Appendix E

SAQPs

Sampling and Analysis Quality Plan – August 2025 Event

HMAS Albatross PFAS Ongoing Monitoring Program

Department of Defence

13 August 2025

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1. Introduction

Department of Defence (Defence) engaged GHD Pty Ltd (GHD) to prepare this Sampling and Analysis Quality Plan (SAQP) to support the per- and poly-fluoroalkyl substance (PFAS) Ongoing Monitoring Plan (OMP) (Defence, 2019a) at His Majesty's Australian Ship (HMAS) Albatross (the 'site') and the broader Management Area in New South Wales (NSW) and the Jervis Bay Territory Region. The Management Area is defined in the PFAS Management Area Plan (PMAP) (Defence, 2019b) and includes the site and discrete residential properties in off-site areas where surface water, groundwater and soil were found to contain PFAS, within the Braidwood Road drain sub-catchment, Nowra Creek sub-catchment, Upper Currambene Creek sub-catchment and Cabbage Tree Creek sub-catchment. The site and broader Management Area are presented on Figure 1, Appendix A.

The purpose of the OMP is to set out requirements for the collection of adequate data to identify and evaluate:

– Spatial, and temporal (including seasonal) variability of PFAS in the environment.
– Changes to sources, transport pathways and/or receptors, described as a conceptual site model (CSM) for the site and the Management Area.
– Whether risks to human and ecological receptors require review.
– The influence that risk management activities at the site, as outlined in the PMAP have had on PFAS in the environment.
– 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.

The purpose of this SAQP is to document the procedures that will be used to obtain data of sufficient quality to meet the objectives of the OMP and to facilitate the ongoing monitoring program.

1.1 Objectives

The key objectives of this SAQP are to:

– Define the proposed scope of work.
– Outline the proposed sampling methodology to be adopted.
– Outline the proposed quality assurance and quality control (QA/QC) measures to be adopted.
– Define the data collection and management requirements for this program.

1.2 Scope of works

The following scope of works are proposed as per the OMP (Defence, 2019a):

– Monitor the nature and extent (spatial and temporal) of PFAS impact in surface water pathways associated with site sources of PFAS derived from the historical use of aqueous film forming foam (AFFF).
– Monitor the migration of PFAS in surface water from the site using data obtained from this SAQP monitoring program and historical data.
– Provide confirmation of the current understanding of risk.
– Provide supporting data for assessment of management actions, where relevant.

Additional sampling locations have been included in this SAQP, in addition to those detailed in the OMP. These are detailed with rationale in Section 4.1.

1.3 Guidelines and legislation

This SAQP has been developed with reference to the following guidelines and legislation:

– Australian and New Zealand Guidelines (ANZG) (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

- Department of Defence (2018, amended 2021). *Contamination Management Manual – Annex L Data Management*.
- Department of Defence (2018, amended 2021). *Contamination Management Manual – Annex K Management of PFAS Contamination*.
- Department of Defence (2025). *PFAS Ongoing Monitoring Plan, Template (dated 16 May 2025) Appendix E PFAS Analytical Suite*.
- Department of Health (DoH) (2017). *Health Based Guidelines Values for PFAS for use in site investigation in Australia*.
- Heads of Environmental Protection Authorities (HEPA) (2025). *PFAS National Environmental Management Plan (NEMP), Version 3.0*.
- National Environment Protection Council (NEPC) (1999, amended 2013). *National Environment Protection (Assessment of Site Contamination) Amendment Measure* (NEPM) *(No. 1)*.
- National Health and Medical Research Council (NHMRC) (2019). *Guidance on PFAS in Recreational Water*.
- Standards Australia (1998). *AS/NZ 5667:1998 Water Quality – Sampling*.

1.4 Limitations

This report has been prepared by GHD for Department of Defence and may only be used and relied on by Department of Defence for the purpose agreed between GHD and Department of Defence as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Department of Defence arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Department of Defence and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Site and environmental setting

2.1 Site details

A summary of the site identification details is provided in Table 1 and the site locality is shown on Figure 1, Appendix A.

Table 1 Site identification summary

Information	Details
Street Address	HMAS Albatross (0026), Parma NSW 2540.
Coordinates (approximate site centre)	34°56'56"S and 150°32'13"E.
Site Area	Approximately 900 hectares (ha).
Military Area (Property ID)	0026
Local Government Area	Shoalhaven
Traditional custodians	Jerrinja and Wandi-Wandandian tribe of the Yuin nation.
Current Land Use	Department of Defence airfield with hangars / workshops and associated infrastructure including offices, training facilities, fire station and sewage treatment plant (STP).
Surrounding land use	Land uses surrounding the site include the following: – North: The land to the north of the site is a mix of agricultural and residential properties. The site is bound by Braidwood Road, which has a drainage channel located parallel. Bamarang Reservoir is located approximately 3.5 km north west of the site. The water from the reservoir is understood to be sourced from the Shoalhaven River approximately 10 to 11 km upstream from Calymea Creek. Cabbage Tree Creek is located to the north of the site, approximately 150m from the site boundary. – Northeast: Nowra Hill Public School, further to the northeast is Nowra Creek, located approximately 2.5 km from the site boundary. – East: The topography falls to the east of the site through agricultural land. The upper tributaries of and Currambene Creek is located in this area. – South: Parma Christmas Tree Farm and other agricultural land are located to the south, traversed by the upper tributaries of the Yerriyong Gully. – West: Albatross Aviation Technology Park and further west is Nowra Motorcross complex with a clearing along Braidwood Road and race track. Calymea State Conservation Area is mostly located to the west and is a heavily vegetated forest.

2.2 Environmental setting

Table 2 provides a summary of the site's environmental setting.

Table 2 Environmental setting summary

Item	Description
Climate	The climate of the HMAS Albatross region (NSW South Coast) is considered warm, mild, and temperate. Temperatures average a high of 27 °C in the summertime, with a low of 15 °C. Winter highs centre around 17 °C, while lows drop to 7 °C. Most rainfall is sporadic but tends to arrive in late summer and early autumn. Heavy rainfall can occur if a strong anticyclone is found to the south. Combined with the basin-like topography, surface water retention and flooding on the site can be significant and the runways can be flooded and put out of operation.
Topography and site drainage	The site is located on mostly flat terrain, at an elevation of approximately 120 m Australian Height Datum (AHD). The area has been extensively cleared and highly modified by flattening of ridges to create a level site for the airfield. The Nowra Hill Radar Tower in the north-east corner of the site is at an elevated part of the site of approximately 197 m AHD. Elevation drops steeply in the east of the site to approximately 40 m AHD towards Currambene Creek. Stormwater across the site is collected in constructed drains that divert water to two main discharge points. These discharge points are the Braidwood Road drain in the north of the site, which receives the majority of stormwater discharge, and Currambene Creek in the south of the site. The site will undergo capital maintenance works undertaken as part of the National Airfields Works (P0010) that may change the site drainage. The aim of this project is to maintain the network of aircraft pavements, stormwater drainage and aeronautical ground lighting.
Hydrology	The site is divided into two water catchment areas: – Shoalhaven River Basin which is in the north-west portion of the site. – Clyde River Basin which is in the south and east portions of the site. Surface water from the Shoalhaven River Basin generally flows north towards Shoalhaven River, and the Clyde River Basin flows south and south-east towards Currambene Creek and Jervis Bay. Surface water flow paths from the base and their associated receiving catchments are shown in Figure 4, Appendix A. Beyond the site, natural surface water bodies include Cabbage Tree Creek, Calymea Creek, Shoalhaven River, Currambene Creek, Yerriyong Gully, Braidwood Road, Flat Rock Creek and Parma Creek. Town water for the site is sourced from the Bamarang Reservoir, approximately 3.5 km to the north-west of HMAS Albatross.
Soil landscape	On-site soils consist of alluvium, described as grey-brown to yellow-brown silty sands and sandy clays. These are present from the surface to approximately three metres below ground level (m bgl) in the eastern portion of the site. In areas closer to site infrastructure and support buildings, alluvium is limited to shallower depths of up to 1.5 m bgl, overlying firm to stiff sandy clay and highly weathered sandstones.
Acid sulfate soils (ASS)	The CSIRO Atlas of Australian Acid Sulfate Soils (2013) indicates the probability of occurrence of ASS across the site is extremely low probability/very low confidence. The 'very low confidence' is due to the lack of investigation data for acid sulphate soils in the area.
Geology	Beneath the alluvial soils, the site is located on Permian Berry Siltstone, comprising mid grey to dark grey siltstone to fine sandstone, overlying the quartz sandstones of the Permian Nowra Sandstone (Aurecon, 2017). Intrusive investigation undertaken in 2017 identified the presence of siltstone to a depth of between 0.8 and 4.2 m bgl in the east and between 4.8 and 10 m bgl in the west (Aurecon, 2017).
Hydrogeology	The intermediate groundwater aquifer residing in the weathered Berry Siltstone clay/ironstone (laterite) formation that underlies the site is generally semi-confined. Groundwater has generally been encountered at depths of greater than 5 m bgl within the vicinity of the runway, with the recorded standing water level (SWL) ranging from 2.0 to 8.0 m bgl. The inferred groundwater direction is either north to northeast towards the Shoalhaven River or south to southeast towards Currambene Creek and Jervis Bay (Aurecon, 2017).

Item	Description
	There are no current registered groundwater bores on the site or within a 500 m radius of the site. The site is serviced by reticulated water, and the grassed airside training areas are irrigated using treated effluent from the on-site STP (AECOM, 2020). There is a discontinuous and intermittent perched water layer that appears after heavy rain events (the shallow perched system). The continuous intermediate groundwater aquifer is fed by rainfall recharge and has accumulated over geologic time on the relatively impermeable subsurface material below the site. Recharge of the deeper siltstone unit may be from regional flow and the overlying units (GHD, 2023).
Groundwater and surface water use	Groundwater and surface water are not used on-site for any purposes. All water is supplied through town water. Treated water from the STP is used to irrigate three on-site areas. These areas are the western pad, the parachute training area and an area near the flight deck procedural trainer area. In regard to surrounding use, the results of a water use survey which was issued to neighbouring properties as part of the PSI (Aurecon, 2016) and the results were reported in the DSI (Aurecon, 2017) indicated that: – Drinking water was either supplied through town water or rainwater. – Residents did not use bore water for any purposes, with the exception of one resident who indicated a dam was used for irrigation for lawn, fruit and vegetables as well as stock.
Ecology	The operational areas within HMAS Albatross are highly disturbed and comprise hard surfaces including taxiways, aprons, runways surrounded by mown grass. Previous investigations at the site indicate the absence of threatened ecological communities (TEC) and native vegetation communities. The closest mapped TEC is 30 m north of the site boundary.
Heritage	HMAS Albatross is not listed for its indigenous heritage values on any Commonwealth or State register. Four Indigenous heritage elements were identified as present on the site (Biosis, 2020). In addition, areas of archaeological potential, including potential burial sites, scarred trees and open artefact scatters were identified. All heritage elements and areas of archaeological potential are located outside of the Project area.

2.3 Conceptual site model

The CSM is presented in the PMAP (Defence, 2019b) which summarised the linkages between sources, exposure pathways and receptors. A further assessment of risk exposure pathways is presented in the DSI (Aurecon, 2017), HHERA (Environmental Risk Sciences [EnRiskS], 2017) and the Addendum HHERA (EnRiskS, 2018).

2.3.1 Sources

The CSM identified several sources of PFAS which were divided into two distinct groups:

– Primary sources of PFAS: identified as areas with soil containing a high contaminant concentration and include the firefighting training area and STP.
– Secondary sources of PFAS: identified to exist at generally low concentrations and distributed in both on-site and off-site areas, including:
    - Soil at the STP irrigation areas, hangars, flightlines and associated activities.
    - Groundwater.
    - Surface water.

The primary pathway for PFAS from the site has been identified as surface run-off (Defence, 2019b), with the major PFAS discharge point located at Braidwood Road Drain on the site's western boundary.

GHD reviewed 34 AECS outside the two site wide CSRs in the Source Characterisation Report (GHD, 2025a). Of these 15 AECS were identified and are considered as PFAS primary and/or secondary source areas. A summary of these identified PFAS source zones associated with the management area is provided Table 3 below and are presented in Figure 2 of Appendix A.

Table 3 Summary of identified PFAS source zones associated with the management area

AEC	Area activity	Historic / ongoing source?	Inferred discharge area
AEC 1	Fire station and suppression store was constructed in 1999 – has used and /or stored both legacy AFFF and AFFF Ansulite.	Historic, with ongoing sources from impacted environmental media.	– SW Braidwood Road Drain – GW Braidwood Road Drain
AEC 2	Former fire training area (FFTA) - has used both legacy AFFF and AFFF Ansulite.	Historic, with ongoing secondary sources from impacted environmental media.	– SW Braidwood Road Drain – GW Yerriyong Gully
AEC 11	ROMEO facility – built in 2012. Has stored and still stores both legacy AFFF and AFFF Ansulite. The site contains 3 x AFFF storage tanks for waste that are pumped out by Ventia when full.	Ongoing, with ongoing secondary sources from impacted environmental media.	– SW Braidwood Road Drain – GW Braidwood Road Drain
AEC 15	STP and effluent storage dam – historically wastewater potentially containing legacy AFFF was potentially captured and released to the STP. Sewerage captured across the eastern operational hangar areas (excluding ROMEO) of the site eventually discharges to the STP. The STP has the potential to overflow to Currambene Creek during high rainfall events.	Ongoing	– SW Yerriyong Gully – GW Yerriyong Gully
AEC 16	Effluent irrigation area – this area receives water from the STP for irrigation.	Ongoing, with ongoing secondary sources from impacted environmental media.	– SW Yerriyong Gully – GW Yerriyong Gully
AEC 22	Former Firefighting training area – the PSI stated that the area was for regular fire training with fires extinguished with legacy AFFF.	Historic, with ongoing secondary sources from impacted environmental media.	– SW Braidwood Road Drain – GW Braidwood Road Drain
AEC 24d	AFFF exercise area (former).	Historic, with ongoing secondary sources from impacted environmental media.	Multiple areas
AEC 25	AFFF spill at Hangar K (Dec 2014) – flow into stormwater drains and retention basin. Heavy rainfall then caused the retention basin to overflow and discharge into open stormwater.	Historic, with ongoing secondary sources from impacted environmental media.	Multiple areas
AEC 27B	Parachute training area – historically has received excess fill from construction activities on the base.	Historic, with ongoing secondary sources from impacted environmental media.	– SW Braidwood Road Drain – GW Yerriyong Gully
AEC 30	Former Stockpile area – located along the road outside Gate 3. Historical aerials show this area in use from 2015 to July 2018.	Historic, with potential ongoing secondary sources from impacted environmental media.	– SW Upper Currambene / Yerriyong Gully – GW Upper Currambene / Yerriyong Gully
AEC 31	Former Stockpile area – located to the west of the STP. Has had visible stockpiles since 2004. Large area during 2015 which coincided with the building of the base support services area and canteen.	Historic, with potential ongoing secondary sources from impacted environmental media.	– SW Yerriyong Gully – GW Yerriyong Gully

AEC	Area activity	Historic / ongoing source?	Inferred discharge area
AEC 32	Former Stockpile area – south of the Napo area. This area received soil during the build of the Base support services and canteen area in 2015. All soil stockpiles were removed by 2017.	Historic, with potential ongoing secondary sources from impacted environmental media.	– SW Upper Currambene – GW Upper Currambene
AEC 33	Former Stockpile area - this former stockpile area is located to the north west of the FFTA. The area was used between 2016 and 2017.	Historic, with potential ongoing secondary sources from impacted environmental media.	– SW Braidwood Road Drain – GW Braidwood Road Drain
AEC 34	Clear disturbed area – this area is located to the north east of Hangar J. The area was cleared sometime in August 2015 to May 2016 based on historical aerials.	Historic, with potential ongoing secondary sources from impacted environmental media.	– SW Upper Currambene – GW Upper Currambene

2.3.2 Migration pathways

PFAS can travel from a source to human or environmental receptors via transport pathways, such as surface water, groundwater and stormwater. The primary transport pathways of PFAS from the above source areas are via groundwater and surface water pathways. The PFAS migration pathways at the Bases and surrounding management area can be summarised as:

- Exposure during excavation and construction activities.
- Dispersion of soil and dust from wind and water.
- Overland transport of particulate and dissolved PFAS, via surface water runoff.
- Migration of groundwater to a discharge area, including standing water bodies and creeks.
- Vertical migration from soil (and to a lesser extent, concrete) to groundwater.
- Active distribution of PFAS impacted waters via the effluent irrigation system.

2.3.3 Receptors

The following potential receptors associated with the management area include:

- Human health:
  - HMAS Albatross personnel and site users (including intrusive maintenance workers).
  - Residents at neighbouring properties (off-site).
  - Consumers of home grown produce (off-site).
  - Recreational users of surface water (off-site).
- Ecology and environment:
  - On and off-site terrestrial ecological receptors (flora and fauna).
  - On and off-site groundwater and surface water aquatic ecology (flora and fauna).

3. Data quality assessment

3.1 Data quality objectives

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

– Clarifies the study objective.
– Defines the most appropriate collection of data as relevant to the study objective.
– Determined the conditions from which to collect data.
– Specifies tolerable limits on decision errors, which will be used as the basis for establishing the quantity and quality of data, needed to support the decision.

The DQOs for monitoring are presented in Table 4. They have been prepared in line with the DQO process as outline in the ASC NEPM (Schedule B2) (NEPC, 2013).

Table 4 Data quality objectives

Process	Description
Step 1: State the problem	The historical use, storage and waste management of legacy AFFF containing PFAS HMAS Albatross has contributed to soil, sediment, surface water and groundwater impacts on- and off-site. Defence's management of the risks under the PMAP aims to avoid or minimise exposure to PFAS contamination from Defence properties to human health and ecological receptors. Defence and State agencies require continued monitoring data to enable informed risk/remedial management decisions to protect human health and the environment. As part of the HMAS Albatross PMAP, ongoing surface water and groundwater monitoring at on- and off-site locations is required to assess spatial and temporal variation in PFAS concentrations. This dataset will provide a baseline to benchmark any remediation works that are to be undertaken at the site in the future. The 'problem' as it stands is that a robust, site wide data set is required to meet both the objectives outlined above. Specifically, assessment of temporal changes in PFAS concentrations are required to assist in informing management measures instigated at the site, and to justify transition to standard monitoring protocols. This will allow (if required) the update and refinement of the CSM, HHERA and inform management decisions by Defence and state agencies.
Step 2: Identify the decision/goal of the study	The principal objective of the OMP is to provide sufficient information on PFAS distribution and risk so that informed decisions can be made on the management of any risks. This information is gained through: - Undertaking surface water monitoring to assess the changes in the nature and extent (spatial and temporal) of PFAS concentrations on and off-site. - Collecting further baseline data from different media, for comparison during and after remediation of hotspot/source areas to assess the success of the remediation and management methods. - Conducting surface water monitoring to assess seasonal effects on water flow and PFAS concentrations, including during or immediately after extreme or high rainfall events. From these objectives, the following questions need to be understood: - How many sampling locations are required to meet the objectives of the OMP? - Are there sentinel sampling points that can be easily accessed? - What is the sampling frequency required at each sample location? - What is the laboratory limit of reporting (LOR) required at each sample location? - How do the concentrations compare to previous rounds of monitoring? lower, higher or stable? Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant a revision of the HHERA? - Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant refinement of any existing management measures? - Are there any statistical trends in the data set?

Process	Description
	- Do the concentrations trigger any additional measures? - Is the data reliable, valid and of sufficient quality to make informed decisions?
Step 3: Identify the information inputs	To allow assessment of the data against the study goal listed in Step 2 above, the following inputs will be considered: - PFAS results from previous environmental investigations to assess variations over time and to measure the success of the remediation and management measures. - Surface water collected and analysed for PFAS, as part of the OMP. - Field data (i.e. physio-chemical parameters) on surface water. - Weather conditions preceding sampling events, particularly rainfall events. - Site status and land use scenarios and whether these have changed. - Advances in laboratory analytical approaches and changes in regulatory requirements. - Changes in land uses or water usage.
Step 4: Define the boundaries of the study	The OMP comprises sampling locations within the Management Area, comprising HMAS Albatross and off-site as shown on Figure 3, Appendix A. The monitoring will be ongoing. The frequency of the sampling is defined in Section 4.1.
Step 5: Develop the analytical approach/decision rules	The decision rules can be defined as: - The analytical and field data will be used to assess changes to the nature, extent and magnitude of PFAS in surface water and to assess the effectiveness of implemented management measures. - All samples analysed for the full PFAS suite, appropriate laboratory LOR and suitability of data assessed to ensure the laboratory QA/QC is within acceptable ranges. - Comparison of PFAS concentrations in surface water against the adopted assessment criteria. Where exceedances or first time detections or significant increases/decreases are observed, these will be considered using a holistic approach that looks at the results in the context of climatic events, changes in SWLs etc. - Comparison of PFAS concentrations in surface water against previous results to determine any temporal or spatial trends or variations in concentrations. Variations will be assessed against recharge events (rainfall) and surface water flow. - Assessment of any trends (such as temporal or seasonal trends) and exceedance of trigger values may inform decision making to consider whether further monitoring may be reduced or continued. - As outlined in the PFASIM OMP Template (Defence, 2025), PFAS monitoring data must be of sufficient quality to support ecological risk assessment. Surface water results will be compared against relevant ecological screening criteria, including those specified in the PFAS NEMP, with particular reference to the 99% Species Protection Level (SPL). Where standard LORs exceed these thresholds, analytical limitations will be identified and results interpreted accordingly. Where appropriate, method refinements (e.g. application of lower LORs), alternative lines of evidence, or further investigations will be recommended to determine whether the HHERA remains current. This approach ensures transparency, consistency with Defence's framework, and a robust basis for ecological risk evaluation. The decision on the acceptance of analytical data should be made on the basis of data quality indicators (DQIs) detailed in this SAQP and the following: - If detections of PFAS are reported in field blanks or rinsate blanks, then consider if there is a potential for cross contamination between sample locations and what impact this has on conclusions of trends. - If PFAS concentrations increase by more than an order of magnitude over three consecutive sampling rounds or to concentrations associated with potentially unacceptable risks to human health or the environment in areas where the HHERA concluded that PFAS risks were low and acceptable, then a revision to the HHERA may be required.
Step 6: Specify performance or acceptance criteria	Two primary decision error-types may occur due to uncertainties or limitations in the project data set. This may include: - Surface water network is no longer adequate to assess risks. - A sample/area may be deemed to pass the nominated criteria, when in fact it does not. This may occur if contamination is 'missed' due to limitations in the sampling plan, or if the project analytical data set is unreliable.

Process	Description
	- A sample/area may be deemed to fail the nominated criteria, in actuality, it may not. This may occur if the project analytical data set is unreliable, due to inappropriate sampling, sample handling, or analytical procedures. The following tasks would be undertaken: - Review of the monitoring network to ensure it will achieve the optimal results to inform management decisions. Update the OMP as required. - An assessment to understand the likelihood of a decision error being made based on the results of a QA/QC assessment and the closeness of the data to the assessment criteria. - A QA/QC assessment, evaluating the reliability and useability of data, which are expressed as five DQIs.
Step 7: Develop the plan for obtaining data	This OMP provides the framework sampling of surface waters at HMAS Albatross. As the overarching OMP for the site is currently under revision, this SAQP has been developed as an interim plan to ensure monitoring is conducted in accordance with the scheduled routine monitoring program. The SAQP outlines the scope of work, sampling methodologies, monitoring locations, and adopted PFAS assessment levels. It should be developed in response to the principal study questions identified in Step 2 and designed to meet the Data Quality Objectives (DQOs) established in Step 6. To maintain the integrity and reliability of data the following measures should be adopted: - Field and analytical data are collected in accordance with the PFAS NEMP (HEPA, 2025) and the ASC NEPM (NEPC, 2013). - Field personnel should be trained and have sufficient experience to complete the fieldwork to an acceptable standard, as per the protocols outlined in the OMP / SAQP. - Robust field and laboratory QA/QC protocols are adopted, as outlined in Section 4.6. - Use laboratories that are National Association of Testing Authorities (NATA) accredited for PFAS analysis and ensure laboratory LORs are suitable to meet the relevant adopted assessment levels.

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3.2 Assessment of data quality

The acceptance criteria for DQIs are based on those outlined in the OMP (Defence, 2019a) and are provided in Table 5.

Table 5 DQI acceptance criteria

DQI	Acceptance criteria
Field QA/QC	
Field program	Fieldwork is to be undertaken by suitably experienced field staff in accordance with the sampling procedures outlined in this SAQP.
Rinsate blank samples (where sampling equipment is reused)	Rinsate blank samples should be collected at a rate of one per day of monitoring and analysed for PFAS. The concentration of PFAS should be less than the laboratory LOR.
Trip blank samples	Trip blank samples for PFAS should be submitted to the laboratory at a rate of one per batch. The concentration of PFAS should be less than the laboratory LOR.
Intra- and inter-laboratory duplicates	Intra- and inter-laboratory duplicates are to be collected and analytes at a rate of 1 in 10 primary samples. The relative percentage differences (RPDs) are to be calculated for all primary and field duplicate pairs and will be considered acceptable based on the following RPD limits: - 200% for concentrations within 1 to 10 times the analyte LOR. - 50% for concentrations within 10 to 30 times the analyte LOR. - 30% for concentrations greater than 30 times the analyte LOR.
Laboratory QA/QC	
Laboratory duplicates	Laboratory duplicate sample RPDs are to be less than: - 20% for high level concentrations (i.e. greater than 20 times the analyte LOR). - 50% for medium level concentrations (i.e. between 10 and 20 times the analyte LOR).
Matrix spikes	Matrix spike recoveries are to be in the range of 70 to 130% of the theoretical recovery or as nominated in the laboratory's QC report.
Method blanks	Method blank samples are to have a concentration less than the laboratory LOR.
Laboratory control samples	The recovery of laboratory control samples are to be within the laboratories' specified range for the particular analyte or analytical suite.

4. Sampling rationale and methodology

4.1 The OMP

The OMP (Defence, 2019a) outlines the requirements for the monitoring works to be undertaken and provides the basis for the preparation of this SAQP.

This August sampling event is for the second biannual surface water sampling event for 2025 (groundwater is undertaken annually). The scope of work presented in this SAQP is consistent with the requirements outlined in the OMP (Defence, 2019a) with the exception of the deviations presented in Table 6.

Table 6 Deviations from OMP

Location	Deviation	Rationale
0026_SW106	Add location to OMP.	PFAS characterisation of surface water. Data used to establish baseline conditions.
0026_SW049		
0026_SW065		
0026_SW123		
0026_SW124		
0026_SW185		
0026_SW186		
0026_SW187		
0026_SW188		
0026_SW001	Removed from the OMP	SW001 has been removed from the OMP and replaced with a location situated closer to the site (SW187). This adjustment was made to improve representativeness of potential site discharges and reduce the influence of upstream residential areas on surface water quality. The revised location provides a more direct indication of what may be leaving the site boundary and entering the surrounding environment.

A summary of the total number of locations (sum of existing OMP locations and the proposed additional sampling locations) to be included in this event is provided in Table 7. All monitoring locations are presented on Figure 3 in Appendix A and tabulated in Appendix B.

It is noted that off-site agreements will be required for some of these new locations prior to accessing.

Table 7 Number of monitoring locations

Media	Total number of locations
Surface water	21

Surface water monitoring locations have been determined based on the following:

- Locations targeting pathways from source areas and to receptors were included to provide an indication of potential change in directions.
- From surface water bodies that are known to receive surface water flow from the site.
- Surface water bodies that receive groundwater discharge (i.e. springs).

4.2 Sample collection and handling

4.2.1 Surface water sampling

The surface water sampling methodology is presented in Table 8, which will be used for both the transitional event and annual OMP events.

Table 8 Surface water sampling methodology

Item	Description
Technical guidelines	Australian Standard 5667:*1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS 5667.1:1998)*. Australian Standard 5667:*1998 Water Quality – Sampling, Part 6: Guidance on the Sampling of rivers and streams (AS 566.6:1998)*. ASC NEPM (NEPC, 2013). PFAS NEMP (HEPA, 2025)
Field chemistry and sampling	A surface water sample will be collected as a 'grab sample' mid-way through the water column or approximately 0.5 m below the surface at the individual surface water sampling locations. If the reachable water column is less than 0.5 m deep, the sample will be collected from at least half the water depth, and care should be taken to avoid surface films entering the sample. If the water column is greater than 0.5 m deep, the sample should be taken 20 to 30 cm below the surface of the water. Each individual sample will be collected into a new laboratory-supplied, unpreserved sample container with new nitrile gloved hands. An extendable sampling pole may be used for easier sample collection. Field parameters (pH, EC, redox, DO and temperature) will be measured and recorded for all surface water locations. In addition, observations of water quality such as the flow (flowing or not flowing), colour, turbidity level, and the presence/absence of odour or sheen will be recorded. The sample containers will be labelled with the job number, sample identification and date collected.
Quality assurance and quality control (QA/QC)	The following field QA/QC samples will be collected and analysed for PFAS (standard suite) as part of the surface water sampling program: One intra-laboratory duplicate per ten primary samples. One inter-laboratory duplicate per twenty secondary samples. One rinsate sample per day of sampling (where applicable). One trip blank per batch.
Sampling schedule	The sampling round will include monitoring at 21 surface water locations, which includes both the existing OMP locations and the proposed additional sampling locations outlined in Section 4.3.2.

4.2.2 Sample handling and transport to the laboratory

Following the collection of each batch of samples, samples will be immediately stored in a cool, dark environment (esky) prior to being forwarded to the NATA accredited analytical laboratory within the specified holding times along with a standardised chain of custody (COC) form. Analyses will be undertaken on a standard turnaround time of five business days, and analytical results will be emailed to GHD as a compiled report from the laboratory (as Esdat files and PDF report).

4.2.3 Calibration

All field instruments (e.g., water quality meters) must be calibrated by the equipment supplier prior to use in the field to optimise the accuracy of the measurements taken. The field team will check the calibration certificate from the equipment supplier to confirm that the field instruments are in good working condition.

All calibration certificates for equipment hired will be collected as part of the field documentation and presented as an attachment in the Sampling Event Report.

4.2.4 Waste management

All solid waste, comprising of dedicated sampling equipment (i.e. bailers, gloves etc) and general rubbish will be collected and disposed of in the general waste bins present on-site.

4.2.5 Logistics

All sample containers will be couriered directly from the laboratory to a GHD office prior to the commencement of fieldwork. After each batch of samples has been prepared in the field, they will be transported by the nominated laboratory's courier directly to the laboratory with a signed COC form detailing the requested analysis.

4.3 Analytical suite and laboratory analysis methods

4.3.1 Laboratory NATA accreditation details

The NATA accredited laboratories selected for this monitoring program are as follows:

– Primary laboratory: Australian Life Science (ALS) Environmental, Smithfield, New South Wales (NATA Accreditation No. 825).
– Secondary laboratory: Eurofins, Girraween, New South Wales (NATA Accreditation No. 1261).

4.3.2 Analytical schedule

All surface water samples collected as part of the monitoring program will be submitted for standard level analysis of the standard 28 PFAS suite to the laboratory limit of reporting (LOR), as outlined in Table 9.

Table 9 ***Department of Defence (2025). PFAS Ongoing Monitoring Plan, Template (dated 16 May 2025) Appendix E PFAS Analytical Suite vs the current (as of August 2025) LOR from the primary and secondary laboratories.***

Chemical Class	Analyte Code	Analyte Name	LOR (ug/L)	
			ALS	Eurofins
Perfluoroalkane sulfonic acids	PFBS	Perfluorobutane sulfonic acid	0.02	0.01
	PFPeS	Perfluoropentane sulfonic acid	0.02	0.01
	PFHxS	Perfluorohexane sulfonic acid	0.01	0.01
	PFHpS	Perfluoroheptane sulfonic acid	0.02	0.01
	PFOS	Perfluorooctane sulfonic acid	0.01	0.01
	PFDS	Perfluorodecane sulfonic acid	0.02	0.01
Perfluoroalkyl carboxylic acids	PFBA	Perfluorobutanoic acid	0.1	0.05
	PFPeA	Perfluoropentanoic acid	0.02	0.01
	PFHxA	Perfluorohexanoic acid	0.02	0.01
	PFHpA	Perfluoroheptanoic acid	0.02	0.01
	PFOA	Perfluorooctanoic acid	0.01	0.01
	PFNA	Perfluorononanoic acid	0.02	0.01
	PFDA	Perfluorodecanoic acid	0.02	0.01
	PFUnDA	Perfluoroundecanoic acid	0.02	0.01
	PFDoDA	Perfluorododecanoic acid	0.02	0.01
	PFTrDA	Perfluorotridecanoic acid	0.02	0.01
	PFTeDA	Perfluorotetradecanoic acid	0.05	0.01
Perfluoroalkyl sulfonamides	FOSA	Perfluorooctane sulfonamide	0.02	0.05
	MeFOSA	N-Methyl perfluorooctane sulfonamide	0.05	0.05
	EtFOSA	N-Ethyl perfluorooctane sulfonamide	0.05	0.05
	MeFOSE	N-Methyl perfluorooctane sulfonamidoethanol	0.05	0.05

Chemical Class	Analyte Code	Analyte Name	LOR (ug/L)	
			ALS	Eurofins
	EtFOSE	N-Ethyl perfluorooctane sulfonamidoethanol	0.05	0.05
	MeFOSAA	N-Methyl perfluorooctane sulfonamidoacetic acid	0.02	0.05
	EtFOSAA	N-Ethyl perfluorooctane sulfonamidoacetic acid	0.02	0.05
(n:2) Fluorotelomer sulfonic acids	4:2 FTS	4:2 Fluorotelomer sulfonic acid	0.05	0.01
	6:2 FTS	6:2 Fluorotelomer sulfonic acid	0.05	0.05
	8:2 FTS	8:2 Fluorotelomer sulfonic acid	0.05	0.01
	10:2 FTS	10:2 Fluorotelomer sulfonic acid	0.05	0.01

4.3.3 Validation of analytical results

After completion of a monitoring event, analytical results will be reviewed and may need to be validated to confirm the original results if a QAQC discrepancy is considered possible. This would be achieved by requesting re-analysis of a sample by the laboratory or, if required, re-sampling and analysis. GHD would seek approval from Defence prior to mobilisation to site for re-sampling.

4.4 Data management

4.4.1 Sample nomenclature

All sample naming will be in accordance with the Defence Contamination Management Manual (DCMM), specifically Annex L (Data Management). Sample IDs will follow the nomenclature below:

PPPP_XX000_YYMMDD

Where for this monitoring program:

– PPPP = Property ID = ‘0026’ for HMAS Albatross.
– XX = Location type, e.g. ‘MW’ for monitoring well or ‘SW’ for surface water.
– 000 = Three-digit sample number = e.g. ‘030’.
– YYMMDD = Sample date by year, month then day, e.g. ‘250217’.

The above example would provide a sample ID (at HMAS Albatross) of ‘0026_MW030_250217.’

QA/QC samples will be labelled in accordance with DCMM Annex L, as per the following nomenclature:

– Intra-laboratory duplicate (blind): PPPP_QC1XX_YYMMDD.
– Inter-laboratory duplicate (split): PPPP_QC2XX_YYMMDD.
– Rinsate blank: PPPP_QC3XX_YYMMDD.
– Trip blank: PPPP_QC5XX_YYMMDD.

4.4.2 Defence ESdat requirements

All field and analytical data collected as part of this monitoring program will be uploaded, stored and managed in the Defence Environmental Data Management System (EDMS) in accordance with DCMM Annex L using ESdat software. After completion of a monitoring event, field and analytical data will be uploaded into ESdat prior to submission of the factual report for the sampling event.

4.5 Adopted screening criteria

The relevant guidelines and legislation reviewed at the time of this report to define the adopted screening criteria are outlined in Section 1.3. While the screening criteria presented in Table 10 remain consistent with those outlined in the OMP (Defence, 2019a), it is acknowledged that the PFAS National Environmental Management Plan (NEMP) has undergone updates since the OMP's publication.

Table 10 presents the adopted screening criteria to assess the PFAS data in this monitoring program for human health and ecological receptors as per the OMP (Defence, 2019a).

Table 10 Summary of adopted screening criteria

Media	Receptor	Guideline
Surface water	Ecology	NEMP (2025) – freshwater and marine water 99% species protection.
	Human health	NEMP (2025) – Recreational.

4.6 Quality assurance / quality control sampling

4.6.1 Field duplicate and inter-laboratory duplicate samples

Intra-laboratory (blind) and inter-laboratory (split) duplicates are to be collected and analysed for PFAS in accordance with the PFAS NEMP 2.0 (HEPA, 2025) at a minimum frequency of 1 in 10 primary samples and 1 in 20 secondary samples.

4.6.2 Rinsate samples

Rinsate blank samples are to be collected at a rate of one per day of monitoring where re-usable sampling equipment has been used (e.g. interface probe, trowel). The rinsate blank sample is collected by pouring laboratory supplied deionised water over the decontaminated sampling equipment into the appropriate sampling container for PFAS analysis.

4.6.3 Trip blank samples

Trip blank samples will be used to estimate the amount of contamination introduced during the transport and storage of samples from the time of sampling to the time of analysis. Trip blanks are laboratory supplied and will be collected at a rate of 1 sample per fieldwork and analysed for PFAS at standard LOR.

4.7 Field documentation

4.7.1 Field notes

All sampling locations for each monitoring round will have an accompanying field record which will include information specific to the location type. This information is summarised in Table 11.

Table 11 Summary of fieldwork documentation

Media	Information to be recorded
Surface water	- Date, time and field staff present. - Field parameters (pH, EC, redox, DO, temperature and turbidity). - Observations of colour, turbidity, presence/absence of odour or sheen. - Environmental observations such as weather, temperature, slope and erosion. - Hydrological observations such as flow (flowing or not flowing) and estimated width and depth of water body with photographs of each sample point. - Intra- or inter-laboratory duplicates collected (if applicable). - Other comments (i.e. access) (if applicable).

All calibration certificates for equipment hired during fieldwork will be collected and presented in the Sampling Event Report as part of the field documentation.

4.7.2 Sample labels

Sample containers will be labelled with the following identification:

– Project number.
– Sample identification (as per the nomenclature outlined in Section 4.4).
– Sampler name.
– Sample collection date.

4.7.3 Chain of Custody forms

For each batch of samples prepared in the field, a COC form will be completed and sent with the samples to the laboratory. The COC form will include information such as the project number and name, sample identification and date, requested analyses and will be signed by the field staff representative. Upon receipt of samples at the laboratory, the COC will be signed by a laboratory staff member.

If additional samples are collected during monitoring based on field observations which are not from sampling locations included in this SAQP, GHD will seek approval from Defence for analysis of these samples.

5. Reporting

5.1 Sampling event report

After each monitoring event, information, field and laboratory data will be documented in a Sampling Event Report prepared in accordance with Defence *PFAS Ongoing Monitoring Program Reporting Guidance* (Defence, 2024) and will include:

- The scope of works undertaken including constraints and assumptions.
- Deviations from SAQP/OMP and associated implications (if any).
- Sampling methodology.
- PFAS screening criteria.
- Evaluation of the quality assurance and quality control to assess the adequacy for interpretative use.
- Summary of the field observations including weather conditions, surface water, visual and olfactory.
- Results and discussions including field parameters and analytical results, with comparison to historical conditions and screening criteria, and consideration of results and other information against OMP triggers.
- Conclusions and summary of key findings.
- Figures presenting management area, site layout and source areas (including CSR ids) surface water flow direction, PFAS distribution figures for each media.
- A tabulated summary of field observations and parameters and laboratory analytical results which includes comparison with the adopted assessment criteria.
- Attachments for all field and laboratory documentation, such as:
  - Field records for surface water monitoring locations.
  - Equipment calibration certificates.
  - Chain of custody forms.
  - Laboratory analytical certificates.

6. References

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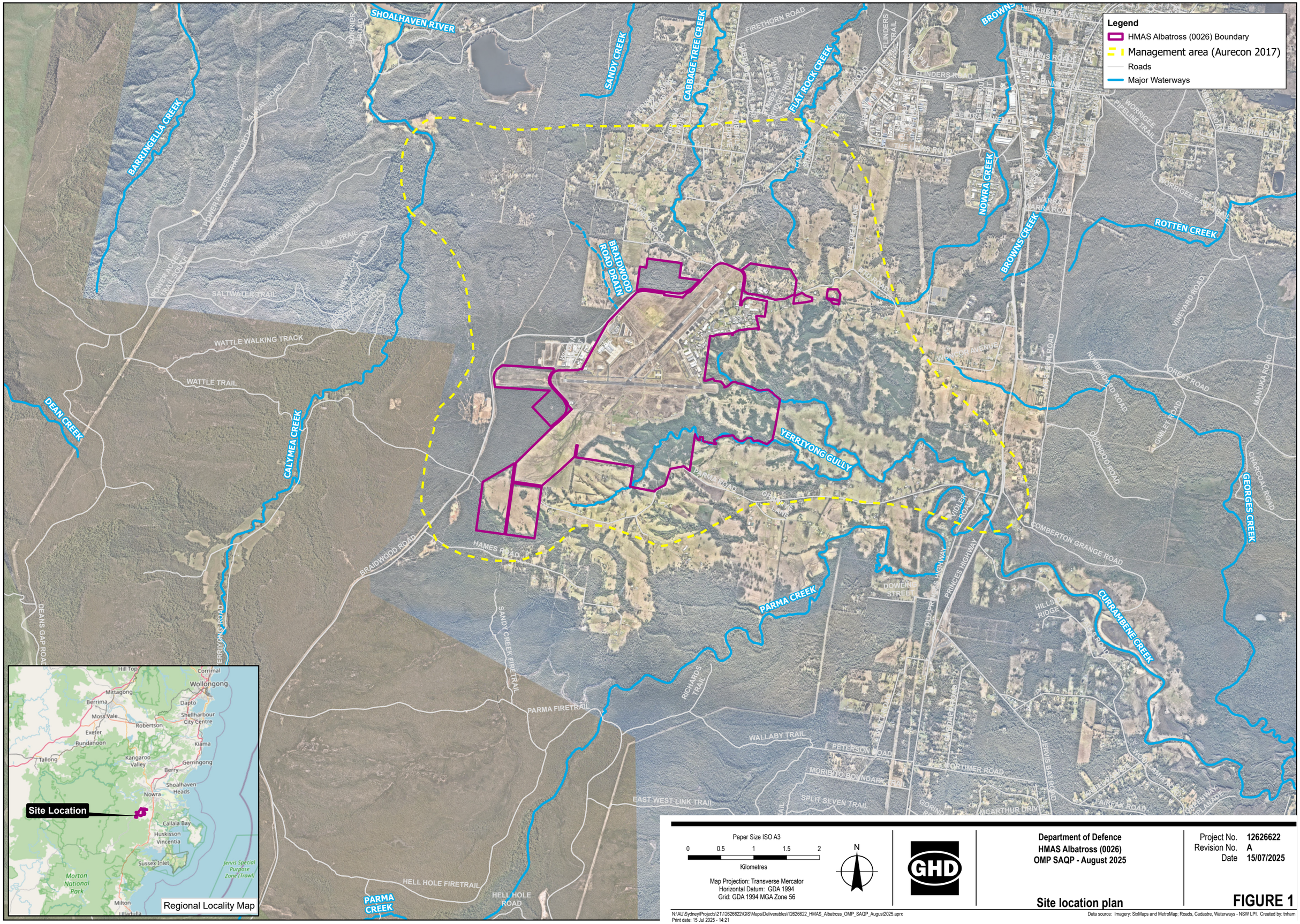
Appendices

Appendix A

Figures



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Kilometres

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Grid: GDA 1994 MGA Zone 56

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HMAS Albatross (0026)
OMP SAQP - August 2025

Project No. **12626622**
Revision No. **A**
Date **15/07/2025**

Site location plan

FIGURE 1

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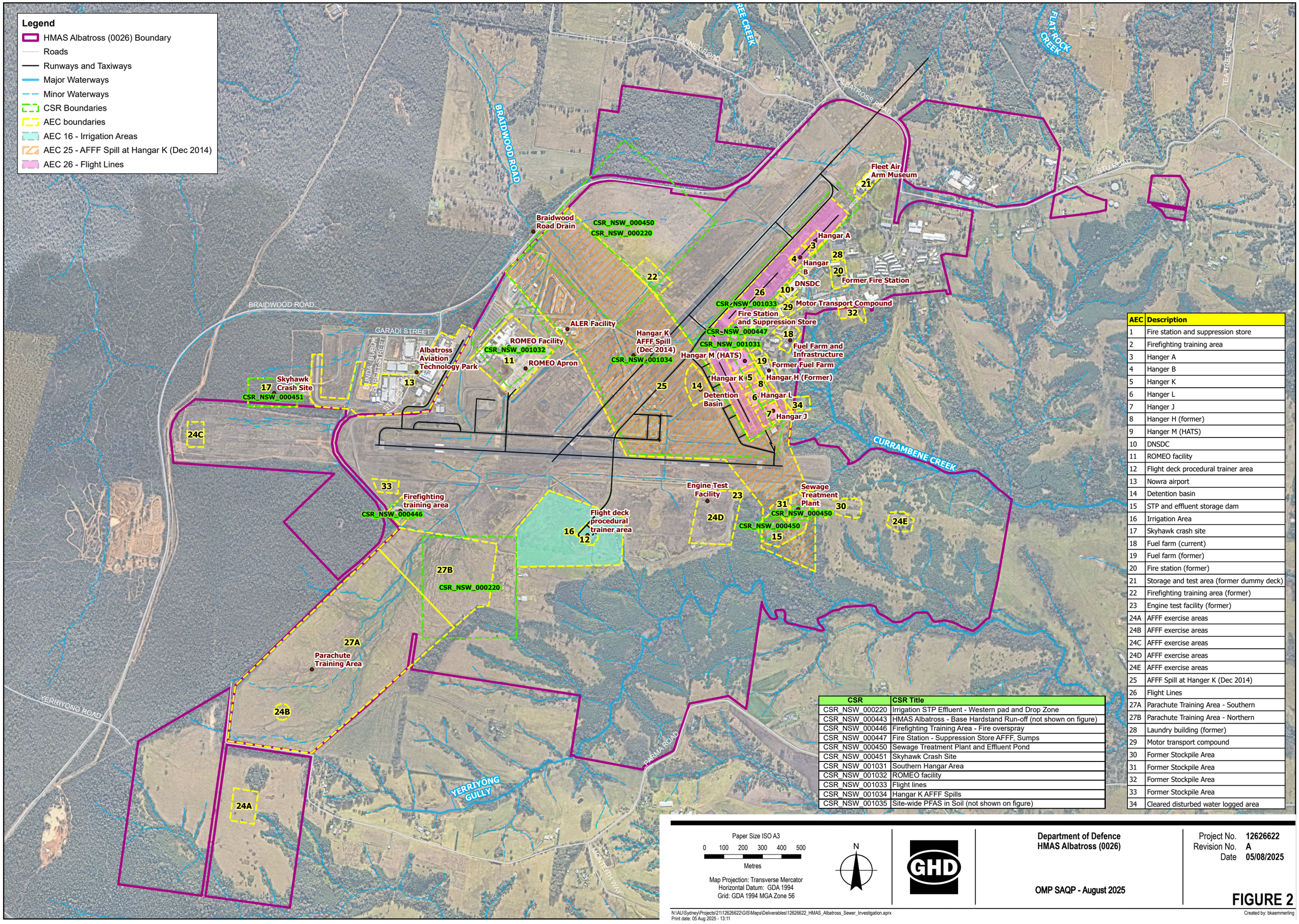

AEC	Description
1	Fire station and suppression store
2	Firefighting training area
3	Hanger A
4	Hanger B
5	Hanger K
6	Hanger L
7	Hanger J
8	Hanger H (former)
9	Hanger M (HATS)
10	DNSDC
11	ROMEO facility
12	Flight deck procedural trainer area
13	Nowra airport
14	Detention basin
15	STP and effluent storage dam
16	Irrigation Area
17	Skyhawk crash site
18	Fuel farm (current)
19	Fuel farm (former)
20	Fire station (former)
21	Storage and test area (former dummy deck)
22	Firefighting training area (former)
23	Engine test facility (former)
24A	AFFF exercise areas
24B	AFFF exercise areas
24C	AFFF exercise areas
24D	AFFF exercise areas
24E	AFFF exercise areas
25	AFFF Spill at Hanger K (Dec 2014)
26	Flight Lines
27A	Parachute Training Area - Southern
27B	Parachute Training Area - Northern
28	Laundry building (former)
29	Motor transport compound
30	Former Stockpile Area
31	Former Stockpile Area
32	Former Stockpile Area
33	Former Stockpile Area
34	Cleared disturbed water logged area

CSR	CSR Title
CSR_NSW_000220	Irrigation STP Effluent - Western pad and Drop Zone
CSR_NSW_000443	HMAS Albatross - Base Hardstand Run-off (not shown on figure)
CSR_NSW_000446	Firefighting Training Area - Fire overspray
CSR_NSW_000447	Fire Station - Suppression Store AFFF, Sumps
CSR_NSW_000450	Sewage Treatment Plant and Effluent Pond
CSR_NSW_000451	Skyhawk Crash Site
CSR_NSW_001031	Southern Hangar Area
CSR_NSW_001032	ROMEO facility
CSR_NSW_001033	Flight lines
CSR_NSW_001034	Hangar K AFFF Spills
CSR_NSW_001035	Site-wide PFAS in Soil (not shown on figure)

Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 56

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HMAS Albatross (0026)

OMP SAQP - August 2025

Project No. **12626622**
Revision No. **A**
Date **05/08/2025**

FIGURE 2

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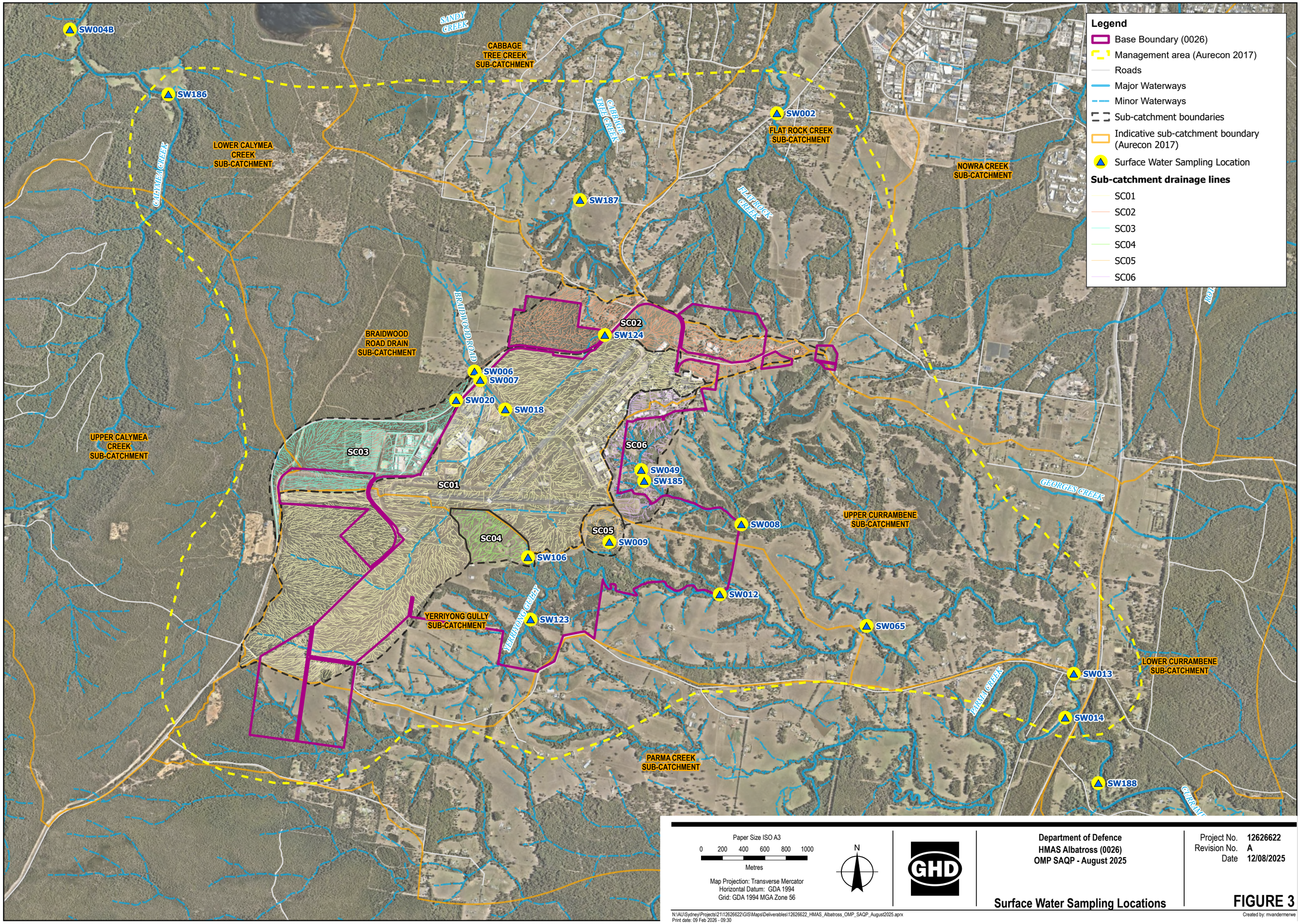

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HMAS Albatross (0026)
OMP SAQP - August 2025

Surface Water Sampling Locations

Project No. **12626622**
Revision No. **A**
Date **12/08/2025**

FIGURE 3

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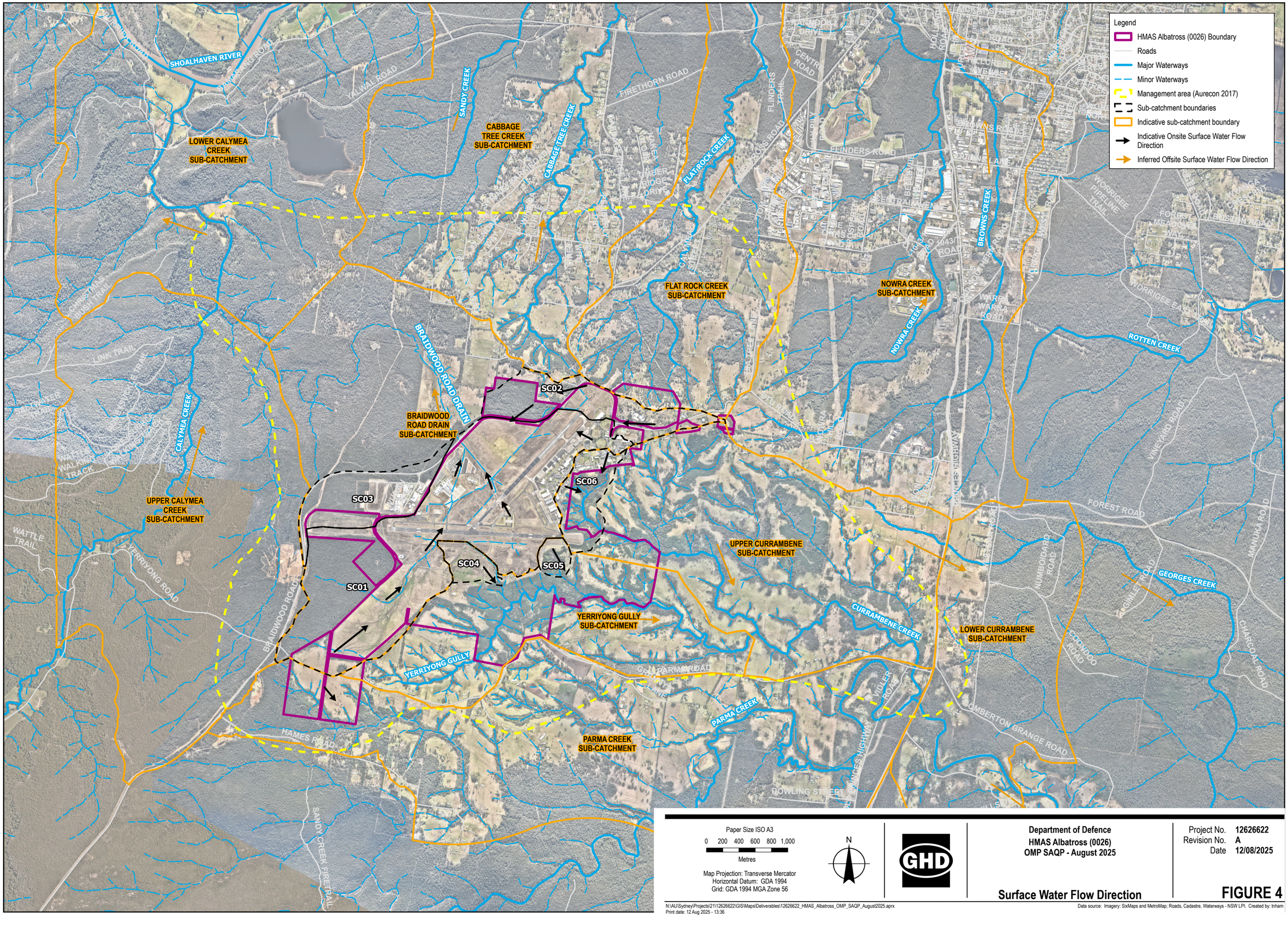

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Grid: GDA 1994 MGA Zone 56

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HMAS Albatross (0026)
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Surface Water Flow Direction

Project No. **12626622**
Revision No. **A**
Date **12/08/2025**

FIGURE 4

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Appendix B

OMP sample locations

Table B.1 Surface water sampling locations

Area	Sub-catchment	Location ID	Easting	Northing
On-base	Braidwood Road drain	0026_SW007	274962	6131014
		0026_SW018	275199	6130736
	Yerriyong Gully	0026_SW009	276181	6129485
		0026_SW012	277223	6128991
		0026_SW106[1]	275413	6129341
		0026_SW123[1]	279621	6128988
Off base	Braidwood Road drain	0026_SW005	-	-
		0026_SW186[1]	272019	6133710
		0026_SW006	274908	6131095
		0026_SW020	274735	6130823
		0026_SW124[1]	276139	6131439
	Cabbage Tree Creek	0026_SW187[1]	275904	6132713
	Calymea Creek	0026_SW004B	271090	6134321
	Flat Rock Creek	0026_SW002	277762	6133532
	Parma Creek	0026_SW013	280564	6128242
		0026_SW014	280483	6127827
		0026_SW188[1]	280795	6127151
	Upper Currambene Creek	0026_SW008	277426	6129656
		0026_SW049[1]	276482	6130165
		0026_SW185[1]	276510	6130061
		0026_SW065[1]	278609	6128694

Table Notes:

1 – Monitoring locations added to this OMP.

Note: Eastings and Northings are sourced from the Defence ESdat database.

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