

BAESA - F35 MRO&U Facilities

Environment - Desktop Contamination Assessment

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Commercial-in-Confidence

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Environment - Desktop Contamination Assessment

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1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been engaged by Design Inc to undertake desktop contamination assessment of potential constraints associated with the proposed design options (options B1, B2 and C2) for the Phase 2A masterplan and 2B concept design input for the land within the current BAE footprint (here in referred to as the Site) and Lot 201 at RAAF Base Williamtown (here in referred to as the Base). The location of the Site and Lot 201 are shown on **Figure 1 (Appendix A)** and the Site layout and surrounding land use features are shown in **Figure 2 (Appendix A)**. AECOM understands the proposed design incorporates the following key elements:

- Aircraft bays
- Paint bays
- Verification bays
- Scuff and refresh capability
- Storage IM&T requirements
- Support equipment (SE)
- Office space
- Taxiways
- Engine run up areas
- Sovereign and partner air vehicles.

2.0 Objectives

The objectives of the desktop contamination assessment are as follows:

- To outline the existing contamination issues from previous investigations associated with Site and Lot 201 from surrounding land uses to inform concept design
- Provide recommendations for further work and/or management (if required).

3.0 Scope of Work

The desktop contamination assessment included the following scope of work:

- Review of background information including concept design documentation, technical reports (preliminary hazard analysis, geotechnical and contamination assessment), other background reports and relevant sections of the Newcastle Airport Master Plan 2036.
- Summarise key environmental conditions that may impact on concept design including topography, geology, hydrogeology and hydrology.
- Summarise the surrounding land uses and potential and known contamination (from previous investigations).
- Provide a desktop contamination assessment report (this report) summarising the findings to inform concept design and provide recommendations to address data gaps (where required).

It is noted at the time of writing, the previous environmental assessment report (reportedly prepared in 2016) for this project was not provided for review and consideration in this assessment.

4.0 Review of Background Information

4.1 Preliminary Design Documentation

The preliminary design documentation has been prepared in two work elements and these are summarised below:

- Schedule 1 – South Hangar Adaptive Reuse: Four new F-35 General Maintenance Bays to be located in the existing hangar, hangar floor fit-out, supporting facilities and site services amplification.
- Schedule 2 – North Hangar Adaptive Reuse and Extension: Extension of the existing facility to provide seven F-35 General Maintenance Bays. This work element includes Enabling Works to be delivered on the adjacent Newcastle Airport Astra Aerolab subdivision.

This desktop contamination assessment has taken into consideration the land within the current BAE footprint (the Site) and Lot 201.

4.2 Newcastle Airport Master Plan 2036

Review of the Newcastle Airport Master Plan 2036² indicated that:

- The Australian and NSW governments are seeking to grow the defence and aerospace-related industries in and around RAAF Base Williamtown.
- Various developments are proposed, within the NAPL leasehold boundary, in the vicinity of the BAE footprint including a taxiway upgrade, commercial area and car parking.

4.3 Management Area

In 2017, the NSW Government released the NSW EPA Williamtown Management Area and issued a series of institutional controls by way of advisory notices for residents to minimise exposure to per- and poly-fluoroalkyl substances (PFAS) originating from the Base. Lot 201 is located within the Primary Management Zone, NSW EPA advised that this zone has significantly higher levels of PFAS detected and therefore, the strongest advice applies, including groundwater, bore water and surface water should not be used for any purpose, and do not do anything with groundwater, bore water or surface water (including in creeks and drains) that might lead to incidental ingestion (swallowing).

4.4 Previous Environmental Investigations

Previous environmental investigations targeting the assessment of PFAS contamination at the Base and surrounding areas. As part of this desktop contamination assessment, the following key information sources and associated information were reviewed and considered relevant to inform concept design:

- *Stage 2B Environmental Investigation Report. RAAF Base Williamtown, Williamtown NSW.* June 2016 (AECOM, 2016).
- *Environmental Site Assessment – December 2017 – RAAF Base Williamtown Stage 2B Environmental Investigation.* December 2017 (AECOM, 2017).
- PFAS Management Area Plan (PMAP) – RAAF Base Williamtown (Defence, 2019).
- RAAF Base Williamtown (0908), Stage 2 Detailed Site Investigation (AECOM, 2020a).
- *Monitoring Report – September 2020. Southern Area Groundwater Project, RAAF Base Williamtown.* 20 November 2020 (AECOM, 2020b).

These reports are summarised in **Section 7.0**.

² Newcastle Airport Pty Ltd, 2036 Newcastle Airport Vision

5.0 Surrounding Land Uses

The key surrounding land uses are summarised as follows:

- North: Newcastle Airport and Lake Cochran.
- East: an existing detention pond, short term car parking and the sewage treatment plant (STP).
- South: vegetated land and the STP effluent ponds. Private residential properties are located further south.
- West: vegetated land including Lot 201.

5.1 Sensitive Environmental Receptors

The sensitive environmental receptors identified in proximity to the Site include:

- Tilligerry State Conservation Area, located to the west, north and east of the Site.
- Tilligerry National Park (northern banks of Tilligerry Creek).
- Kooragang Nature Reserve, which includes Fullerton Cove, the northern channel of the Hunter River, Kooragang Island (with the exception of the western extent and industrial area), most fringing mangroves and islands and some former farmlands which have been developed on reclaimed land north of the Hunter River near Tomago (NSW National Parks and Wildlife Service, 1998).
- Hunter Wetlands National Park.
- Groundwater dependent ecosystems (GDEs). A search of the Bureau of Meteorology Groundwater Dependent Atlas indicated there are high potential GDEs located in the vicinity of the Site.

6.0 Key Environmental Conditions

6.1 Topography

This Site is located in a low-lying-areas associated with the Lower Hunter River. The region is characterised by low sand dunes, sand sheets and estuarine mud flats. The topography in the vicinity of the Site is relatively flat at approximately 4-5 m AHD.

6.2 Geology

Based on previous investigations, the subsurface conditions across the Base comprised Tomago sand beds with a minimum thickness of 20 m consisting of poorly graded, fine to medium grained quartzose sand. The logged conditions recorded in the vicinity of the Site, were fine to medium grained sand.

6.3 Hydrogeology

The Site is located on highly permeable sandy soils with a shallow aquifer flowing south-southwest. The shallow groundwater table rises rapidly with rainfall and rises to intersect with surface water in drainage channels.

6.4 Surface Water Drainage

The surface water drainage network at the Base consists of a combination of open, unlined drains, underground pipes, pits, culverts and detention storage. Surface water run-off in the south-western corner of the Base is directed to Lake Cochran before discharging into Dawsons Drain.

7.0 Summary of Previous Investigations

7.1 Environmental Investigation Report (AECOM, 2016)

The Stage 2B Environmental Investigation outlines the assessment of PFAS contamination in soil, sediment, surface water and groundwater associated with the Base and surrounding areas. Aqueous Film Forming Foam (AFFF), containing PFAS was used at the Base for fire training and emergency response from around 1970s. Seven key PFAS source areas were identified, with the following two being in the vicinity of the Site:

- Lake Cochran: located approximately 40 metres to the north-west of the Site. Lake Cochran receives surface water run-off from across the Base which has been reported to contain PFAS dissolved in surface water. Surface water runoff from Lake Cochran discharges to Dawson Drain.
- The Sewage Treatment Plan (STP) (Facility 410): located 150 metres to the east of the Site. The STP treats wastewater, containing dissolved PFAS, generated at the Base.

In addition to the above PFAS sources, the Former and Current Fire Stations (Facility 165) located approximately 1 km to the north of the Site is also a potential source of PFAS contamination, given the groundwater flows in a southerly direction.

The key findings of the nature and extent of contamination were:

- PFAS has accumulated in the soil profile or soaks into pavements in areas where AFFF was historically used. Rainwater leaching carries the highly soluble chemical to the groundwater table and surface water run-off dissolves PFAS and carries it to surface water drains.
- A PFAS groundwater plume exists below the Base and the surrounding areas within the Tomago Sand Beds Aquifer. The dominant groundwater flow direction is south and south-east. The groundwater plume extends below the Site.
- All major surface water drains at Base contain PFAS in surface water and sediments. Surface water run-off from the south-western portion of the Base, in the vicinity of the Site, discharges through Dawsons Drain.
- While AFFF containing high concentrations of PFAS is no longer used at the Base, residual PFAS contamination in soil, sediment in drains and lakes, and from pavements is likely to continue leaching to surface and groundwater for the immediate future.
- Fill material, of varying composition, was encountered across the Base during vertical boring. The average fill thickness was approximately 0.4 metres.
- While the primary focus of this environment investigation was PFAS contamination, selected monitoring wells along the southern Base boundary were sampled for other contaminants including hydrocarbon compounds, volatile organic compounds and pesticides. One monitoring well (MW175D), located near Lot 201 reported phenolic compounds (at a concentrations of 43.7 µg/L). This single detection suggested groundwater impacts were of limited extent.

7.2 Environmental Site Assessment – December 2017 (AECOM, 2017)

The 2017 Stage 2 ESA was undertaken to address data gaps identified at the completion of the 2016 investigation (AECOM, 2016). The 2017 Stage 2 ESA included additional sampling of soil, sediment, surface water, groundwater and marine water biota at Base and surrounding areas. The following additional information gathered is relevant to the Site:

- PFAS impacted groundwater extend from the Base boundary to approximately 250 m south of Cabbage Tree Road. Sampling in the vicinity of the Site indicated PFOS concentrations were in the range of 0.07 – 50 µg/L which is above the adopted assessment criteria for human health. The area of Lot 201 is within the Southern Area, which comprises high concentrations of PFAS (namely PFOS + PFHxS > 50 µg/L).
- The testing of non-PFAS contaminants including hydrocarbon compounds, volatile organic compounds and pesticides indicated that no significant impacts in groundwater were reported (at the locations tested).

7.3 PFAS Management Area Plan (PMAP) – RAAF Base Williamtown (Defence, 2019)

The PMAP outlines the plan to manage the elevated risks of PFAS contamination at and around Base. The response actions relevant to the PFAS contamination in the vicinity of the Site are outlined below:

- Lake Cochran (identified as PFAS Source #3 in the PMAP): The PMAP recommended to continue operation of water treatment plant while other remedial management options are assessed. It is noted that a passive barrier remediation system was commissioned in August 2020 to replace the water treatment plan which was operating since 2017. The passive system intercepts surface water entering and discharging from Lake Cochran. Concentrations in groundwater and surface water are being assessed through a targeting monitoring program and a regional PFAS ongoing monitoring program.
- STP (identified as PFAS Source #6 in the PMAP): PMAP required a review of the outcomes of the works currently being undertaken to manage PFAS in wastewater generated from the Base. The works involve an STP inflow study to assess whether works can reduce PFAS inflow. Further assessment and remediation of the effluent lagoon sediments are also being considered.
- The Southern Area PFAS Plume (identified as PFAS Source #8 in the PMAP): The PMAP reported that the overall goal is to reduce PFAS flux that has already migrated off-Base. A water treatment plant to treat groundwater immediately south of Lake Cochran was commissioned in late 2019. Performance monitoring indicated that concentrations of PFAS compounds in groundwater continued the trend of gradually decreasing. The depth to groundwater in the wells monitored ranged from 0.499 to 1.751 metres below top of well casing. Additional groundwater extraction well network planned further south on private land.

7.4 RAAF Base Williamtown (0908), Stage 2 Detailed Site Investigation (AECOM, 2020a)

The Stage 2 Detailed Site Investigation was undertaken to further update and refine the risk profile for existing contaminated records at the Base. A total of 61 targeted contaminated site records were investigated, with the following three being in the vicinity of the Site:

- Domestic Airport – Former bulk fuel storage (identified as CSR_NSW_000672): located adjacent to the northern Site boundary. Review of previous reports indicated the four former above ground storage tanks that stored waste oil and aviation gasoline have been decommissioned. AECOM (2020a) noted that although information provided to date indicates that the four ASTs have been removed, however no remediation and validation reports have been reviewed to confirm this. Therefore, exposure pathways included dermal contact and incidental ingestion of soil by commercial workers and intrusive maintenance workers, and inhalation of soil and groundwater vapours within a trench (less than 1.5 m bgl) by intrusive maintenance workers.
- Former Caltex Bulk Fuel Storage – Avgas (identified as CSR_NSW_000854): located adjacent to the eastern Site boundary. Review of previous reports indicated the two former aviation gasoline underground storage tanks have decommissioned, removed and validated.

- Former BP Airport Bulk Fuel Storage (identified as CSR_NSW_000859): located 150 to the north-east of the Site boundary. Review of previous reports indicated the three former aviation gasoline underground storage tanks have been decommissioned, removed and validated.

No intrusive works or sampling were conducted in these areas as part of the AECOM (2020a) investigation.

8.0 Discussion

Based on the review of background information and key previous investigations to date, the following contamination issues have been identified:

- Multiple PFAS sources have been identified and investigated at the Base, which are located hydraulically upgradient and cross-gradient of the Site. The PFAS sources are contributing to a groundwater plume which extends from the Base to the south, in the area of the Site, with the high PFAS concentrations (known as Southern Area Plume) encompasses Lot 201.
- The groundwater in the vicinity of the Site is relatively shallow, most recently measured in September 2020 to be 0.5 metres below the top of the well casing. Due to the shallow nature of the groundwater and the highly permeable sandy soils, it is known that there is interaction between surface water and groundwater with PFAS migrating between these media.
- In addition to PFAS, an isolated detection of phenolic compounds in groundwater have been identified up gradient of the Site.
- Bulk fuel storage has occurred to the north and east of the Site.
- Fill material of unknown origin is likely to be present across the Site, used for levelling purposes.

9.0 Conclusions and Recommendations

Based on the desktop contamination assessment completed by AECOM, the following conclusions are provided to inform the concept design:

- The available groundwater and surface water data is considered to be adequate to inform the concept design. It is noted that limited soil data is available for the Site and Lot 201.
- The design should limit the generation of excess soil. However, an in-situ assessment of contamination in areas of proposed excess spoil can be conducted prior to construction activities commencing to better inform cost constraints and soil management requirements to support more advanced design options.
- Any spoil generated on the existing BAE Site (Commonwealth Land) should consider the Defence PFAS Management Framework³. Any spoil generated on Lot 201 will need to be managed in accordance with NSW Waste regulations.
- Any groundwater or surface water encountered throughout the construction process should be treated as contaminated. If dewatering is required, water will need to be tested for contaminants of concern and appropriately managed. The existing on Base Water Treatment Plants currently established to treat PFAS impacted surface water and groundwater could be considered for the management of such waters during construction (subject to Defence agreement).
- In order to manage potential human health impacts associated with on-site workers coming into contact with PFAS impacted water, the stormwater design will need to consider limiting the pooling of surface water in the vicinity of the construction footprint.
- Prior to any construction or earth moving, a Construction Environmental Management Plan for the management of soil and water is recommended.

³ Department of Defence. Defence PFAS Construction and Maintenance Framework, July 2019.

Appendix A

Figures



0 100 200 300 m

BAE SYSTEMS AUSTRALIA WILLIAMTOWN FIGURE 1 - SITE LOCATION



BAE - F35 MRO&U - Master Plan and CDR - Environment - Desktop Contamination Assessment

Legend

- Existing site boundary
- Waterbody

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0 50 100 150 m

**BAE SYSTEMS AUSTRALIA
WILLIAMTOWN
FIGURE 2 - SITE LAYOUT**

**BAE - F35 MRO&U -
Master Plan and CDR -
Environment - Desktop
Contamination Assessment**

Legend

-  Site boundary
-  Lot 201
-  Waterbody
-  Cadastre boundary

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