

**Investigation of per- and poly-  
fluoroalkyl substances at HMAS  
Albatross**

**Preliminary Site Investigation  
Department of Defence**

**29 September 2016  
Revision: 3  
Reference: DEHP-ID-  
183-D1 / 251529**

# Document control record

Document prepared by:

**Aurecon Australasia Pty Ltd**

ABN 54 005 139 873

Level 14, 32 Turbot Street

Brisbane QLD 4000

Locked Bag 331

Brisbane QLD 4001

Australia

**T** +61 7 3173 8000

**F** +61 7 3173 8001

**E** brisbane@aurecongroup.com

**W** aurecongroup.com

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Document control					aurecon
<b>Report title</b>		Preliminary Site Investigation			
<b>Document ID</b>		<b>Project number</b>		DEHP-ID-183-D1 / 251529	
<b>File path</b>		http://cs.au.aurecongroup.com/cs/llisapi.dll/open/166957709			
<b>Client</b>		Department of Defence	<b>Client contact</b>		Darron Coyle
<b>Rev</b>	<b>Date</b>	<b>Revision details/status</b>	<b>Author</b>	<b>Reviewer</b>	<b>Approver</b>
0	12 July 2016	Draft	Aurecon, Environmental Strategies, EnRiskS	Aurecon Environmental Strategies EnRisks	Aurecon
1	17 August 2016	Draft, updated based on Auditor comments	Aurecon, Environmental Strategies	Aurecon Environmental Strategies	Aurecon
2	30 August 2016	Draft, updated based on Defence comments	Aurecon	Aurecon	Aurecon
3	29 September 2016	Updated based on Defence and agency comments	Aurecon	Aurecon	Aurecon
<b>Current revision</b>		<b>3</b>			

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Brisbane QLD 4000

Locked Bag 331  
Brisbane QLD 4001  
Australia

**T** +61 7 3173 8000

**F** +61 7 3173 8001

**E** [brisbane@aurecongroup.com](mailto:brisbane@aurecongroup.com)

**W** [aurecongroup.com](http://aurecongroup.com)



# Executive summary

## Background

This report presents findings of a Preliminary Site Investigation (PSI) of per- and poly-fluoroalkyl substances (PFAS) at HMAS Albatross (0026), Nowra, NSW (the site) and the surrounding area. The site is currently occupied by an airfield operated by the Department of Defence (Defence). The extent of the investigation includes any areas downstream that have the potential to be impacted by PFAS originating from the site.

This PSI forms the first stage of a comprehensive Stage 1 to Stage 3 Detailed Site Investigation (DSI) and human health and environmental risk assessment (HHERA) associated with potential PFAS arising from the historical use of legacy aqueous film forming foam (AFFF), during firefighting activities at the site. The primary focus of this investigation is on the presence of PFAS arising from historical use and storage of legacy AFFF at HMAS Albatross, and its potential impact on the site and surrounding area.

## Objectives

The objectives of the PSI are to:

- Identify areas of concern from the historical use and storage of legacy AFFF at HMAS Albatross
- Evaluate the likelihood and impact from potential PFAS within soil, sediment, surface water and groundwater
- Assess the adequacy and completeness of all information gathered
- Enable early identification of potential exposure to PFAS via drinking water supply and subsequent mitigation of exposure risk, if required
- Prepare a Sampling and Analysis Quality Plan (SAQP) for the DSI (reported separately)

## Scope of works

The scope of works of the PSI are consistent with the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amendment 1, 2013)* and comprise:

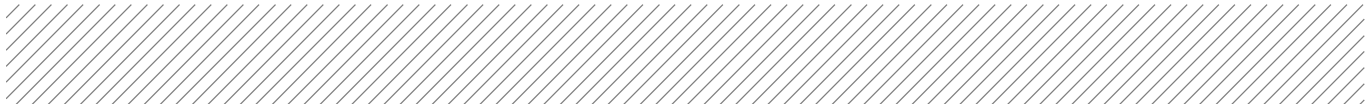
- Review of site history, including past and current uses of AFFF
- Review of site condition
- Review of previous site investigation reports
- Inspection of property

- Interviews with Defence personnel and contractors familiar with former practices, storage and waste management of historical AFFF products at the site
- Initial off-property surface water and point of use water sampling, laboratory analysis and assessment of results
- Development of a preliminary Conceptual Site Model (CSM) for potential PFAS originating from HMAS Albatross activities
- Preparation of a PSI report, including:
  - Findings of the desktop assessment, site inspection and site interviews
  - Findings of the initial off-property water investigation and the point of use surface water investigation
  - Presentation of the preliminary CSM for potential PFAS associated with the site
  - Assessment of the risk from PFAS based on preliminary investigation data

## Findings

During the PSI, the following findings were made in relation to the historical use and storage of AFFF at HMAS Albatross and potential impacts from the site to the surrounding area:

- Whilst other products are also known to contain PFAS, legacy AFFF is the major source of potential PFAS within the environment
- The airfield became operational in June 1941, while the base became fully operational in May 1942
- From the 1970s, HMAS Albatross used 3M Lightwater as the primary source of liquid fire suppression. However, in 2004, Defence began progressively replacing 3M Lightwater with Ansulite across the Defence estate
- AFFF Ansulite is stored in bulk at the fire station and suppression store as well as at each of the hangars, the ROMEO facility and the Nowra Airport. In addition, small quantities of AFFF Ansulite are stored at the fuel farm, Defence National Storage Distribution Centre (DNSDC) and flight lines. AFFF Ansulite is used at the above areas as well as the flight deck procedural trainer area, various exercise areas and the parachute training area.
- Wastewater potentially containing legacy AFFF and AFFF Ansulite is captured by the detention basin and STP and effluent storage dam
- There are various other areas potentially containing legacy AFFF from historical activities, spills or overflows, including the AFFF spill at Hangar K in December 2014 (thought to be a mixture of legacy AFFF and AFFF Ansulite), the former Hangar H, the Skyhawk crash site, areas irrigated with treated effluent, the former fuel farm, the former fire station and storage and test area (dummy deck), the former firefighting training area and the former engine test facility
- Residents have indicated that they do not use bore water for any purposes (including stock water). In addition, surface water does not appear to be used for drinking water. One resident indicated the use of a spring to top-up one of their dams which is subsequently used for livestock and agricultural purposes. Other residents have indicated that surface water, including dams and natural waterways are used for agricultural purposes, including livestock watering and irrigation.
- A number of potentially sensitive receptors are present, including:
  - Surface water runoff from the site, including Parma Creek, Currambene Creek and Yerriyong Gully, which flow into Jervis Bay and Calymea and Flat Rock Creeks, which flow into the Shoalhaven River
  - Groundwater, which is likely present between 10.0 m and 30.0 m bgl within fractures in shale and between 40.0 m and 50.0 m bgl within sandstone. Groundwater in the north-west portion of the



site flows slowly towards the Shoalhaven River, while groundwater in the south and east portion of the site is likely to flow more rapidly towards Currumbene Creek and finally Jervis Bay

- Ecological communities were identified on and off site and two Threatened Ecological Communities, three wetlands of national importance, 82 threatened species and 69 migratory species were identified as potentially occurring within a 20 km radius of the site
  - Land uses immediately surrounding the site, including agricultural activities, such as livestock, poultry, beekeeping and crops
  - Defence personnel, contractors and site visitors coming into direct contact with impacted soils and/or water as part of general or construction activities
  - Consumers of impacted groundwater or surface water. Generally, town water or rain water is used for human consumption, however there may be currently unknown instances where bore water, river/creek water or dam water is used for human consumption.
  - Recreational users of surface water
  - Consumers of home-grown produce (eg vegetable garden, poultry, beekeeping) or aquatic biota
  - Defence personnel and site visitors on site ingesting impacted water (eg irrigation of treated effluent)
  - Off site residents using impacted surface water for irrigation (eg ingestion)
- Potential migration pathways include:
- Ingestion
  - Surface water
  - Groundwater
  - Underground services

Potential areas of concern associated with PFAS within the site include:

- |   |   |
|---|---|
| ■ Fire station and suppression store                    | ■ Effluent irrigation areas                   |
| ■ Firefighting training area                            | ■ Skyhawk crash site                          |
| ■ Hangars A, B, J, K, L and M                           | ■ Fire station (former)                       |
| ■ Flight lines  | ■ Storage and test area (dummy deck) (former) |
| ■ DNSDC   | ■ Firefighting training site (former)         |
| ■ ROMEQ facility  | ■ Engine test facility (former)               |
| ■ Flight deck procedural trainer area                   | ■ Fuel farm (former)                          |
| ■ Fuel farm and associated infrastructure (current)     | ■ Hangar H (former)                           |
| ■ Nowra Airport   | ■ AFFF exercise areas                         |
| ■ Detention basin                                       | ■ Parachute training area                     |
| ■ Sewage treatment plant (STP) and effluent storage dam | ■ Hangar K AFFF spill (December 2014)         |

## Preliminary Conceptual Site Model

A preliminary CSM has been developed for the site and its surrounds and is provided in Table 1.

Table 1 Preliminary CSM (PFAS only)

Areas of concern	Pathway	Receptor
<b>Northern catchment</b>		
<ul style="list-style-type: none"> <li>■ Fire station and suppression store (1)</li> <li>■ Firefighting training area (2)</li> <li>■ Hangars A (3), B (4), K (5) and M (9)</li> <li>■ Hangar H (former) (8)</li> <li>■ Flight lines (26)</li> <li>■ DNSDC (10)</li> <li>■ ROMEO facility (11)</li> <li>■ Nowra Airport (13)</li> <li>■ Detention basin (14)</li> <li>■ Effluent irrigation areas (16)</li> <li>■ Skyhawk crash site (17)</li> <li>■ Former fire station and storage and test area (dummy deck) (20, 21)</li> <li>■ Firefighting training site (former) (22)</li> <li>■ AFFF exercise areas (24)</li> <li>■ Hangar K AFFF spill (25)</li> <li>■ Parachute training area (27)</li> </ul>	Ingestion of PFAS	Defence personnel, contractors and site visitors Residents at neighbouring properties Recreational users of surface water
	Overland transport of particulate and dissolved PFAS, via surface run off	On site surface water drainage system and subsequent downstream receiving waters (ie those in the Shoalhaven River Basin, including Calymea Creek and Flat Rock Creek) Surrounding land users Ecological communities
	Vertical migration of particulate and dissolved PFAS to groundwater	Groundwater Land users and environments down gradient of groundwater
<b>Southern catchment</b>		
<ul style="list-style-type: none"> <li>■ Hangars L (6) and J (7)</li> <li>■ Hangar H (former) (8)</li> <li>■ Flight lines (26)</li> <li>■ Flight deck procedural trainer area (12)</li> <li>■ Fuel farm and associated infrastructure (current) (18)</li> <li>■ Fuel farm (former) (19)</li> <li>■ STP and effluent storage dam (15)</li> <li>■ Effluent irrigation areas (16)</li> <li>■ Engine test facility (former) (23)</li> <li>■ AFFF exercise areas (24)</li> <li>■ Hangar K AFFF spill (25)</li> <li>■ Parachute training area (27)</li> </ul>	Ingestion of PFAS	Defence personnel, contractors and site visitors Residents at neighbouring properties Recreational users of surface water
	Overland transport of particulate and dissolved PFAS, via surface run off	On site surface water drainage system and subsequent downstream receiving waters (ie those in the Clyde River Basin, including Currumbene Creek and Yerryong Gully) Surrounding land users Ecological communities
	Vertical migration of particulate and dissolved PFAS to groundwater	Groundwater Land users and environments down gradient of groundwater



## Recommendations

Further delineation of the sources, pathways and receptors identified in this PSI is required to inform the risk to human health and/or the environment from PFAS arising from the storage and use of AFFF at HMAS Albatross. As such, it is recommended that a DSI be undertaken to determine the nature and extent of PFAS on the site and surrounding area.

A SAQP has been developed for the DSI that details the sampling of groundwater, surface water, sediment and soils, where there is a potential pathway or at a sensitive receptor.