) groundwater within the upper and lower basalt aquifers is Segment C.

For RAAF Point Cook, an assessment of applicable Environmental Values was undertaken in the addendum to the Stage 2 DSI (Senversa 2020). This report concluded that groundwater within the upper and lower basalt aquifers was Segment C.

Environmental Values that apply to groundwater Segment C include:

- Water dependant ecosystems and species
- Potable mineral water supply
- Agriculture and irrigation (stock watering)
- Industrial and commercial use
- Water-based recreation (primary contact recreation)
- Traditional Owner cultural values

- Buildings and structures
- Geothermal Properties

According to existing reports (DSI (Aurecon 2020) and Addendum to the DSI (Aurecon 2022a) for RAAF Williams, Laverton and the Stage 2 DSI (Senversa 2020) for RAAF Point Cook), an assessment of whether Environmental Values are existing, likely or potential was undertaken. These assessments considered identified use on and in the vicinity of each base. The following tables outline the outcome of the previous groundwater assessments with respect to Environmental Values and the screening criteria to be used to assess potential impacts.

Table 8. Groundwater Environmental Values On- and Off-Base – RAAF Williams Laverton and RAAF Base Point Cook

Groundwater Env. Value	On-Base			Off-Base			Screening Criteria
	Existing	Likely / Potential	Unlikely	Existing	Likely / Potential	Unlikely	
RAAF Williams, Laverton							
Water Dependent Ecosystems and Species	✓			✓			Refer to Section 6.3 below.
Potable Mineral Water Supply			✓			✓	No criteria have been adopted for Potable Mineral Water Supply, as groundwater does not have mineral water characteristics within the Management Area.
Agriculture and Irrigation (Stock Watering)			✓	✓			In the absence of published guideline values for stock watering, the NHMRC drinking water values have been considered (0.07 µg/L for PFOS + PFHxS and 0.56 µg/L for PFOA).
Industrial and Commercial			✓			✓	No criteria have been adopted for Industrial and Commercial groundwater use, as this use is considered unlikely to be present within the Management Area.
Water-based Recreation (Primary Contact Recreation)			✓	✓			Water Based Recreation Criteria from NHMRC, 2019.
Traditional Owner Cultural Values	✓			✓			In the absence of published guideline values for Traditional Owner Cultural Values, the NHMRC drinking water values have been considered (0.07 µg/L for PFOS + PFHxS and 0.56 µg/L for PFOA).

Groundwater Env. Value	On-Base			Off-Base			Screening Criteria
	Existing	Likely / Potential	Unlikely	Existing	Likely / Potential	Unlikely	
Buildings and Structures	✓			✓			No criteria have been adopted for the Environmental Value Buildings and Structures as no PFAS criteria has been developed for this scenario, and PFAS is not known to affect the integrity of structures.
Geothermal Properties			✓			✓	No criteria have been adopted for the assessment of geothermal properties based on temperatures of groundwater measured during prior assessments.
RAAF Williams, Point Cook							
Water Dependent Ecosystems and Species	✓			✓			Refer to Section 6.3 below.
Potable Mineral Water Supply			✓			✓	No criteria have been adopted for Potable Mineral Water Supply, as groundwater does not have mineral water characteristics within the Management Area.
Agriculture and Irrigation (Stock Watering)			✓	✓			In the absence of published guideline values for stock watering, the NHMRC drinking water values have been considered as an initial screening value (0.07 µg/L for PFOS + PFHxS and 0.56

Groundwater Env. Value	On-Base			Off-Base			Screening Criteria
	Existing	Likely / Potential	Unlikely	Existing	Likely / Potential	Unlikely	
Industrial and Commercial			✓			✓	No criteria have been adopted for Industrial and Commercial groundwater use, as this use is considered unlikely to be present within the Management Area.
Water-based Recreation (Primary Contact Recreation)			✓	✓			Water Based Recreation Criteria from NHMRC, 2019.
Traditional Owner Cultural Values	✓			✓			In the absence of published guideline values for Traditional Owner Cultural Values, the NHMRC drinking water values have been considered (0.07 µg/L for PFOS + PFHxS and 0.56 µg/L for PFOA).
Buildings and Structures	✓			✓			No criteria have been adopted for the environmental value Buildings and Structures as no PFAS criteria has been developed for this scenario, and PFAS is not known to affect the integrity of structures.

Groundwater Env. Value	On-Base			Off-Base			Screening Criteria
	Existing	Likely / Potential	Unlikely	Existing	Likely / Potential	Unlikely	
Geothermal Properties			✓			✓	No criteria have been adopted for the assessment of geothermal properties based on temperatures of groundwater measured during prior assessments.

Table 9. Groundwater Environmental Values On- and Off-Base – RAAF Williams Laverton and RAAF Base Point Cook

Aspect	Relevant Environmental Values	PFOS + PFHxS	PFOA
Freshwater/Marine: High conservation/ecological value systems (99% species protection)	Water-Dependent Ecosystems	0.00023 µg/L	19 µg/L
Freshwater/Marine: Slightly to moderately disturbed systems (95% species protection)		0.13 µg/L	220 µg/L
Irrigation (drinking water criteria adopted for screening purposes)	Traditional Owner Cultural Values, Agriculture and Irrigation (Irrigation and stock watering)	0.07 µg/L	0.56 µg/L
Recreational water	Water-based Recreation (Primary Contact Recreation)	2 µg/L	10 µg/L

6.3 Water Dependent Ecosystem Screening Criteria

HEPA 2020 has adopted trigger values for species protection levels for toxicants, providing guidance for assessment of aquatic ecosystems. Percent species protection levels range from 80% (highly disturbed systems) to 99% (largely unmodified systems). The water bodies on and surrounding the sites vary in ecosystem disturbance and modification, and as such different protection levels apply. The following outlines the adopted species protection levels and criteria based on water feature:

- On-base built drainage channel, swale or pipework: No species protection is required, as protection of Environmental Values in artificial surface water drains is not a requirement.
- On-base surface water pond, dam or depression: 95% species protection is adopted as vegetation is generally present in and around these moderately to highly modified features, which supports a freshwater ecosystem (0.13 µg/L for PFOS + PFHxS and 220 µg/L for PFOA).
- On and off-base water bodies (i.e. rivers, creeks, lakes and wetlands):
  Groundwater has the potential to discharge to surface water receptors and surface water has the potential to migrate into on and off-base creeks, lakes, wetlands and retention basins, the environmental setting around each base results in the following application of ecosystem criteria:
    - **RAAF Williams, Laverton:** The inland waters surrounding the base are highly modified ecosystems, with a stream quality rating of poor (ERS 2021). Therefore, 95% species protection screening criteria have been adopted to account for bioaccumulation (0.13 µg/L for PFOS + PFHxS and 220 µg/L for PFOA).
    - **RAAF Base Point Cook:** Potential surface water receptors include RAAF Lake (on-Base) and Port Phillip Bay (off-base), respectively. Based on salinity and classification under the ERS, RAAF Lake and Port Phillip Bay adopt a 99% marine species protection for screening purposes, which accounts for the potential for bioaccumulation and site setting (0.00023 µg/L for PFOS + PFHxS and 19 µg/L for PFOA).

7 TRIGGERS FOR ACTION AND REVIEW

Data collected during this OMP is reviewed after each sampling event annually against historical data to assess potential reasons for changes in PFAS concentrations. PFAS analytical data is to be reviewed holistically with environmental, field and laboratory data to understand whether external factors (for example rainfall) could be influencing the data and compared to criteria provided in Section 6 to assess potential impacts.

Changes in the understanding of the risks, triggered by 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 this OMP may inform a number of risk-management decisions, including:

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

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

- **Screening criteria**: a water quality standard identified as being appropriate for a contaminant in a water body to assess the overall impact on water quality (as summarised in Section 6).
- **Trigger level**: a specific assessment criterion applied to a contaminant to assess whether there have been possible adverse trends in environmental monitoring data. Trigger levels alert stakeholders and regulators to these changes. The trigger levels and responses are described in Table 10.

It is noted that prior to considering any trigger responses outlined in Table 10, the following must be 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). This should include consideration of whether field sampling QA/QC results are acceptable - for example, rinsate blanks should not suggest that cross contamination has occurred.
- 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 reanalysis of the sample (if sufficient is available) or resampling is considered.

Once these initial checks are completed, the trigger levels and responses can be considered as outlined in the following Table 10. Trigger data should consider a range of factors prior to action being undertaken.

A review of available sampling locations must be completed following each OMP sampling event. If an OMP sampling location is found to be inaccessible, damaged or destroyed, a review on alternative locations must be completed. Recommendations should be made to Defence regarding repair the location, replacement, decommissioning or removing the location from the OMP.

7.1 Trigger Point – Action Considerations

Triggers and responses are provided in Table 10.

Table 10. Trigger levels and responses

Trigger	Response	Applicable Site
First time detection of PFAS in groundwater / surface water	**On-site** • Review the CSM to assess groundwater and surface water pathways and the potential for migration to off-site receptors. • If receptors are identified on-site, 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-site** • Evaluate potential off-site migration of PFAS via groundwater or surface water pathways as identified in the CSM. • Consider additional monitoring of off-site wells or surface water bodies to assess potential receptor exposure.	Both sites
First time exceedance of the agriculture and irrigation stock (drinking) water guideline in groundwater	**On-site** • Calculate the rolling average over a three-year period (where available) for sample results from the same location and compare with the irrigation screening criteria. If three years of data is not available, calculation of rolling averages using the available data set. • Evaluate groundwater flow direction and velocity to assess the potential for PFAS migration towards off-site receptors. **Off-site** • Conduct off-site monitoring if an irrigation water receptor is in the potential migration pathway. • If PFAS is detected off-site above irrigation water guidelines, notify relevant stakeholders (e.g., regulators, property owners) and consider management measures or more frequent monitoring to monitor risk.	Both sites

Trigger	Response	Applicable Site
First time exceedance of the recreational water guideline in groundwater / surface water	**On-site** Water-based Recreation (Primary Contact Recreation) is considered unlikely on each base, therefore not relevant as a trigger, as groundwater is not being extracted to fill swimming pools and surface water is not being used for recreational purposes (swimming). **Off-site** • Assess potential migration pathways to off-site 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. If three rounds of data are not available, comparison of the results against the available data set. • Review risk profile for identified potential receptors including confirmation of exposure pathways based on consideration of CSM.	Both sites
First time exceedance of adopted ecological screening criteria in groundwater / surface water.	**On-site and Off-site** • 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 that particular Base or area. If three years of data is not available, calculation of rolling averages using the available data set. • Compare with historic results and assess degree of change with reference to current understanding of site-specific risk assessment where available.	Both sites
Increasing PFAS trends	**On-site** • Conduct further assessment to determine whether the CSM and risk profile require updating, focusing on migration pathways. • Investigate potential sources contributing to the trend (e.g., legacy contamination, leaching from soil). • Evaluate the need for additional control measures if migration towards sensitive on-site receptors is identified. **Off-site** • Assess off-site receptor risks based CSM and consideration of surface water or groundwater pathway. Monitor trend and risk in subsequent rounds. • Consider expanding off-site monitoring programs if increasing trends indicate a migration toward sensitive receptors.	Both sites

Trigger	Response	Applicable Site
Decreasing PFAS trends	**On-site** • Assess whether reduced risks warrant changes to on-site controls (e.g., frequency of monitoring, groundwater/surface water use restrictions). • Consider reducing on-site monitoring frequency or locations if the trend is stable. **Off-site** • If decreasing trends are observed off-site, assess whether further monitoring of off-site receptors is necessary. If risks have sufficiently reduced, recommend scaling back monitoring efforts at next OMP review.	Both sites
Detection of new maximum concentrations (On or Off-site)	**On-site** • Review historical data trends to understand if the increase is part of a longer-term trend or a temporary anomaly. • Review concentration against risk assessments (where available). Reassessing potential risks in the context of the CSM to on-site receptors (workers, visitors, ecosystems). • Evaluate whether the new maximum concentration requires additional mitigation measures on-site (e.g. precautionary advice or restricting access/use). **Off-site** • Assess whether the new maximum concentration is indicative of PFAS migration towards off-site receptors (e.g., irrigation water sources, ecological receptors). • Consider modification to off-site monitoring if necessary to track further migration. • Communicate findings to affected stakeholders, if necessary, based on CSM and understanding of risk based on previous risk assessment undertaken at each Base. • Evaluate and implement off-site mitigation measures if required, such as precautionary advice or restricting access to contaminated areas.	Both sites
Development works or changes in land use	**On-site and Off-site** Review change in land use and assess for proposed changes that may introduce additional receptors. Consider linkage with source areas, proposed land use and likely PFAS concentrations in environmental media. Consider preceding Trigger Point Action Considerations - points 1 – 3, prior to engaging with stakeholders relevant to the works to identify (where appropriate) potential actions to mitigate potential exposure risk.	Both sites
Water Use Surveys	**On-site and Off-site**	Both sites

Trigger	Response	Applicable Site
	Consider data collected from 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 identified 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 (where appropriate) potential actions to mitigate potential exposure risk.	
Changes in EPA Victoria Precautionary Advice	If the EPA modifies the geographical extent of the existing Management Area associated with the precautionary advice relating to fish consumption from Skeleton Creek, review available data across different media to assess relevance and changes to existing management measures. Consider preceding Trigger Point Action Considerations - points 1 – 3, prior to engaging with EPA and other relevant stakeholders to identify (where appropriate) potential actions to mitigate potential exposure risk.	RAAF Williams, Laverton
OMP Sampling Location is Inaccessible, Damaged or Destroyed	• Review potential alternative sampling locations. • Provide recommendations to Defence regarding repair, replacement, decommissioning or removing the sampling location from the OMP.	Both sites

Updates to this OMP may be required for several reasons. Data on changes in the distribution, concentration, transport (pathways and flow rates) and transformation of the contaminants and 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 by PFAS. Update to this OMP may be required if sampling locations are found to be inaccessible, damaged or destroyed.

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

- Changes to State Government advice on types of exposure-minimisation behaviours (e.g., consumption of home produce).
- Changes or refinements to the monitoring network, frequency and parameters.
- Feedback and information received from on-going community consultation.
- Any significant changes of land use 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, all relevant information, including 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 entire data set, including the current and historic data, will be reviewed. An Ongoing Monitoring Report (OMR) will then be prepared.

The OMR will report on the objectives of this OMP, which are to identify and evaluate:

- Spatial, and temporal (including seasonal) variability of PFAS in the environment.
- Changes to sources, migration pathways or receptors, described as a CSM for the base.
- Changes in risks to human and environmental receptors.
- The influences of risk management activities at the base, as outlined in the 2022 PMAP have had on PFAS in the environment.
- 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.

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, along with the current PMAP and OMR, will be published on the Defence website.

APPENDIX A REFERENCES

Key documents

RAAF Williams, Laverton

Aurecon, 2020. Investigation of per- and poly-fluoroalkyl substances at RAAF Williams Laverton, Detailed Site Investigation, November 2020.

Aurecon, 2022a. Investigation of per- and poly-fluoroalkyl substances at RAAF Williams Laverton, Addendum to the Detailed Site Investigation, March 2022.

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SLR, 2018. Further Advice, Standing of Statements and Certificates of Environmental Audit (Stages 1 to 5), Williams Landing, Vic. Dated 14 November 2018.

RAAF Base Point Cook

Aecom, 2021. Stage 5 Interpretive Report: Groundwater and Soil Vapour, RAAF Base Point Cook (0932): Former Fire Training Area, December 2021.

Aecom, 2022a. Stage 3 Human Health Risk Assessment, RAAF Base Williams Point Cook (0932): Former Fire Training Area. March 2022.

Aecom, 2022b. Stage 3 Ecological Risk Assessment, RAAF Base Point Cook (0932): Former Fire Training Area. March 2022.

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GHD, 2022. Remediation of Former Fire Training Area, RAAF Base Williams, Point Cook, Victoria S53V Environmental Audit Report. November 2022.

Senversa, 2017. Stage 1 Preliminary Site Investigation RAAF Base Williams – Point Cook. August 2017.

Senversa, 2020. Stage 2 Detailed Site Investigation RAAF Base Williams Point Cook. October 2020.

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, 2024. Defence Safety Manual (SafetyMan), 2024. URL: https://www.defence.gov.au/about/governance/work-health-safety/policy. Accessed 10 July 2024.

Defence, 2022. RAAF Williams, Laverton PFAS Ongoing Monitoring Plan, dated August 2022.

Defence, 2022. RAAF Williams, Laverton PFAS Management Area Plan, dated August 2022.

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.

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Environmental Protection Act 2017 (Victoria).

HEPA (2025) PFAS National Environmental Management Plan Version 3.0, Heads of EPA Australia and New Zealand (HEPA), dated 2025.

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

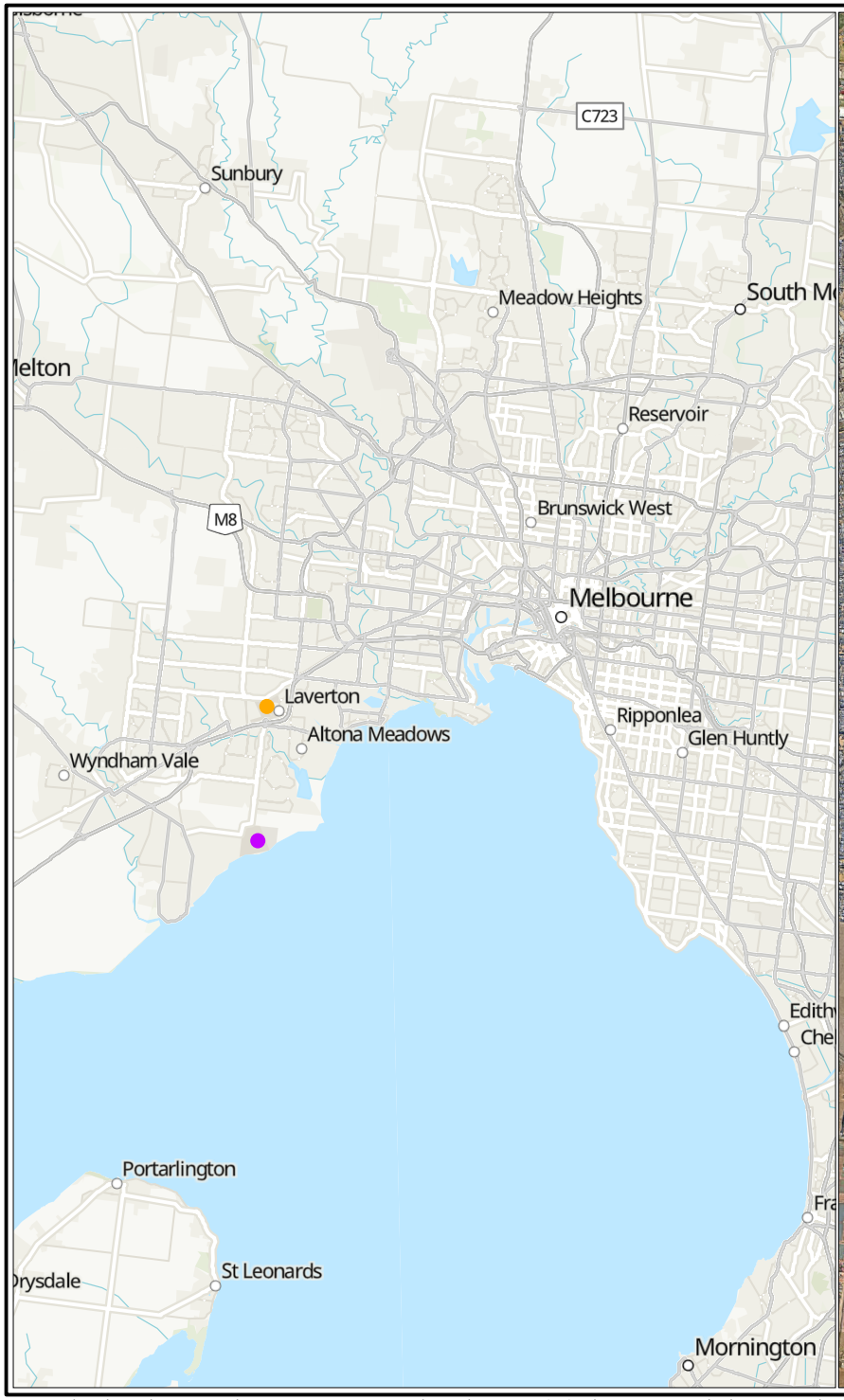
National Health and Medical Research Council (NHMRC), 2019. Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water. August 2019 (NHMRC 2019).

Stantec, 2024. PFAS Ongoing Monitoring Report, March 2023 & July/August 2023, RAAF Williams (Laverton). 16 July 2024.

Victorian Government, 2021. Environmental Reference Standard No. 245 26 May 2021.

APPENDIX B FIGURES

List of Figures



Legend

- Laverton Management Area
- Point Cook Management Area
- Laverton Site Boundary
- Point Cook Site Boundary
- Former Extent of RAAF Williams
- Laverton Site Location
- Point Cook Site Location

JBS&G

Job No: 66022	
Client: Department of Defence	
Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS

Scale 1:55,000

0 1,000 2,000

metres

Coord. Sys. GDA2020 MGA Zone 55

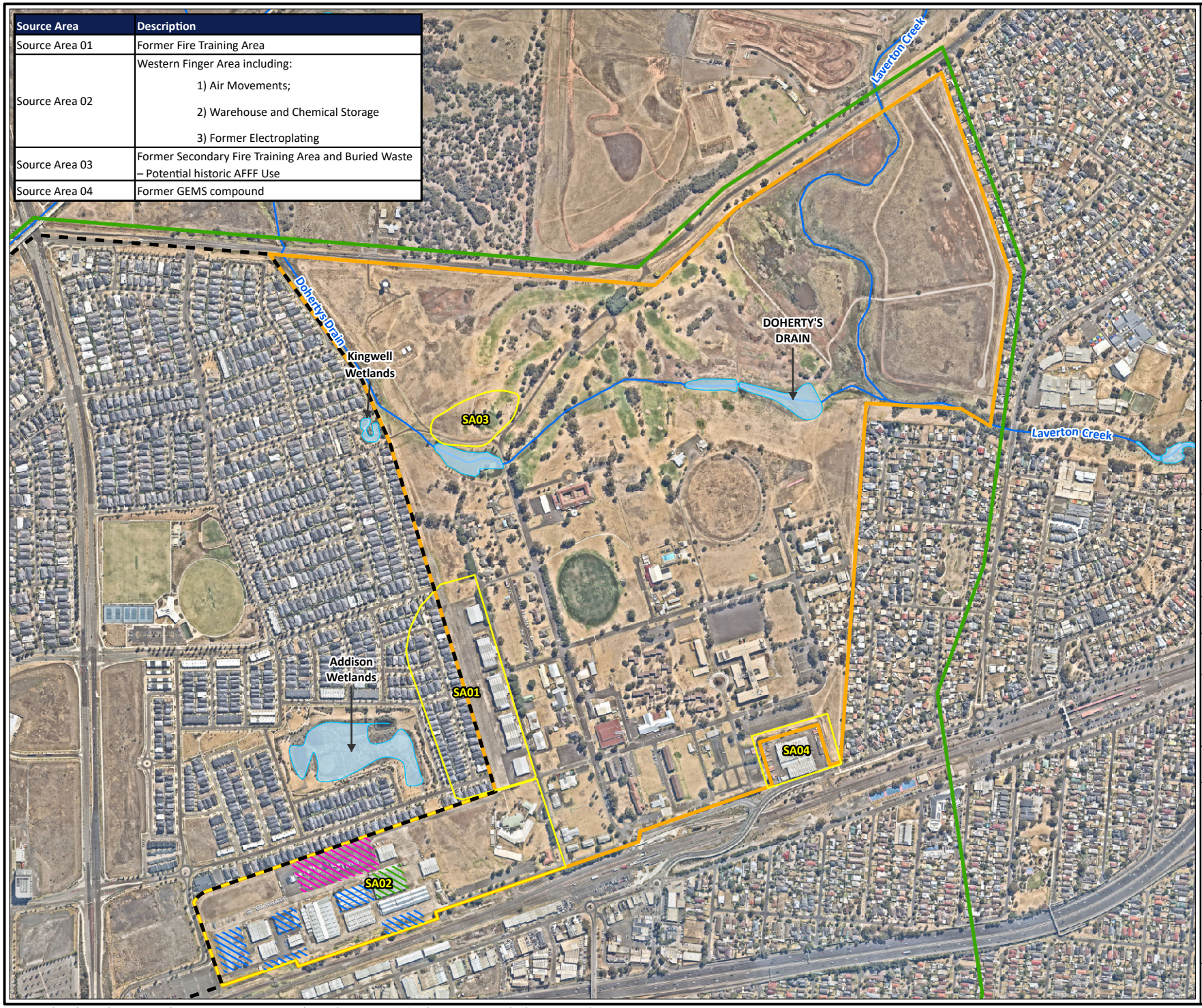
RAAF Williams, Laverton
RAAF Base Point Cook

SITE LOCATION

FIGURE 1

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_01_Site Location
Reference: ESRI Topographic Basemap - Accessed Imagery: 24/02/2025 & www.nearmap.com - Imagery Date: 17/03/2024

Source Area	Description
Source Area 01	Former Fire Training Area
Source Area 02	Western Finger Area including: 1) Air Movements; 2) Warehouse and Chemical Storage 3) Former Electroplating
Source Area 03	Former Secondary Fire Training Area and Buried Waste – Potential historic AFFF Use
Source Area 04	Former GEMS compound



Legend

- Laverton Management Area
- Laverton Site Boundary
- Laverton Source Area
- Former Extent of RAAF Williams
- Air Movements
- Former Chemical Storage Area
- Former Electroplating Area
- Waterbodies
- Watercourse

JBS&G

Job No: 66022

Client: Department of Defence

Version: Rev D | Date: 24-Feb-2025

Drawn By: JS | Checked By: JS

Scale 1:11,000

0 200 400
metres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Williams, Laverton

LAVERTON SOURCE AREAS

FIGURE 2A

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_02a_Laverton Source Areas
Reference: www.nearmap.com - Imagery Date: 17/03/2024

Source Area	Description
Source Area 01	Former Fire Training Area (FTA)
Source Area 02	Fire Training Compound (FTC), Former Fire Station and Solid Waste – Horizon Tank
Source Area 03	Fire Fighting Practice (PS30 and PS31)
Source Area 04	Fire Fighting Practice Area C
Source Area 05	Fuel Farm
Source Area 06	Old Hangers, Aircraft Parking, Refuelling & Maintenance, Paint Stripping and Waste Collection Pit
Source Area 07	The Airfield, Aircraft maintenance areas and Aircraft Crash Sites
Source Area 08	Sewage Treatment Plant (STP) and Rifle Range, Munitions/Sludge Dump
Source Area 09	RAAF Lake and storm water discharge channels
Source Area 10	Army and Airforce Canteen Service (AAFCANS), Service Station and Carwash

Legend

- Point Cook Management Area
- Point Cook Site Boundary
- Point Cook Source Area
- Remediated Area

Source Area 2, 3 and 8 Components

- Fire Training Compound and Former Fire Station
- Rifle Range
- SP30
- SP31
- STP
- Soild Waste - Horizon Tank
- Watercourse

JBS&G

Job No: 66022

Client: Department of Defence

Version: Rev D | Date: 24-Feb-2025

Drawn By: JS | Checked By: JS

Scale 1:14,000

0 200 400

metres

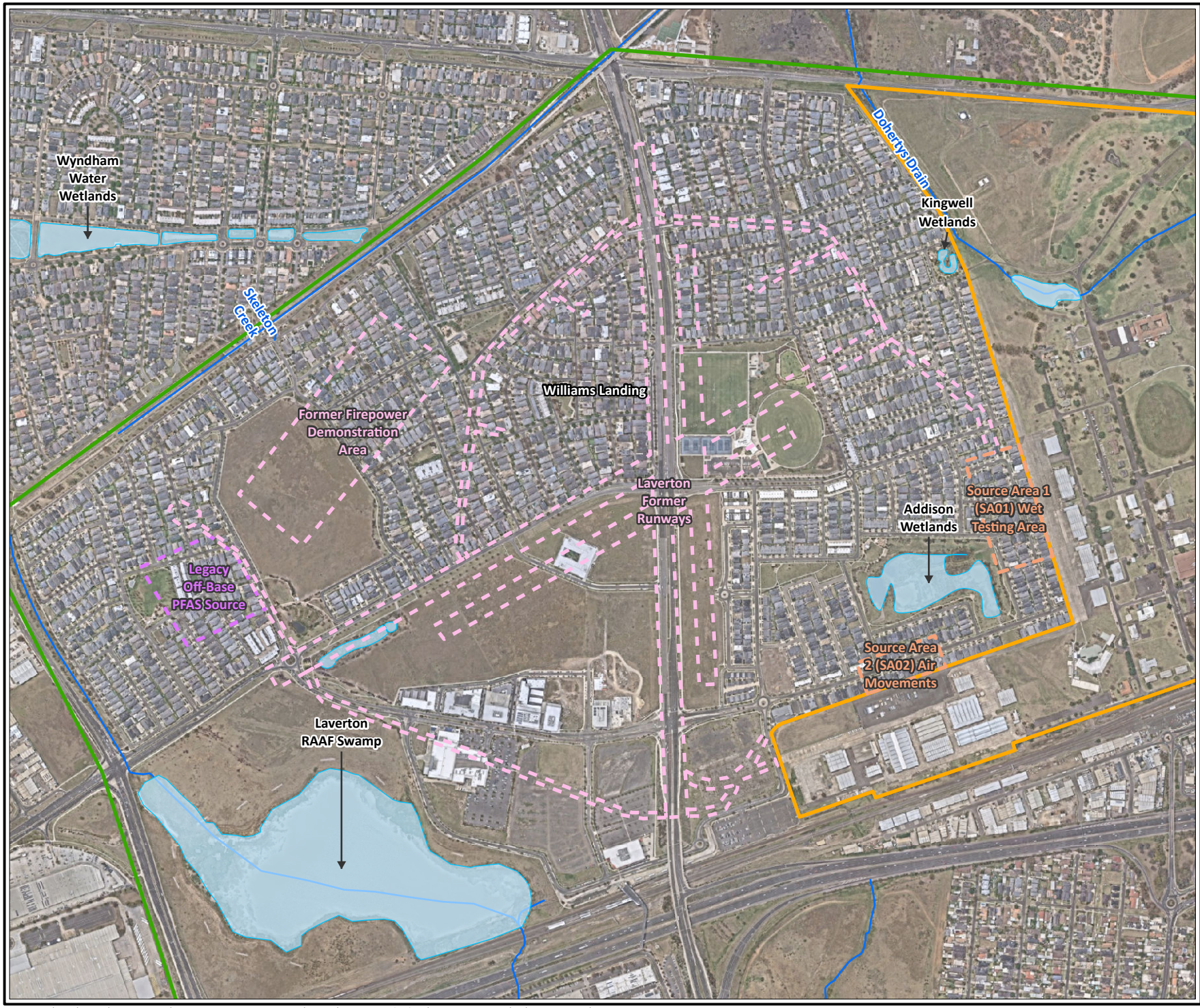
Coord. Sys. GDA2020 MGA Zone 55

RAAF Base Point Cook

POINT COOK SOURCE AREAS

FIGURE 2B

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_02b_Point Cook Source Areas
Reference: www.nearmap.com - Imagery Date: 01/12/2024



Legend

- Laverton Site Boundary
- Laverton Management Area
- Waterbodies
- Historic Off-Base Legacy PFAS Sources
- Areas where AFFF May Have Been Used Historically
- Off-Base Legacy PFAS Sources Associated with Known On-Base Sources
- Watercourse

JBS&G

Job No: 66022	
Client: Department of Defence	
Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS

Scale 1:11,000

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metres

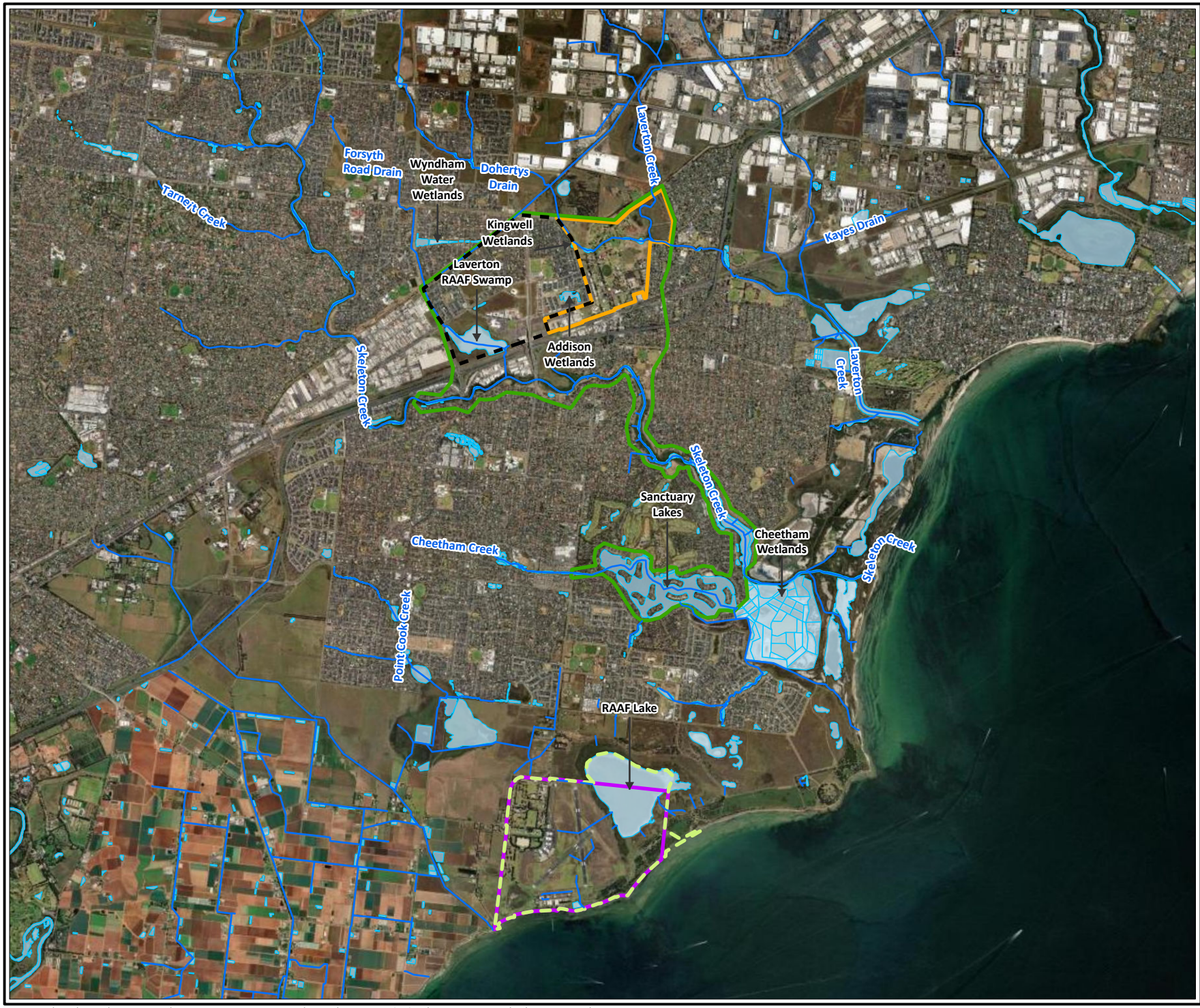
Coord. Sys. GDA2020 MGA Zone 55

RAAF Williams, Laverton

SUSPECTED OFF-BASE LEGACY PFAS SOURCES

FIGURE 2C

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_02c_Laverton Historical PFAS Sources
Reference: www.nearmap.com - Imagery Date: 01/12/2024



Legend

- Laverton Management Area
- Point Cook Management Area
- Point Cook Site Boundary
- Laverton Site Boundary
- Former Extent of RAAF Williams
- Waterbodies
- Watercourse

JBS&G

Job No: 66022

Client: Department of Defence

Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS

Scale 1:70,000

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Kilometres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Williams, Laverton and RAAF Base Point Cook

ON-BASE AND REGIONAL WATER BODIES

FIGURE 3

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_03_On-Base and Regional Water Bodies
Reference: ESRI Topographic Basemap - Accessed Imagery Accessed. Date: 23/04/2024

Legend

- Laverton Site Boundary
- Former Extent of RAAF Williams
- Laverton Source Area
- Waterbodies
- Watercourse
- Groundwater Gauging Location

Note:
* This monitoring well was found to be lost, compromised or could not be accessed during the Well Integrity Assessment completed by JBS&G in 2024.

JBS&G

Job No: 66022	
Client: Department of Defence	
Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS
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0 300 600
metres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Base Williams
Laverton, Victoria

GROUNDWATER GAUGING LOCATIONS

FIGURE 4A

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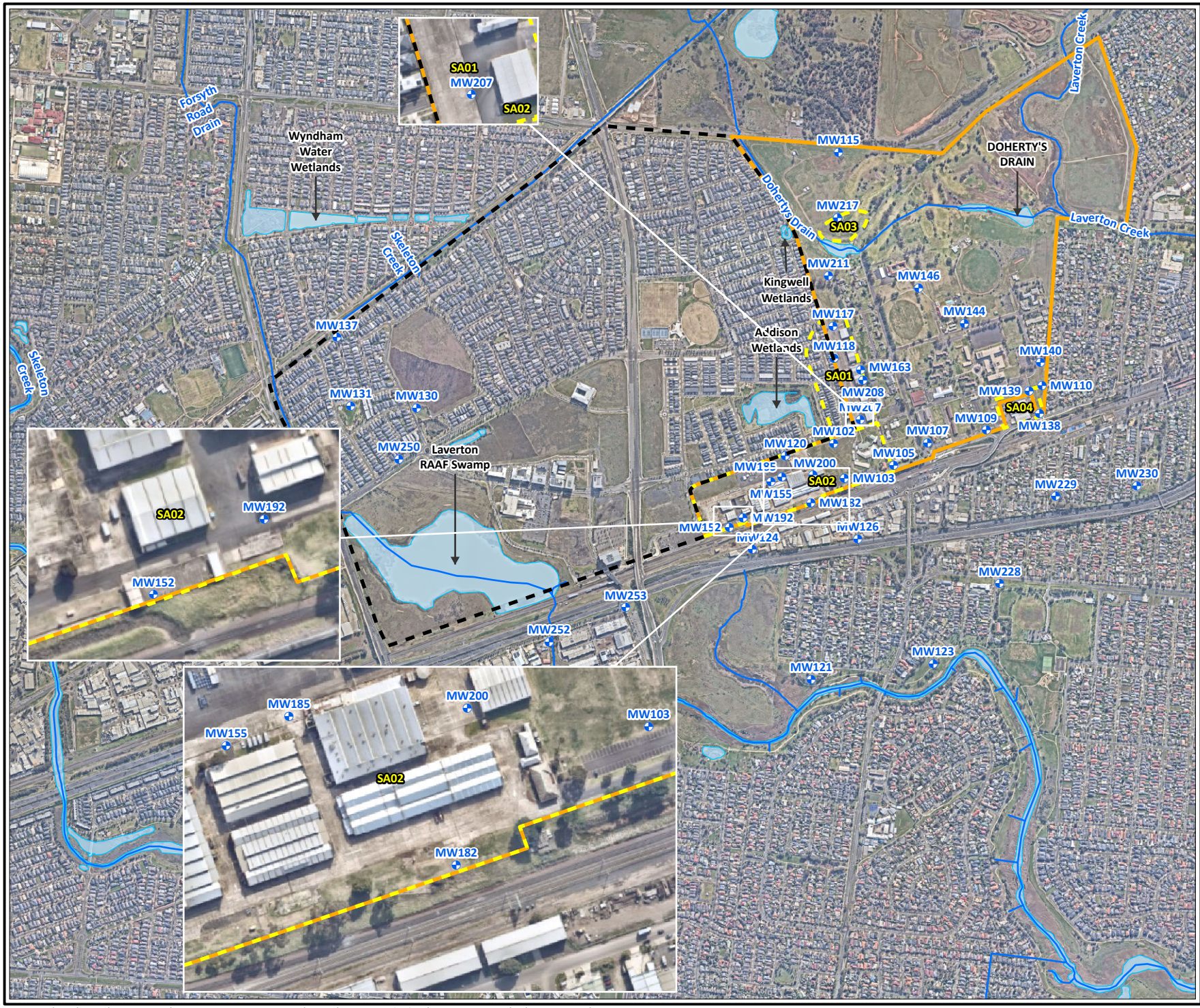
Reference: www.nearmap.com - Imagery Date: 17/03/2024



Legend

- Laverton Site Boundary
- Laverton Source Area
- Former Extent of RAAF Williams
- Waterbodies
- Watercourse
- Groundwater Sampling Location

Note:
* This monitoring well was found to be lost, compromised or could not be accessed during the Well Integrity Assessment completed by JBS&G in 2024.

JBS&G

Job No: 66022

Client: Department of Defence

Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS

Scale 1:20,126

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metres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Base Williams
Laverton, Victoria

GROUNDWATER SAMPLING LOCATIONS

FIGURE 4B

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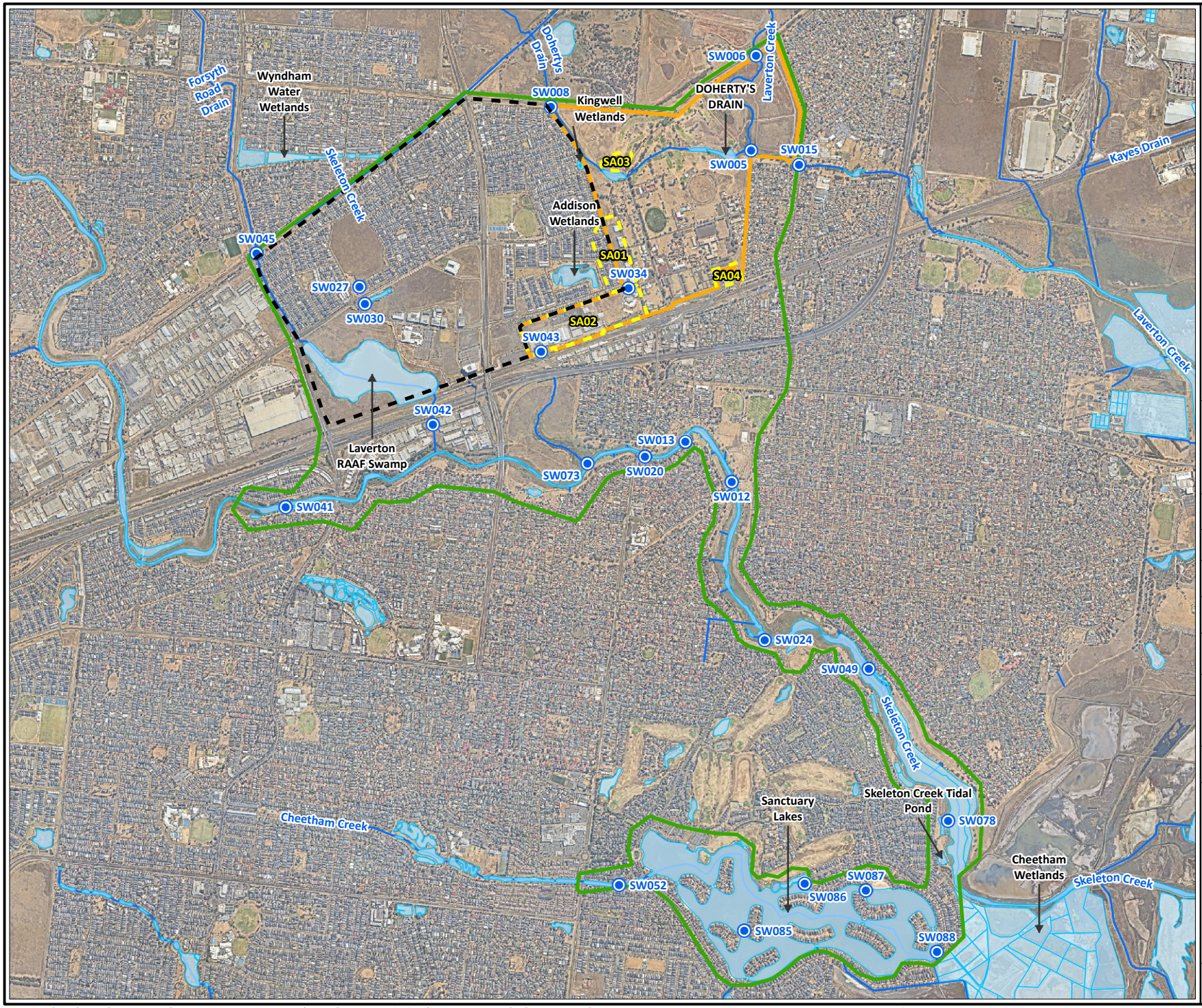

Legend

- Laverton Site Boundary
- Laverton Management Area
- Former Extent of RAAF Williams
- Laverton Source Area
- Waterbodies
- Watercourse
- Surface Water Location

JBS&G

Job No: 66022

Client: Department of Defence

Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS

Scale 1:32,000

0 500 1,000

metres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Williams, Laverton

SURFACE WATER SAMPLING LOCATIONS

FIGURE 4C

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_04c_Laverton Surface Water Sampling Locations
Reference: www.nearmap.com - Imagery Date: 17/03/2024

Legend

- Point Cook Management Area
- Point Cook Site Boundary
- Point Cook Source Area
- Waterbodies
- Watercourse
- Existing Groundwater Well
- To be Installed

Note:
* This monitoring well was found to be lost, compromised or could not be accessed during the Well Integrity Assessment completed by JBS&G in 2024.

JBS&G

Job No: 66022	
Client: Department of Defence	
Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS
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0 200 400
metres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Base Point Cook

GROUNDWATER GAUGING LOCATIONS

FIGURE 5A

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_05a_Point Cook Groundwater Gauging Locationsd
Reference: www.nearmap.com - Imagery Date: 01/12/2024

Legend

- Point Cook Management Area
- Point Cook Site Boundary
- Point Cook Source Area
- Waterbodies
- Watercourse
- Existing Groundwater Well
- To be Installed

Note:
* This monitoring well was found to be lost, compromised or could not be accessed during the Well Integrity Assessment completed by JBS&G in 2024.

JBS&G

Job No: 66022	
Client: Department of Defence	
Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS

Scale 1:12,000

0 200 400
metres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Base Point Cook

GROUNDWATER SAMPLING LOCATIONS

FIGURE 5B

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_05b_Point Cook Groundwater Sampling Locations
Reference: www.nearmap.com - Imagery Date: 01/12/2024

Legend

- Point Cook Management Area
- Point Cook Site Boundary
- Point Cook Source Area
- Waterbodies
- Watercourse
- Existing Groundwater Well
- To be Installed

Note:
* This monitoring well was found to be lost, compromised or could not be accessed during the Well Integrity Assessment completed by JBS&G in 2024.

JBS&G

Job No: 66022

Client: Department of Defence

Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS

Scale 1:4,000

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metres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Base Point Cook

GROUNDWATER SAMPLING LOCATIONS - SOURCE AREA 1

FIGURE 5C

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Reference: www.nearmap.com - Imagery Date: 01/12/2024

Legend

- Point Cook Management Area
- Point Cook Site Boundary
- Point Cook Source Area
- Waterbodies
- Stormwater Drain
- Watercourse
- Surface Water Location

JBS&G

Job No: 66022

Client: Department of Defence

Version: Rev D	Date: 24-Feb-2025
Drawn By: JS	Checked By: JS

Scale 1:11,500

0 200 400

metres

Coord. Sys. GDA2020 MGA Zone 55

RAAF Base Point Cook

SURFACE WATER SAMPLING LOCATIONS

FIGURE 5D

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Department of Defence\66022_RAAFWilliams\GIS\02_MapProjects\66022_RAAF_LavertonPointCook_OMP_RevD.aprx; Name:66022_05d_Point Cook Surface Water Sampling Locations
Reference: www.nearmap.com - Imagery Date: 01/12/2025

APPENDIX C SAMPLE LOCATION INFORMATION

Table 11. Groundwater Gauging and Sampling Locations for RAAF Williams, Laverton and PFAS Management Area

Sample ID	Gauging Only	Gauging and Sampling	Property	Easting	Northing
MW100	✓		On-Base	302155.423	5806515.508
MW101	✓		On-Base	302391.566	5806651.435
MW102		✓	On-Base	302687.375	5806734.661
MW103		✓	On-Base	302729.816	5806598.989
MW104	✓		On-Base	302867.022	5806626.674
MW105		✓	On-Base	302921.768	5806649.94
MW106	✓		On-Base	303030.838	5806668.963
MW107		✓	On-Base	303054.131	5806738.373
MW108	✓		On-Base	303192.377	5806779.714
MW109		✓	On-Base	303283.85	5806787.691
MW110		✓	On-Base	303500.832	5806961.546
MW111	✓		On-Base	303549.678	5807508.41
MW112	✓		On-Base	303813.434	5807643.459
MW113	✓		On-Base	303790.737	5808047.059
MW114	✓		On-Base	303423.215	5808108.345
MW115		✓	On-Base	302706.344	5807872.556
MW116	✓		On-Base	302540.469	5807566.226
MW117		✓	On-Base	302685.112	5807194.173
MW118		✓	On-Base	302689.619	5807069.205
MW119	✓		On-Base	302749.8	5806862.185
MW120		✓	On-Base	302498.298	5806688.116
MW121		✓	Off-Base	302599.821	5805814.084
MW123		✓	Off-Base	303075.846	5805876.087
MW124		✓	Off-Base	302369.976	5806321.504
MW125	✓		Off-Base	302572.423	5806333.826
MW126		✓	Off-Base	302781.656	5806362.895
MW127*	✓		Off-Base	301841.016	5807065.333
MW128	✓		Off-Base	301547.121	5806935.655

Sample ID	Gauging Only	Gauging and Sampling	Property	Easting	Northing
MW130		✓	Off-Base	301059.658	5806873.652
MW131		✓	Off-Base	300802.916	5806882.367
MW132	✓		Off-Base	301146.756	5807249.681
MW133	✓		Off-Base	301391.777	5807159.243
MW134	✓		Off-Base	302531.446	5807531.448
MW135	✓		Off-Base	301824.028	5807652.587
MW136	✓		Off-Base	301361.322	5807556.68
MW137		✓	Off-Base	300747.947	5807149.665
MW138		✓	On-Base	303491.26	5806852.414
MW139		✓	On-Base	303450.401	5806941.053
MW140		✓	On-Base	303495.326	5807050.816
MW144		✓	On-Base	303197.91	5807203.44
MW145	✓		On-Base	303159.77	5807344.23
MW146		✓	On-Base	303019.42	5807342.75
MW147	✓		On-Base	302303.76	5806414.11
MW152		✓	On-Base	302280.15	5806408.9
MW154	✓		On-Base	302498.9	5806568.02
MW155		✓	On-Base	302443.03	5806586.26
MW157	✓		On-Base	302451.17	5806532.54
MW159	✓		On-Base	302446.78	5806497.86
MW163		✓	On-Base	302793.48	5807022.21
MW164	✓		On-Base	302732.68	5807188.71
MW165	✓		On-Base	303466.97	5807309.33
MW168	✓		On-Base	302501.41	5806491.89
MW171	✓		On-Base	302453.5	5806452.14
MW173	✓		On-Base	302479.95	5806461.83
MW175	✓		On-Base	303486.44	5807298.83
MW176	✓		On-Base	302506.69	5806616.11
MW181	✓		On-Base	302550.25	5806523.31
MW182		✓	On-Base	302599.208	5806504.93
MW185		✓	On-Base	302485.67	5806605.94
MW186	✓		On-Base	302539.81	5806634.15

Sample ID	Gauging Only	Gauging and Sampling	Property	Easting	Northing
MW188	✓		On-Base	302550.341	5806564.5
MW190	✓		On-Base	302323.49	5806422.04
MW192		✓	On-Base	302333.74	5806445.4
MW194	✓		On-Base	302314.831	5806425.29
MW196	✓		On-Base	302353.52	5806429.82
MW197	✓		On-Base	302235.18	5806416.92
MW200		✓	On-Base	302606.708	5806611.53
MW201	✓		On-Base	302638.494	5806549.1
MW203	✓		On-Base	302521.58	5807834.65
MW206	✓		On-Base	302762.491	5806902.88
MW207		✓	On-Base	302791.102	5806828.55
MW208		✓	On-Base	302802.221	5806982.58
MW209	✓		On-Base	302854.587	5806823.05
MW211		✓	On-Base	302667.38	5807389.4
MW212	✓		On-Base	302982.97	5807571.64
MW213	✓		On-Base	302763.13	5807546.98
MW214	✓		On-Base	302712.22	5807692.43
MW215	✓		On-Base	303243.36	5807736.72
MW217		✓	On-Base	302703.17	5807616.61
MW218	✓		On-Base	303437.8	5807888.13
MW222	✓		On-Base	303668.03	5808239.88
MW225	✓		On-Base	302719.62	5806623.52
MW228		✓	On-Base	303335.69	5806188.31
MW229		✓	Off-Base	303554.24	5806529.27
MW230		✓	Off-Base	303871.55	5806570.81
MW250		✓	Off-Base	300990.14	5806674.19
MW252		✓	Off-Base	301576.701	5805961.961
MW253		✓	Off-Base	300990.14	5806674.19

[1] Off-Base monitoring locations will require the agreement of the landholder/leaseholder.
* This monitoring well was found to be lost, compromised, or could not be accessed during the Well Condition Survey completed by JBS&G in 2024.

Table 12. Surface Water Sampling Locations for RAAF Williams, Laverton and PFAS Management Area

Sample ID	Property	Latitude	Longitude
SW005	On-Base	-37.85746107	144.7670646
SW006	On-Base	-37.85218107	144.7675763
SW008	On-Base	-37.85476068	144.753019
SW012	Off-Base	-37.87597003	144.7651415
SW013	Off-Base	-37.87363827	144.7619379
SW015	Off-Base	-37.85830879	144.7704261
SW020	Off-Base	-37.87443058	144.7590605
SW024	Off-Base	-37.88484013	144.7671928
SW027	Off-Base	-37.86456207	144.7392175
SW030	Off-Base	-37.86551513	144.7395749
SW034	On-Base	-37.86499726	144.7581983
SW041	Off-Base	-37.87676425	144.7336376
SW042	Off-Base	-37.87236169	144.7441629
SW043	On-Base	-37.8684278	144.7519104
SW045	Off-Base	-37.86254936	144.7320272
SW049	Off-Base	-37.88659946	144.7744865
SW052	Off-Base	-37.89834309	144.7565044
SW073	Off-Base	-37.87474054	144.7549926
SW078	Off-Base	-37.89519008	144.7798323
SW085	Off-Base	-37.90106012	144.7652697
SW086	Off-Base	-37.89836882	144.7697066
SW087	Off-Base	-37.8988842	144.7740807
SW088	Off-Base	-37.90242747	144.7789438

Table 13. Groundwater Gauging and Sampling Locations for RAAF Base Point Cook and PFAS Management Area

Sample ID	Gauging and Sampling	Property	Easting	Northing
MW002	✓	On-Base	302068.04	5800041.86
MW003*	✓	On-Base	302084.91	5799975.35
MW004	✓	On-Base	302085.39	5799959.59
MW005	✓	On-Base	301671.16	5799586.16
MW007	✓	On-Base	302092.54	5799504.57
MW008	✓	On-Base	302128.81	5799594.87
MW010	✓	On-Base	301723.30	5799544.84
MW011	✓	On-Base	301700.61	5799517.43
MW013	✓	On-Base	301569.17	5799093.27
MW015	✓	On-Base	302132.57	5799446.76
MW016	✓	On-Base	302198.23	5799335.63
MW017	✓	On-Base	302014.8	5799265.07
MW018	✓	On-Base	302102.75	5799267.66
MW019	✓	On-Base	302136.98	5799204.87
MW020	✓	On-Base	302150.80	5798633.38
MW021	✓	On-Base	302314.55	5798663.58
MW022	✓	On-Base	302353.33	5798665.15
MW023	✓	On-Base	302375.45	5798664.21
MW024*	✓	On-Base	302397.19	5798666.85
MW025	✓	On-Base	303630.19	5799545.78
MW026	✓	On-Base	301754.76	5799385.24
MW027	✓	On-Base	301977.51	5799400.28
MW031	✓	On-Base	301484.12	5798370.52
MW032	✓	On-Base	301500.76	5798509.13
MW033	✓	On-Base	301517.18	5798639.33
MW034	✓	On-Base	302319.89	5798629.38
MW035	✓	On-Base	303031.12	5799766.62
MW038	✓	On-Base	303451.55	5799430.79
MW039	✓	On-Base	303499.6	5799511.4
MW041	✓	On-Base	303593.52	5799480.13

Sample ID	Gauging and Sampling	Property	Easting	Northing
MW042	✓	On-Base	303502.2	5799451.7
MW044	✓	On-Base	303503.1	5799450.2
MW045	✓	On-Base	303455.1	5799350.5
MW047	✓	On-Base	303376.69	5799034.31
MW049*	✓	On-Base	303014.63	5798752.7
MW051*	✓	On-Base	301996.13	5798575.45
MW054*	✓	On-Base	302299.61	5799439.99
MW057	✓	On-Base	302027.17	5799236.9
MW061*	✓	On-Base	302159.81	5799318.74
MW062	✓	On-Base	302353.33	5798665.15
MW064*	✓	On-Base	302895.78	5798878.87
MW103*	✓	On-Base	301569.17	5799093.27
MW104	✓	On-Base	302140.71	5799422.87
MW105*	✓	On-Base	301919.83	5798559.48
MW106	✓	On-Base	302326.28	5798784.83
MW107	✓	On-Base	302385.62	5798603.45
MW110	✓	On-Base	303744.87	5799681.96
MW112	✓	On-Base	301605.55	5798460.19
MW119	✓	On-Base	303656.1	5799327
MW120	✓	On-Base	303684.0	5799443.1
MW125	✓	On-Base	303710.3	5799350.9
MW129	✓	On-Base	303522.7	5799171.5
MW133	✓	On-Base	303467.4	5799252.1
MW134	✓	On-Base	303623.7	5799398.9
MW141	✓	On-Base	303612.6	5799202.1
MW142	✓	On-Base	303661.8	5799243.7
MW150*	✓	Off-Base	303737.9	5799342.1
MW154	✓	On-Base	303462.7	5799088.2
MW158	✓	On-Base	303542.1	5799281.6
MW160	✓	On-Base	303570.8	5799368.3
MW166	✓	Off-Base	303766.0	5799444.6
MW167	✓	Off-Base	303800.4	5799427.1

Sample ID	Gauging and Sampling	Property	Easting	Northing
MW168	✓	Off-Base	303786.2	5799385
MW169*	✓	Off-Base	303814.4	5799384.7
MW172	✓	On-Base	303541.4	5799193.2
MW174	✓	On-Base	303481.5	5799272.5
MW179	✓	On-Base	303469.2	5799332.3
MW180	✓	On-Base	303690.7	5799375.6
MW182	✓	On-Base	303626.3	5799392.3
MW183*	✓	On-Base	303679.9	5799450.6
MW184	✓	On-Base	303652.1	5799294.5
MW185	✓	On-Base	303620.8	5799201.6
MW197	✓	On-Base	To be installed	To be installed
MW198	✓	On-Base	To be installed	To be installed
MW199	✓	On-Base	To be installed	To be installed
MW200	✓	On-Base	To be installed	To be installed
MW201	✓	On-Base	To be installed	To be installed
MW202	✓	On-Base	301699.516	5799533.387
MW203	✓	On-Base	302100.847	5799969.288
MW204	✓	On-Base	302104.880	5799268.266
MW205	✓	On-Base	302012.786	5799256.625
MW206	✓	On-Base	302167.333	5799313.908
MW207	✓	On-Base	302252.114	5798959.776c
MW208	✓	On-Base	To be installed	To be installed
MW209	✓	On-Base	To be installed	To be installed
MW210	✓	On-Base	To be installed	To be installed
MW211	✓	On-Base	302230.041	5799430.332
MW212	✓	On -Base	302001.618	5799292.687

* This monitoring well was found to be lost, compromised, or could not be accessed during the Well Condition Survey completed by JBS&G in 2024.

Table 14. Surface Water Sampling Locations for RAAF Base Point Cook and PFAS Management Area

Sample ID	Property	Easting	Northing
SW001	On-Base	303184.861	5799559.823
SW002	On-Base	303287.988	5799579.622
SW003	On-Base	303394.018	5799654.342
SW004	On-Base	303416.099	5799687.073
SW005	On-Base	303482.35	5799755.618
SW006	On-Base	303559.35	5799801.435
SW202	On-Base	302113.5252	5798557.381
SW203	On-Base	302107.3166	5798569.065
SW205	On-Base	302686.122	5800258.68
SW206	On-Base	302766.7519	5800252.623
SW207	On-Base	303039.5084	5799861.08
SW208	On-Base	302981.7129	5799826.137
SW209	On-Base	303120.612	5799703.049
SW210	On-Base	303070.7775	5799668.237
SW212	On-Base	303155.3471	5799520.343
SW213	On-Base	302608.1707	5798649.201
SW214	On-Base	302646.1245	5798591.985
SW215	On-Base	303458.1766	5799573.691
SW216	On-Base	302111.1992	5799638.807
SW217	On-Base	302297.21	5798698.83
SW218	On-Base	Unknown	Unknown
SW219	On-Base	302313.0449	5799616.161
SW220	On-Base	302281.8609	5799389.02
SW221	On-Base	302716.188	5799288.7
SW222	On-Base	302136.0749	5799218.911
SW223	On-Base	302065.6257	5799199.34
SW224	On-Base	301882.9032	5798990.306
SW225	On-Base	302559.2392	5798990.289
SW227	On-Base	302864.7011	5800148.095
SW228	On-Base	303093.1782	5799866.615

Sample ID	Property	Easting	Northing
SW229	On-Base	303443.789	5799834.632
SW230	On-Base	303344.5287	5799671.538
SW232	On-Base	302331.8638	5798580.069
SW233	On-Base	301696.3207	5798547.413
SW234	On-Base	301716.4009	5798489.444
SW260	On-Base	Coordinates not confirmed	Coordinates not confirmed
SW263	On-Base	Coordinates not confirmed	Coordinates not confirmed
SW264	On-Base	Coordinates not confirmed	Coordinates not confirmed
SW265	On-Base	Coordinates not confirmed	Coordinates not confirmed
SW266	On-Base	Coordinates not confirmed	Coordinates not confirmed

APPENDIX D OMP REVIEW

Table 15 OMP monitoring location and frequency review RAAF Williams, Laverton

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW230	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Well location to target groundwater downgradient of SA04 – Former GEMS Compound – on-Base historic source. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of groundwater.
MW250	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Well location to replace MW129, that has not been able to be located in a number of previous OMP monitoring events. Location will provide data on both historic (now) off-Base source areas associated with the Former Primary Fire Training Area, as well as provide data on groundwater up gradient of Laverton RAAF Swamp. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of groundwater.

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW252	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Well installed in 2024. Location will provide data down gradient of Laverton RAAF Swamp.
MW253	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Well installed in 2024. Location will provide data down gradient of Laverton RAAF Swamp.

Table 16 OMP monitoring location and frequency review RAAF Base Point Cook

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW197	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Added to monitoring network to inform understanding of the shallow groundwater and PFAS migration between SA09 - RAAF Lake and SA01 – FTA. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate interaction between RAAF Lake and Port Phillip Bay (assessment of tidal influence on the dune sands.
MW198	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	
MW199	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	
MW200	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	
MW201	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Groundwater well to target shallow groundwater discharging into Port Phillip Bay from a component of SA02 - Former Fire Training Compound (FTC) / Former Fire Station / Storage Area / Solid Waste Horizon Tank. Gauging and monitoring location will inform extent of PFAS and tidal interaction/influence associated with Port Phillip Bay.
MW202	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Location targeting intermediate aquifer groundwater beneath SA03 - Fire Fighting Practice Areas (PS31).

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
						Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of intermediate aquifer.
MW203	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Location targeting intermediate aquifer groundwater beneath SA03 - Fire Fighting Practice Areas (PS30). Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of intermediate aquifer.
MW204	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	MW204 targets the intermediate aquifer within the SA04 – Fire Fighting Practice Area. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of intermediate aquifer.
MW205	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	MW205 targeting the intermediate aquifer in the footprint of the SA05 - Fuel farm. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater.

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
						Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of intermediate aquifer.
MW206	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Location targets the intermediate aquifer beneath SA06 - Old Hangers, Aircraft Parking, Refuelling & Maintenance, Paint Stripping and Waste Collection Pit, West of Building 197 – UST_01 A0506, and West of Building 184 – UST_03 Diesel Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of intermediate aquifer.
MW207	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Location targeting groundwater migrating from SA04 and SA06 to SA02 from these sources towards Port Phillip Bay. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of intermediate aquifer.
MW208	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	Added to monitoring network to inform understanding of the intermediate groundwater

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW209	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	and PFAS migration between SA09 - RAAF Lake and SA01 – FTA. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate interaction between RAAF Lake and Port Phillip Bay (assessment of tidal influence on the dune sands.
MW210	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	
MW211	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	MW211 targets the intermediate aquifer within the SA04 – Fire Fighting Practice Area. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of intermediate aquifer.
MW212	Yes	Yes	Yes	Yes	Added to OMP monitoring well network.	MW212 targeting the intermediate aquifer in the footprint of the SA05 - Fuel farm. Monitoring will inform the nature and extent of PFAS, within groundwater, in addition to the quality (field parameters) of groundwater. Gauging data will also be used to evaluate whether any significant changes have occurred in the flow direction of intermediate aquifer.

APPENDIX E PFAS ANALYTICAL SUITE

Target analytes		Laboratory LOR µg/L[1]
Perfluoroalkane sulfonic acids		
PFBS	Perfluorobutane sulfonic acid	0.02
PFPeS	Perfluoropentane sulfonic acid	0.02
PFHxS	Perfluorohexane sulfonic acid	0.01
PFHpS	Perfluoroheptane sulfonic acid	0.02
PFOS	Perfluorooctane sulfonic acid	0.01
PFDS	Perfluorodecane sulfonic acid	0.02
Perfluoroalkyl carboxylic acids		
PFBA	Perfluorobutanoic acid	0.1
PFPeA	Perfluoropentanoic acid	0.02
PFHxA	Perfluorohexanoic acid	0.02
PFHpA	Perfluoroheptanoic acid	0.02
PFOA	Perfluorooctanoic acid	0.01
PFNA	Perfluorononanoic acid	0.02
PFDA	Perfluorodecanoic acid	0.02
PFUnDA	Perfluoroundecanoic acid	0.02
PFDoDA	Perfluorododecanoic acid	0.02
PFTrDA	Perfluorotridecanoic acid	0.02
PFTeDA	Perfluorotetradecanoic acid	0.05
Perfluoroalkyl sulfonamides		
FOSA	Perfluorooctane sulfonamide	0.02
MeFOSA	N-Methyl perfluorooctane sulfonamide	0.05
EtFOSA	N-Ethyl perfluorooctane sulfonamide	0.05
MeFOSE	N-Methyl perfluorooctane sulfonamidoethanol	0.05
EtFOSE	N-Ethyl perfluorooctane sulfonamidoethanol	0.05
MeFOSAA	N-Methyl perfluorooctane sulfonamidoacetic acid	0.02
EtFOSAA	N-Ethyl perfluorooctane sulfonamidoacetic acid	0.02
(n:2) Fluorotelomer sulfonic acids		
4:2 FTS	4:2 Fluorotelomer sulfonic acid	0.05
6:2 FTS	6:2 Fluorotelomer sulfonic acid	0.05
8:2 FTS	8:2 Fluorotelomer sulfonic acid	0.05
10:2 FTS	10:2 Fluorotelomer sulfonic acid	0.05

[1] Laboratory LOR based on Eurofins trace LOR.

APPENDIX F GROUNDWATER WELL DETAILS

RAAF Williams, Laverton

Sample ID	Property	Easting	Northing	TOC (mAHD)	Screen Interval (mbgl)	Well Depth (mbTOC)	Target Aquifer	Status
MW100	On-Base	302155.423	5806515.508	12.64	4.5-10.5	10.75	Shallow	Good
MW101	On-Base	302391.566	5806651.435	12.134	6-10	9.52	Shallow	Good
MW102	On-Base	302687.375	5806734.661	10.986	9.2-10.2	10.69	Shallow	Good
MW103	On-Base	302729.816	5806598.989	10.785	4.7-6.7	6.78	Shallow	Good
MW104	On-Base	302867.022	5806626.674	9.654	4.5-6.5	6.38	Shallow	Good
MW105	On-Base	302921.768	5806649.940	10.477	3.2-6.2	7.11	Shallow	Good
MW106	On-Base	303030.838	5806668.963	10.637	3-6	6.53	Shallow	Good
MW107	On-Base	303054.131	5806738.373	11.628	4-8	8.57	Shallow	Good
MW108	On-Base	303192.377	5806779.714	10.858	4.4-7.4	8.15	Shallow	Good
MW109	On-Base	303283.850	5806787.691	11.054	4-7	7.86	Shallow	Good
MW110	On-Base	303500.832	5806961.546	11.41	4-9	9.92	Shallow	Good
MW111	On-Base	303549.678	5807508.410	11.428	4-7	7.73	Shallow	Good
MW112	On-Base	303813.434	5807643.459	9.201	6-9	8.56	Shallow	Good
MW113	On-Base	303790.737	5808047.059	13.458	7-10	10.27	Shallow	Good
MW114	On-Base	303423.215	5808108.345	11.779	5.2-8.2	9.81	Shallow	Good
MW115	On-Base	302706.344	5807872.556	21.118	9-15	15.64	Shallow	Good
MW116	On-Base	302540.469	5807566.226	14.862	6.5-12.5	12.63	Shallow	Good
MW117	On-Base	302685.112	5807194.173	14.118	4-9	9.72	Shallow	Good
MW118	On-Base	302689.619	5807069.205	13.073	5-8	7.51	Shallow	Good
MW119	On-Base	302749.800	5806862.185	12.025	6-9	9.25	Shallow	Good
MW120	On-Base	302498.298	5806688.116	11.316	4-9	8.85	Shallow	Good
MW121	Off-Base	302599.821	5805814.084	4.842	7.3-10.3	9.8	Shallow	Good
MW123	Off-Base	303075.846	5805876.087	5.97	5.5-7.5	8.495	Shallow	Good
MW124	Off-Base	302369.976	5806321.504	10.79	5-7	7.2	Shallow	Good
MW125	Off-Base	302572.423	5806333.826	11.207	6-9	10	Shallow	Good
MW126	Off-Base	302781.656	5806362.895	9.224	3.3-6.3	6.96	Shallow	Good
MW127	Off-Base	301841.016	5807065.333	14.746	6.5-9.5	9.5	Shallow	Lost
MW128	Off-Base	301547.121	5806935.655	15.031	7.1-10.1	10.1	Shallow	Good
MW130	Off-Base	301059.658	5806873.652	15.824	6.86-9.85	9.5	Shallow	Good
MW131	Off-Base	300802.916	5806882.367	17.146	7.1-10.1	9.89	Shallow	Good
MW132	Off-Base	301146.756	5807249.681	16.547	7.4-8.9	8.9	Intermediate	Good
MW133	Off-Base	301391.777	5807159.243	16.202	7-10	10	Shallow	Good
MW134	Off-Base	302531.446	5807531.448	14.49	5.5-8.5	8.5	Intermediate	Good
MW135	Off-Base	301824.028	5807652.587	16.789	4.8-7.8	7.8	Shallow	Good
MW136	Off-Base	301361.322	5807556.680	17.449	6-9	9	Shallow	Good
MW137	Off-Base	300747.947	5807149.665	18.026	7.2-10.2	10.03	Shallow	Good
MW138	On-Base	303491.260	5806852.414	10.72	5-8	8.77	Shallow	Good

RAAF Williams, Laverton

Sample ID	Property	Easting	Northing	TOC (mAHD)	Screen Interval (mbgl)	Well Depth (mbTOC)	Target Aquifer	Status
MW139	On-Base	303450.401	5806941.053	11.076	6.5-9.5	9.31	Shallow	Good
MW140	On-Base	303495.326	5807050.816	10.437	6.5-9.5	9.24	Shallow	Good
MW144	On-Base	303197.910	5807203.440	12.656	2-5	9	Shallow	Good
MW145	On-Base	303159.770	5807344.230	12.359	2-5	9	Shallow	Good
MW146	On-Base	303019.420	5807342.750	13.145	6-12	12	Shallow	Good
MW147	On-Base	302303.760	5806414.110	11.4	6-9	9.02	Shallow	Good
MW152	On-Base	302280.150	5806408.900	11.338	5-7.8	11.91	Shallow	Good
MW154	On-Base	302498.900	5806568.020	11.55	5-12	12.16	-	Good
MW155	On-Base	302443.030	5806586.260	11.646	5-8	8.1	Shallow	Good
MW157	On-Base	302451.170	5806532.540	11.621	5-8	8	Shallow	Good
MW159	On-Base	302446.780	5806497.860	11.496	3-6	6	Shallow	Good
MW163	On-Base	302793.480	5807022.210	12.87	5-11.5	11.54	-	Good
MW164	On-Base	302732.680	5807188.710	13.2	6-12	12.1	Shallow	Good
MW165	On-Base	303466.970	5807309.330	10.6	Unable to locate in camera survey	13.42	Shallow	Inaccessible within demolition area
MW168	On-Base	302501.410	5806491.890	11.446	7-8	8.33	Shallow	Good
MW171	On-Base	302453.500	5806452.140	12.422	5.5-8	8.6	Shallow	Good
MW173	On-Base	302479.950	5806461.830	12.255	5-7.9	7.9	Shallow	Good
MW175	On-Base	303486.440	5807298.830	10.6	8-12	12.46	-	Good
MW176	On-Base	302506.690	5806616.110	11.34	4.5-8	8.13	-	Good
MW181	On-Base	302550.250	5806523.310	11.171	3.5-7.4	7.9	Shallow	Good
MW182	On-Base	302599.208	5806504.930	12.036	5-7	8.01	Shallow	Good
MW185	On-Base	302485.670	5806605.940	11.338	5-8	7.75	Shallow	Good
MW186	On-Base	302539.810	5806634.150	11.018	4.2-7.1	9.93	Shallow	Good
MW188	On-Base	302550.341	5806564.500	11.223	4.2-6.8	6.71	Shallow	Good
MW190	On-Base	302323.490	5806422.040	11.51	4-10	10.11	-	Good
MW192	On-Base	302333.740	5806445.400	11.559	5-8.8	8.79	Shallow	Good
MW194	On-Base	302314.831	5806425.290	11.406	5-8.8	8.9	Shallow	Good
MW196	On-Base	302353.520	5806429.820	12.504	15.3-19	19.6	Deep	Good
MW197	On-Base	302235.180	5806416.920	11.28	6-14	14	-	Good
MW200	On-Base	302606.708	5806611.530	10.733	4-7	7	Shallow	Good
MW201	On-Base	302638.494	5806549.100	11.06	5-7	7.2	Shallow	Good
MW203	On-Base	302521.580	5807834.650	20.47	Unable to locate in camera survey	28	Intermediate	Inaccessible, within demolition area
MW206	On-Base	302762.491	5806902.880	12.542	5-9	9	Shallow	Good
MW207	On-Base	302791.102	5806828.550	11.681	4.8-7.7	7.8	Shallow	Good
MW208	On-Base	302802.221	5806982.580	12.91	5-8.8	9.3	Shallow	Good

RAAF Williams, Laverton

Sample ID	Property	Easting	Northing	TOC (mAHD)	Screen Interval (mbgl)	Well Depth (mbTOC)	Target Aquifer	Status
MW209	On-Base	302854.587	5806823.050	12.683	4-7.8	8	Shallow	Good
MW211	On-Base	302667.380	5807389.400	14.37	7-13	13.41	Intermediate	Good
MW212	On-Base	302982.970	5807571.640	12.29	5-11	11.27	Intermediate	Good
MW213	On-Base	302763.130	5807546.980	13.92	6.6-15.8	15.79	Shallow	Good
MW214	On-Base	302712.220	5807692.430	18.06	7-26	26.1	Shallow	Good
MW215	On-Base	303243.360	5807736.720	10.54	4.5-9	8.92	Shallow	Good
MW217	On-Base	302703.170	5807616.610	17.236	8-12	13.5	Shallow	Good
MW218	On-Base	303437.800	5807888.130	10.55	4-8	8.33	Shallow	Good
MW222	On-Base	303668.030	5808239.880	12.55	5.7-8.5	8.47	Shallow	Good
MW225	On-Base	302719.620	5806623.520	10.58	6-14.5	14.59	Intermediate	Good
MW228	On-Base	303335.690	5806188.310	5.71	4-7	7.5	Shallow	Good
MW229	Off-Base	303554.240	5806529.270	7.66	8.1-10.1	10.1	Shallow	Good
MW230	Off-Base	303871.550	5806570.810	8.4	4-7	7.5	Shallow	Good
MW250	Off-Base	300963.110	5806648.790	15.51	2.3-6.8	6.8	Shallow	Good
MW252	Off-Base	301576.701	5805961.961	9.96	4.6-7.6	7.6	Shallow	Good
MW253	Off-Base	300990.140	5806674.190	Not available	5.5-9.9	9.9	Shallow	Good

RAAF Base Point Cook

Sample ID	Property	Easting	Northing	TOC (mAHD)	Screen Interval (mbgl)	Well Depth (mbTOC)	Target Aquifer	Status
MW002	On-Base	302068.04	5800041.86	4.704	0.7-2.7	2.78	Shallow	Good
MW003	On-Base	302084.91	5799975.35	4.232	2.2-5.2	4.95	Shallow	Lost - possibly covered by asphalt/concrete
MW004	On-Base	302085.39	5799959.59	4.315	2.2-5.2	5.02	Shallow	Good
MW005	On-Base	301671.16	5799586.16	5.972	2.4-4.4	4.42	Shallow	Good
MW007	On-Base	302092.54	5799504.57	3.602	1.5-3.5	3.43	Shallow	Good
MW008	On-Base	302128.81	5799594.87	3.661	1.5-4.5	3.85	Shallow	Good
MW010	On-Base	301723.3	5799544.84	5.412	2.5-5.0	4.95	Shallow	Good
MW011	On-Base	301700.61	5799517.43	5.611	1.5-4.5	4.18	Shallow	Good
MW013	On-Base	301569.17	5799093.27	3.481	1.4-4.4	4.31	Shallow	Good
MW015	On-Base	302132.57	5799446.76	3.425	1.5-4.0	4.02	Shallow	Good
MW016	On-Base	302198.23	5799335.63	3.292	2.0-5.0	4.49	Shallow	Good
MW017	On-Base	302014.8	5799265.07	3.719	1.5-4.0	4.01	Shallow	Good
MW018	On-Base	302102.75	5799267.66	3.31	1.5-4.0	3.9	Shallow	Good
MW019	On-Base	302136.98	5799204.87	3.091	1.5-4.5	4.46	Shallow	Good
MW020	On-Base	302150.8	5798633.38	2.178	1.3-2.6	3.6	Shallow	Good
MW021	On-Base	302314.55	5798663.58	2.566	1.4-4.2	4.02	Shallow	Good
MW022	On-Base	302353.33	5798665.15	2.361	3.6-5.6	5.53	Shallow	Good
MW023	On-Base	302375.45	5798664.21	2.465	2.4-5.15	5.1	Shallow	Good
MW024	On-Base	302397.19	5798666.85	2.289	2.4-4.25	4.15	Shallow	Lost
MW025	On-Base	303630.19	5799545.78	2.751	1.45-4.45	4.95	Shallow	Good
MW026	On-Base	301754.76	5799385.24	5.973	2.6-6.3	7.31	Shallow	Good
MW027	On-Base	301977.51	5799400.28	4.55	1.0-5.0	5.85	Shallow	Good
MW031	On-Base	301484.12	5798370.52	2.036	0.7-2.0	2.64	Shallow	Good
MW032	On-Base	301500.76	5798509.13	3.404	0.5-3.1	3.62	Shallow	Good
MW033	On-Base	301517.18	5798639.33	3.035	1.1-5.6	6.34	Shallow	Good
MW034	On-Base	302319.89	5798629.38	3.507	0.9-3.9	4.57	Shallow	Good
MW035	On-Base	303031.12	5799766.62	3.415	0.8-3.8	3.81	Shallow	Good
MW038	On-Base	303451.55	5799430.79	1.59	1.2-3.6	3.69	Shallow	Good
MW039	On-Base	303499.6	5799511.4	2.193	1.9-4.6	4.58	Shallow	Good
MW041	On-Base	303593.52	5799480.13	2.355	0.75-7.5	6.86	Shallow	Good
MW042	On-Base	303502.2	5799451.7	2.901	-	5.02	Shallow	Good
MW044	On-Base	303503.1	5799450.2	2.888	7-9	9.94	Intermediate	Good
MW045	On-Base	303455.1	5799350.5	2.466	1-6	2.34	Shallow	Good
MW047	On-Base	303376.69	5799034.31	2.415	2-3	3.04	Shallow	Good
MW049	On-Base	303014.63	5798752.7	1.666	Unknown	2.45	Shallow	Lost

RAAF Base Point Cook

Sample ID	Property	Easting	Northing	TOC (mAHD)	Screen Interval (mbgl)	Well Depth (mbTOC)	Target Aquifer	Status
MW051	On-Base	301996.13	5798575.45	1.102	Unable to locate in camera survey	2.45	Shallow	Lost
MW054	On-Base	302299.61	5799439.99	2.815	Unable to locate in camera survey	3.35	Shallow	Lost
MW057	On-Base	302027.17	5799236.9	3.439	2.5-5.8	5.83	Shallow	Good
MW061	On-Base	302159.81	5799318.74	3.376	Unable to locate in camera survey	2.84	Shallow	Covered by electrical kiosk
MW062	On-Base	302353.33	5798665.15	2.361	3.6-5.6	5.53	Shallow	Good
MW064	On-Base	302895.78	5798878.87	2.586	Blocked	4.2	Shallow	Blocked
MW103	On-Base	301569.17	5799093.27	3.481	1.4-4.4	4.2	Shallow	Lost
MW104	On-Base	302140.71	5799422.87	3.477	1.9-4.9	4.83	Shallow	Good
MW105	On-Base	301919.83	5798559.48	2.327	0.6-1.8	2.799	Shallow	Not located due to tall grass
MW106	On-Base	302326.28	5798784.83	2.272	1.5-3.0	2.98	Shallow	Good
MW107	On-Base	302385.62	5798603.45	2.974	2.0-4.0	5.029	Shallow	Good
MW110	On-Base	303744.87	5799681.96	2.312	0.5-2.0	3.52	Shallow	Good
MW112	On-Base	301605.55	5798460.19	2.578	2.5-4.5	5.49	Intermediate	Good
MW119	On-Base	303656.1	5799327	2.09	0.5-4	4.65	Shallow	Good
MW120	On-Base	303684	5799443.1	2.402	1-4.5	5.4	Shallow	Good
MW125	On-Base	303710.3	5799350.9	2.353	0.7-3.7	4.5	Shallow	Good
MW129	On-Base	303522.7	5799171.5	2.725	0.4-3.4	4.41	Shallow	Good
MW133	On-Base	303467.4	5799252.1	2.97	1.5-4.5	3.55	Shallow	Good
MW134	On-Base	303623.7	5799398.9	2.353	0.75-3	3.865	Shallow	Good
MW141	On-Base	303612.6	5799202.1	2.6	0.7-3.1	3.64	Shallow	Good
MW142	On-Base	303661.8	5799243.7	2.851	0.7-3	3.56	Shallow	Good
MW150	Off-Base	303737.9	5799342.1	2.986	Unable to locate in camera survey	4.14	Shallow	Not accessible (in Port Phillip Bay)
MW154	On-Base	303462.7	5799088.2	2.24	1.0-3.0	2.91	Shallow	Good
MW158	On-Base	303542.1	5799281.6	2.034	1.5-3.8	3.88	Shallow	Good
MW160	On-Base	303570.8	5799368.3	2.503	1.6-3.3	3.32	Shallow	Good
MW166	Off-Base	303766	5799444.6	2.726	1.6-3.7	3.67	Shallow	Good
MW167	Off-Base	303800.4	5799427.1	2.018	1.5-3.8	3.83	Shallow	Good
MW168	Off-Base	303786.2	5799385	2.408	1.6-3.7	3.67	Shallow	Good
MW169	Off-Base	303814.4	5799384.7	2.429	Unable to locate in camera survey	3.81	Shallow	Eroded, located in water
MW172	On-Base	303541.4	5799193.2	2.271	5.5-8	8.41	Intermediate	Good
MW174	On-Base	303481.5	5799272.5	2.626	3.5-9	8.2	Intermediate	Good
MW179	On-Base	303469.2	5799332.3	2.809	5.7-8.3	8.32	Intermediate	Good

RAAF Base Point Cook

Sample ID	Property	Easting	Northing	TOC (mAHD)	Screen Interval (mbgl)	Well Depth (mbTOC)	Target Aquifer	Status
MW180	On-Base	303690.7	5799375.6	2.342	4-6.8	6.77	Intermediate	Good
MW182	On-Base	303626.3	5799392.3	2.603	2-4.2	9.87	Intermediate	Good
MW183	On-Base	303679.9	5799450.6	1.762	21.6-23	9.04	Intermediate	Lost due to dense vegetation
MW184	On-Base	303652.1	5799294.5	1.602	7-9.9	9.86	Intermediate	Good
MW185	On-Base	303620.8	5799201.6	2.412	1.4-3.8	6.784	Intermediate	Good
MW197	On-Base	To be installed, to be co-located with MW208						
MW198	On-Base	To be installed, to be co-located with MW209						
MW199	On-Base	To be installed, to be co-located with MW210						
MW200	On-Base	To be installed						
MW201	On-Base	To be installed						
MW202	On-Base	301699.516	5799533.387	5.81	3-6	6	Shallow	Good
MW203	On-Base	302100.847	5799969.288	4.374	4-7	7	Shallow	Good
MW204	On-Base	302104.88	5799268.266	7.405	5-8	8	Shallow	Good
MW205	On-Base	302012.786	5799256.625	7.642	7-10	10	Shallow	Good
MW206	On-Base	302167.333	5799313.908	7.382	7-10	10	Shallow	Good
MW207	On-Base	302252.114	5798959.776	2.613	5.5-8.5	8.5	Shallow	Good
MW208	On-Base	To be installed, to be co-located with MW197						
MW209	On-Base	To be installed, to be co-located with MW198						
MW210	On-Base	To be installed, to be co-located with MW199						
MW211	On-Base	302230.041	5799430.332	3.241	10.5-13.5	13.5	Shallow	Good
MW212	On-Base	302001.618	5799292.687	7.83	6.3-9.3	9.3	Shallow	Good