Community Information Session
Army Aviation Centre Oakey
Human Health Risk Assessment

5 September 2016
Acknowledgment of country

We would like to respectfully acknowledge the Jarrowair and Giabul, the traditional custodians of the land on which this meeting takes place, and also pay respect to Elders both past and present.
Welcome

Session outline:
- Background
- Overview of Oakey Environmental Investigation
- Overview of Human Health Risk Assessment (HHRA)
- Next steps
- Questions
What are PFAS?

Per- and poly-fluoroalkyl substances (PFAS)

- Group of man-made compounds
- Include PFOS (perfluorinated sulfonate) and PFOA (perfluorooctanoic acid)
- PFAS have been widely used around the world in coatings (including food packaging) and products that resist: heat, oil, stains, grease and water
- Most people in developed countries are likely to have levels of PFOS and PFOA in their blood
- Emerging contaminants
Overview of Environmental Investigation
Current Investigations

Stage 2C - mid-2015 to current

This stage involves:

- Environmental Site Assessment (ESA) - complete
- Human Health Risk Assessment (HHRA)
- Ecological Risk Assessment (ERA)
ESA Findings

- Nine primary PFAS source areas on the Base
- Where AFFF has been used:
  - PFAS have been detected in the soil and pavements;
  - rainwater leaching then carries PFAS through the soil profile to the groundwater table; and
  - surface water run-off carries PFAS into surface water drains and creeks.
ESA Findings

- Groundwater containing PFOS and PFOA has moved off-Base in a west/south westerly direction towards Oakey Creek

- The area where PFOS and PFOA have been detected in groundwater has not changed significantly since July 2015

- The modelling of the possible future size and location of the PFOS and PFOA plumes assumed **no management** of the contamination by Defence, which will not be the case

Inferred extent of groundwater containing PFOS
Human Health Risk Assessment
What is a Human Health Risk Assessment?

- A human health risk assessment (HHRA) is the process to estimate the nature and possibility of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media, now or in the future.

- Human health risk assessment includes 4 basic steps:
  - Step 1 - Hazard Identification
  - Step 2 - Dose-Response Assessment
  - Step 3 - Exposure Assessment
  - Step 4 - Risk Characterisation
Definitions

• **Source**: where contamination has originated from – most often where a chemical was used or stored

• **Pathway**: how a contaminant moves from the source to the receptor – e.g. drinking water, eating contaminated food

• **Receptor**: the community (people, or a group of people) which are exposed and susceptible to a contaminant

• **Hazard**: the capacity of a contaminant to produce a particular type of adverse health effect

• **Risk**: the probability that, in a certain timeframe, an adverse health outcome could occur in receptors that are exposed to a particular concentration of the contaminant
What are the objectives of the HHRA?

- The objective of the HHRA is to assess the potential for current human health risks associated with exposure to PFAS within the Investigation Area.

- Follows an established framework: *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013)
What can the HHRA tell us?

- Potential exposures from different pathways
- Cumulative exposure from multiple pathways
- Exposure scenarios where no adverse health effects are likely
- Which pathways should be focussed on to minimise exposure most effectively
- Data gaps and uncertainties to inform future investigations
What can’t the HHRA tell us?

- Cannot provide and should not be used as a substitute for medical advice
- Cannot predict or be used to determine whether health effects will occur for individuals in the future
- Cannot diagnose whether existing health effects of individuals are associated with past exposure
Environmental Data used in the HHRA

• 1,000+ samples collected on and off-Base including:
  – Groundwater (422)
  – Surface water (78)
  – Soil (212)
  – Sediment (104)
  – Pore Water (10)
  – Pasture plants (55)
  – Fruit & vegetables (52)
  – Chicken eggs (15)
  – Cow & sheep milk (10)
  – Beef & lamb blood serum (58)
  – Locally caught fish (46)

• Blood serum data representative of the Oakey community
**Who?**

Receptors considered in the Investigation Area:
- Residents
- Commercial workers (on- and off-Base)
- Recreational users

**How?**

47 exposure pathways were assessed, including:
- Drinking groundwater
- Indoor uses of groundwater in the home (e.g., showering)
- Outdoor uses of groundwater in the home (e.g., irrigation)
- Eating various foods (e.g. chicken eggs, fish, beef, vegetables)
- Ingestion of dust particles
- Working with groundwater and soil
- Recreational activities (e.g., swimming and fishing)
Residential and recreational exposure pathways

- Use of groundwater for washing animals
- Potential PFAS in soil and dust resulting from the use of groundwater for irrigation
- Fishing in local waterways
- Oakey Creek
- Groundwater containing detectable PFAS may be extracted for domestic uses indoors
- PFAS impacts in pool water as a result of filling with groundwater
- Groundwater used to water home grown livestock or fruit/vegetables
- PFAS detected in surface water and sediment from Oakey Creek
- Boating and swimming in local waterways
- PFAS detected in groundwater outside of the Site boundary
Agricultural worker exposure pathways

Groundwater used to water commercial livestock and irrigate pasture/fodder crops

Irrigation of crops using PFAS impacted groundwater

Use of groundwater for commercial processes may result in direct contact exposures for commercial workers

Potential PFAS in soil and dust resulting from the use of groundwater for irrigation and livestock watering

PFAS detected in groundwater outside of the Site boundary
Estimated Daily Intake

• For each of the 47 pathways an average daily PFAS intake was estimated, considering:
  • Frequency of activity
  • Duration of activity
  • Rate of exposure while undertaking the activity
  • Age specific factors such as body weight, skin surface area, amount of water drunk or food eaten

Tolerable Daily Intake (TDI)

• The TDI is an average daily intake which over a lifetime is expected to have negligible health effects
  • Usually based on doses from studies that showed no effect in animals
  • Intakes above the TDI do not mean adverse health impacts will definitely occur
Potential Outcomes

- Low and acceptable
- Approaching a potential risk
- Elevated

The phrase ‘low and acceptable’ which appears throughout the report is standard terminology used in human health risk assessments completed in accordance with the National Environment Protection Measure (NEPM). This phrase refers to circumstances where the level of risk is calculated to be below the threshold where possible health impacts may occur.
HHRA Key Findings
Groundwater Zones
Low and Acceptable Risks
Groundwater Zones 1 and 2

The findings of the HHRA assessed that the risks from the following pathways are low and acceptable:

- Incidental (unintentional) ingestion and skin contact with surface water and sediment during recreation (e.g. swimming, fishing) in local creeks

- Incidental ingestion and skin contact with groundwater used at work or at home for irrigation, washing animals or washing vehicles

- Incidental ingestion and skin contact with soil

- Ingestion of dust from soil irrigated with groundwater
Low and Acceptable Risks
Groundwater Zones 1 and 2

The findings of the HHRA assessed that the risks from the following pathways are also low and acceptable:

• Incidental ingestion and skin contact with groundwater used for household cleaning and laundry

• Eating fish caught recreationally in local waterways

• Eating beef and lamb from animals that have consumed groundwater

• Eating fruit and vegetables watered with groundwater and/or grown in soil where groundwater has been used for irrigation
Breastfeeding Infants
Groundwater Zones 1 and 2

• The findings of the HHRA assessed that potential risk to infants through exposure (ingestion) of breast milk did not increase potential adverse health risks over a lifetime
Elevated PFAS Intakes
Groundwater Zone 1 and 2

- There are a limited number of pathways for which theoretical intakes were estimated to be greater than the TDI:
  - Drinking groundwater (Groundwater Zone 1 and 2)
  - Incidental (unintentional) ingestion of groundwater used in home swimming pools, for showering/bathing and/or for sprinkler play in Groundwater Zone 2

- The available blood serum data from Oakey indicates that it is unlikely there have been upper range PFAS intakes which may be associated with potential health risks
Overall Key Findings
Groundwater Zones 1 and 2

- The findings of the HHRA assessed that for the typical person living, working or undertaking recreation activities within the Investigation Area there is a low and acceptable risk to health from PFAS exposure.
Recommended Precautions
Recommended Precautions

• Precautionary recommendations are made in the HHRA to reduce PFAS exposure because:
  – People in the community have been exposed to PFAS in the past
  – There are upper (high) range exposures that theoretically have the potential to result in PFAS intakes that exceed the TDI
  – There are data gaps and uncertainties in the information available to inform the HHRA

• Precautionary recommendations focus on the pathways with the greatest potential PFAS intakes
Recommended Precautions from the HHRA

All residents in Investigation Area - Groundwater Zone 1 and Zone 2:
- Do not drink groundwater
- Avoid or minimise consumption of eggs from chickens that drink water containing detectable PFAS until further data can be collected to evaluate potential exposures by this pathway

Additional precautionary advice for residents - Groundwater Zone 2:
- Avoid or minimise the use of groundwater for showering and bathing
- Avoid or minimise the use of groundwater for filling swimming pools or paddling pools
- Avoid or minimise sprinkler play using groundwater
Next Steps
Environmental Investigation

Next Steps

- Environmental Site Assessment – completed 27 July 2016
- Human Health Risk Assessment – completed 5 September 2016
- Ecological Risk Assessment (ERA)
  - Report to be finalised – by the end of October 2016
  - Community information sessions – by the end of October 2016
Ecological Risk Assessment

- The ERA will assess:
  - The potential for PFAS detected in the environment to pose unacceptable risks to ecological receptors (plants and wildlife) within the Investigation Area.
  - The potential for wider ecosystem impacts as a result of the accumulation of PFAS in terrestrial and aquatic plants and wildlife.
- The ERA includes an ecological survey and uses data from other parts of the environmental investigation.
Toxicity Reference Values

- enHealth prepared a Guidance Statement on PFAS, that was endorsed by the Australian Health Protection Principal Committee (AHPPC) on 15 June 2016

- The statement has been made public by some states, but was not published by the Commonwealth

- The Australian Government initiated an independent review of the enHealth reference guidelines

- The Department of Health engaged an expert reviewer, Adjunct Professor Andrew Bartholomaeus, who was independent of the enHealth process, to conduct this review

- Defence will consider ESA and the HHRA in the context of the findings of the enHealth review as appropriate
Voluntary Blood Testing

- The Australian Government has committed to funding a voluntary blood testing program for people who live or work in the Investigation Area (now or in the past)
- Defence is working with Government to finalise the arrangements for implementing this program
- The program is expected to commence during September 2016
- Defence will reimburse those who live or work, or have lived or worked, in the investigation area who have already obtained PFAS blood tests
- Fact sheets with additional details are available
Long and Short-term Management

• Short-term management actions:
  – groundwater trials using United States based technology
  – excavation and stockpiling of sediment from drains on base
  – removal of a large AFFF waste water tank at the base

• Ongoing trials to identify feasible long-term management options:
  – Solidification
  – Stabilisation

• Continue to assess international remediation capabilities
Ongoing Commitments

- Review of HHRA in light of any **enHealth guidance** or new information.
- Address **data gaps and uncertainties** identified by the HHRA
- Annual **residential water sampling**
- Further **environmental monitoring**
- Regular **community engagement**
- Ongoing **alternative water supply** measures
- Continued liaison and collaboration with **Queensland and Local Government**
- Ongoing liaison with **industry and regulatory** professionals nationally and internationally
Where can you find a copy of the HHRA Report?

Published 5 September 2016


Hard copies available for viewing:

- Jondaryan Shire Library
  62 Campbell St, Oakey

- Toowoomba City Library
  155 Herries St, Toowoomba
Further Information

- Community walk-in sessions:
  
  **Tuesday 6 September 2016**
  
  **Oakey Cultural Centre**
  
  10.00am – 1.00pm (morning session)
  3.30pm – 7.00pm (afternoon session)

How can you receive assistance interpreting the report?

- Attend community walk-in sessions
- Take home the HHRA Fact Sheet today
- Contact the project team on 1800 136 129 or defence.oakey.anz@aecom.com
Questions
Thank you

Contact us
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