



Department of  
**Environment and  
Heritage Protection**

Ref F01/2014

To The Stakeholder  
Firefighting foam use.

18 December 2014

**Re: Draft Policy on the Management of Firefighting Foam**

Dear Sir/Madam

Your organisation has been identified as a stakeholder with an interest in the management of firefighting foams and their related wastes. As you may already be aware, a wide variety of current and legacy firefighting foams with different formulations are in use across Australia. All firefighting foams have the potential to cause environmental harm to some degree if released through a combination of effects related to their persistence, bioaccumulation potential, toxicity (short and long term) and biochemical oxygen demand.

In recent years there have been growing concerns regarding the significant impacts that firefighting foams can have on public health and environmental values. The draft Management of Firefighting Foam policy seeks to address those concerns and provide guidance on the department's expectations for the storage, use, treatment, release, disposal and environmental protection measures relevant to firefighting foam.

The Queensland Department of Environment and Heritage Protection has in conjunction with the Western Australian Department of Environment Regulation (DER) researched the associated issues extensively. This has included consultation with experts and regulatory authorities in Australia and overseas and as a result Western Australia and Queensland have drafted complementary policies on the management of firefighting foams for our respective states.

The first draft of the Policy was released for stakeholder comment in early 2014 and the range of issues raised has been taken into account in further research into the issues and changes incorporated in the second draft of the Policy. Accompanying the draft Policy is an *Explanatory Notes* document; this outlines the specific issues, current knowledge, references and basis for the elements of the draft Policy.

The draft policy sets out standards against which users and regulators can make informed and balanced decisions in their choices and uses of foam and the protective measures that are necessary to prevent environmental harm and ensure compliance with environmental legislation.

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The Queensland and WA policies will as far as practical be the same with differences primarily in the references to specific state legislative and regulatory requirements. The departments will consider all comments jointly before formulating the final content of the policies to ensure consistency.

The Department is seeking further comments from stakeholders on any issues that they feel are relevant to their particular application. Please distribute this letter and the attached draft policy to any of your members or associates that you feel are relevant.

Written comments should be received by **Monday 09 February 2015** and be emailed to: [nigel.holmes@ehp.qld.gov.au](mailto:nigel.holmes@ehp.qld.gov.au).

Alternatively comments may be posted to:

Department of Environment and Heritage Protection  
Attention: Firefighting Foam Stakeholder Comments  
PO Box 3130  
Red Hill Rockhampton, Queensland, 4701.

All comments will be considered by Western Australia and Queensland in deciding the final content of the Policy for both states.

Yours sincerely



Rob Lawrence  
**A/Deputy Director-General**

Att.

## Management of Firefighting Foam

*This Policy provides direction for government and industry on the environmental protection requirements of the Queensland Department of Environment and Heritage Protection when making decisions on activities with the potential to impact on the environment.*

### 1 Objective

(see Explanatory Notes §1, §2)

The objective of this policy is to outline the Department of Environment and Heritage Protection's requirements and expectations for the handling, transport, storage, use, release, waste treatment, disposal and environmental protection measures relevant to the use of firefighting foam. Particular regard is given to its management for the prevention of the potential adverse impacts from acute effects such as toxicity and oxygen depletion, as well as persistence, bioaccumulation and any other chronic effects.

### 2 Definitions

The following definitions apply for the purposes of this policy:

#### **ALARP**

(see Explanatory Notes §1.3)

As Low As Reasonably Practical – such that the risks from the activity must be averted unless there is a gross disproportion between the costs and benefits of doing so.

#### **Best practice environmental management**

(see Explanatory Notes §1.3)

The management of the activity to achieve an ongoing minimisation of the activity's environmental harm through cost-effective measures assessed against the measures currently used nationally and internationally for the activity.

#### **Biochemical oxygen demand (BOD)**

(see Explanatory Notes §2.2)

BOD as measured over periods such as 5, 10, 20 and 28 days expressed in milligrams of oxygen per litre for each period. The terms *biochemical* oxygen demand and *biological* oxygen demand are interchangeable for the purposes of this policy. BOD is a measure of the amount of oxygen consumed, primarily by bacteria, in breaking down organic matter in a waterway (algal respiration, sediment and chemical uptake can also contribute to BOD). Elevated BOD will result in depletion of dissolved oxygen from the water column and cause potential harm to aquatic life (e.g. related to decay of organic compounds in foam).

Usually the decomposition of the degradable organics has proceeded so far after 28 days (typically >95%) that no further significant BOD occurs. For firefighting foams the 5 day BOD (BOD<sub>5</sub>), is commonly the time by which 70% of the final value has been reached\*. The standard method for determining BOD<sub>5</sub> in Australia is APHA (1998) section 5210B, using APHA (1998) Section 4500-O for the determination of dissolved oxygen. BOD<sub>5</sub> and BOD<sub>28</sub> are the most usual and relevant measures for assessing environmental risk, BOD<sub>5</sub> indicating likely acute oxygen stress to the receiving environment and BOD<sub>28</sub> reflecting ease of degradation.

#### **Bioaccumulation**

(see Explanatory Notes §2, §2.5–2.8)

A general term for the progressive increase in the amount of a substance in an organism or part of an organism that occurs because the rate of intake exceeds the organism's ability to remove

\* Australian And New Zealand Guidelines For Fresh And Marine Water Quality 2000

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the substance from the body. Intake can be directly from environmental exposure, or from food and water ingestion. See also the related terms *Bioconcentration* and *Biomagnification*<sup>†</sup>.

### **Bioconcentration**

(see Explanatory Notes §2.5–2.8)

Process leading to a higher steady-state *concentration* of a substance in an organism compared to the concentration in the environmental media to which it is exposed. E.g. the *net uptake, against a concentration gradient*, of a contaminant directly from the environment by plants or animals (from water or soil) until an equilibrium (higher) concentration of the contaminant is reached in one or more tissues.

### **Biodegradability (value)**

(see Explanatory Notes §2.3, 2.8)

The degradability of the product or waste under environmental or biological treatment conditions, determined as the ratio of the 28 day biochemical oxygen demand (BOD<sub>28</sub>) to the total chemical oxygen demand (COD) for the oxidisable organics, expressed as a percentage (BOD<sub>28</sub>/COD x 100).

### **Biodegradable**

(see Explanatory Notes §2.3, 2.8)

For the purposes of classifying and stating the biodegradability of a firefighting foam all the organic compounds in its composition must degrade under normal environmental conditions within 28 days from the time of its release to water by:

- >95% to be classed as *readily biodegradable*
- >99% to be classed as *fully biodegradable*.

Otherwise the period over which at least 95% of the organics degrade should be stated (e.g. “readily biodegradable over 45 days”). Foams that contain organic compounds that do not degrade under normal environmental conditions, or break down to produce organic compounds that do not degrade under normal environmental conditions, cannot be classed as readily or fully biodegradable.

### **Biopersistence**

(see Explanatory Notes §2.5, §2.8)

The persistence of a chemical compound in plant or animal tissues unaltered or altered in a way that results in a chemical with similar characteristics or effects. Biopersistence is significant if the chemical compound is toxic and persists in the plant or animal tissues for long enough to have a potentially detrimental effect (beyond that of acute toxicity) or for the chemical to be passed on to further individuals via the food chain<sup>‡</sup>.

### **Biomagnification**

(see Explanatory Notes §2.5–2.8)

Also termed *ecological magnification*. Sequence of processes in an ecosystem by which higher *concentrations* are attained in organisms at higher trophic levels (at higher levels in the food web); at its simplest, a process leading to a higher concentration of a substance in an organism than in its food.

### **Chemical oxygen demand (COD)**

(see Explanatory Notes §2.2, §2.3)

Chemical oxygen demand (COD), expressed as milligrams of oxygen per litre, is a measure of the theoretical maximum amount of oxygen required to oxidise all the chemically oxidisable organics in a sample, as usually determined using acid dichromate. When BOD<sub>28</sub> is subtracted from COD the remaining amounts represent the oxidisable organic components that are not readily biodegradable. Fluorinated organic compounds in foam are a component of the total organic material present. However, because of their chemical stability, they do not contribute to the COD value, as normally measured, and are considered non-oxidisable and non-biodegradable organics.

<sup>†</sup> Glossary of terms used in toxicology, IUPAC Recommendations 2007

<sup>‡</sup> Australian And New Zealand Guidelines For Fresh And Marine Water Quality 2000

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**Contamination**

(see Explanatory Notes §2.6, 2.9.1, 3, 6.1, 6.2)

Contamination of the environment is the release into the environment (whether by act or omission) of a contaminant that is of concern or could cause environmental harm.

**C6 purity-compliant foam**

(see Explanatory Notes §6.3, 7, 7.5)

For the purposes of the Policy, a foam product that is *C6 purity compliant* must not have greater than 50 mg/kg of total impurities in the concentrate for compounds where the *perfluorinated* part of the carbon chain is longer than 6 carbon atoms (e.g. PFOA, PFOA precursors, 7:3Ft, 8:2Ft, 10:2Ft, fluoropolymers, etc.) but excluding PFOS which has a separate impurity limit of 10 mg/kg.

**Environmental persistence<sup>§</sup>**

(see Explanatory Notes §2.5, 2.5.1, 2.6, 2.8)

The long-term persistence of chemicals, or their degradation products with similar characteristics or effects, in the environment under normal environmental conditions, with resistance to degradation by factors such as oxidation, hydrolysis, reduction, exposure to UV light and metabolization by microbes. Environmental persistence increases the risks of toxicity, biopersistence, bioaccumulation, bioconcentration and biomagnification occurring.

An organic compound is considered environmentally *persistent* or *very persistent* under *Annex XIII of REACH (EC 2011)* when its half-life, including that of its degradation products with similar characteristics or effects, is greater than those shown in the table below for each environmental compartment.

Criteria for identifying Persistent (P) and Very Persistent (vP) substances			
Persistent (P) degradation half-life		Very Persistent (vP) degradation half-life	
Marine water	>60 days	Marine water	>60 days
Fresh or estuarine water	>40 days	Fresh, or estuarine water	>60 days
Marine sediment	>180 days	Marine sediment	>180 days
Fresh or estuarine sediment	>120 days	Fresh, or estuarine sediment	>180 days
Soil	>120 days	Soil	>180 days.

**Firewater, wastewater or runoff**

(see Explanatory Notes §3, 6)

Any contaminated water generated where water sprays, jets, mists, deluge, monitors or foam generators have been used to extinguish a fire, dilute a contaminant, cool a container or stockpile, blanket a spill with foam, disperse or dissolve a gas or vapour release or wash down a contaminated area. This includes firewater, wastewater or runoff produced during testing, training, maintenance, accidental release or an incident whether or not a fire was involved.

**Fluorinated organic compounds**

(see Explanatory Notes §7)

All organic compounds that contain the elements fluorine and carbon where the fluorine has replaced some or all of the hydrogen in the straight or branched organic carbon chain including perfluorinated or polyfluorinated compounds. This commonly refers to, but is not limited to, PFOS, PFOA, fluorotelomers, fluorosurfactants, fluoropolymers and their precursors or breakdown products.

**Fluorinated organics analyses**

(see Explanatory Notes §7)

For the purposes of determining the presence of fluorinated organic compounds in soil, water, foam solutions or foam concentrate, sample analyses shall be done for at least PFOS, PFOA, 6:2Ft and 8:2 Ft (6:2 and 8:2 fluorotelomers) content whether in derivatised or free form. Where possible the total organic fluorine content<sup>(i)</sup> should be determined to ensure that there are no significant occurrences of other fluorinated organic compounds.

<sup>§</sup> REACH Annex XIII, PBT and vPvB criteria

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### **General environmental duty (GED)**

(see Explanatory Notes §9)

A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm having regard to the current state of technical knowledge for the activity and other relevant matters.

### **Intergovernmental Agreement on the Environment (IGAE)**

The agreement made on 1 May 1992 between the Commonwealth, the States, the Australian Capital Territory, the Northern Territory and the Australian Local Government Association.

### **PFOA**

(see Explanatory Notes §7)

The fluorinated organic compound perfluoro-octanoic acid: CAS RN 335-67-1 (straight-chain isomer), IUPAC systematic name 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-Pentadecafluoro-octanoic acid (C<sub>7</sub>F<sub>15</sub>CO<sub>2</sub>H) or its carboxylate ion perfluoro-octanoate.

### **PFOS**

(see Explanatory Notes §2.1-2.9, 7)

The fluorinated organic compound perfluorooctanesulphonic acid: CAS RN 1763-23-1, IUPAC systematic name 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-Heptadecafluoro-1-octanesulfonic acid or its ionised form perfluoro-octane sulphonate (C<sub>8</sub>F<sub>17</sub>SO<sub>3</sub>)

### **6:2 Fluorotelomers (6:2Ft) and short-chain homologues**

(see Explanatory Notes §7.5)

The polyfluorinated organic compounds containing a perfluoroalkyl tail (n=6), a dimethylene spacer (n=2) and a functional group. For example, 6:2 fluorotelomer sulphonate (6:2FtS): CAS RN 27619 97-2, IUPAC systematic name 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctane-1-sulphonate or 1H,1H,2H,2H-perfluorooctane sulfonic acid. Also other short-chain fluorotelomer homologues such as 4:2 and 5:3 fluoroteleomers.

### **Safety data sheet (SDS or MSDS)**

(see Explanatory Notes §5)

Safety data sheet, sometimes referred to as a material safety data sheet (MSDS), in the form described by the Safe Work Australia Code of Practice *Preparation of Safety Data Sheets for Hazardous Chemicals* (2011). Information relevant to potential environmental impacts should be placed in *Section 12—Ecological Information* of the SDS.

## 3 Scope

This policy applies to any person, organisation or corporation that handles, transports, stores, uses, releases, treats wastes or disposes of any products, compounds, water, soils, wastes or other materials associated with or contaminated by firefighting foams at any concentration at any place in the state of Queensland and its waters.

This policy does not consider the range of other possible contaminants in addition to firefighting foam that might be in firewater or runoff such as hydrocarbons, chemicals, combustion products, sediments, etc., which may have significant environmental impact.

## 4 Legislation

The *Environmental Protection Act 1994* (EP Act) requires that all persons undertaking any activity that impacts or has the potential to impact the environment in Queensland are required to take all reasonable and practical measures to prevent such harm from occurring (s319). This includes having regard for the nature of the harm or potential harm, the sensitivity of the receiving environment and the current state of technical knowledge for the activity.

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This policy has as its objective the prevention of short-term and long-term environmental harm taking into account the precautionary principle as set out in the *Intergovernmental Agreement on the Environment* and best practice environmental management.

### 5 Related Policies, Standards and Procedures

The EHP *Procedural Guide 2.15 – Managing contaminated firewater* is allied to this policy and guides the measures to be undertaken when dealing with wastewater or firewater (whether the result of a fire or not) that contain any type of firefighting foam.

Standards and references for contaminant threshold and trigger values have been derived from those sources listed in the footnotes on each page.

### 6 Policy

(see Explanatory Notes §1.3, 2, 9)

The Department of Environment and Heritage Protection is committed to managing the health of Queensland's environment by protecting the state's unique ecosystems, including its landscapes and waterways, as well as its native plants, animals and biodiversity through strong environmental regulation that supports sustainable long-term economic development.

All firefighting foams pose a range of hazards to the environment when released during activities such as training, maintenance, testing, incident response, fires and waste disposal. The combination of chemicals used in firefighting foams can have direct and indirect acute and chronic impacts on biota, soils and waterways through their persistence, bioaccumulation, toxicity (PBT) and their biochemical oxygen demand (BOD) when they are released and degrade. The impacts of the release of firefighting foams can also extend to public and economic use of resources such as recreational activities, public amenity, water supply, aquaculture and fisheries.

Of particular concern in regards to firefighting foams is the significant body of existing and growing evidence that fluorinated organic compounds, which have been and are commonly used in some Class B firefighting foams, pose significant risks to the environment through their persistence, bioaccumulation potential and toxicity.

When choosing and procuring firefighting foam and assessing its suitability for a particular application and its potential to cause undesirable environmental effects the user must take into account the:

- composition of the foam and appropriate effectiveness for the intended application
- types and quantities of concentrate to be held on site
- potential volume of firewater that could be generated during an incident
- ability to manage and contain spills and firewater on site
- measures to prevent release of contaminants to soils, groundwater, waterways and air
- facility location and proximity to environmentally sensitive areas
- circumstances under which an intended or unintended release might occur
- pathways for foam and other incident contaminants to be released to the environment
- potential PBT and BOD impacts on the local and wider environmental values
- on-site and off-site treatment and disposal of wastewater and contaminated materials
- remediation of contaminated soils, waterways and groundwater
- training, maintenance and testing needs and requirements.

The Policy also recognises that a prime consideration when choosing and procuring firefighting foam is the effectiveness of the foam for the intended application in providing adequate levels of firefighting performance, safety and property protection. The alternatives available that meet the appropriate performance standards must then be compared in terms of a net environmental

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benefit analysis to select the optimal combination that also best addresses the relevant environmental protection standards and overall best practice.

All firefighting foams must be assessed for their potential to cause environmental harm prior to use or disposal. The need for management, containment and protective measures and procedures must be assessed in terms of the foam's properties relative to:

- Environmental persistence of the compounds in their formulation and any breakdown products.
- Biopersistence, bioaccumulation, bioconcentration and biomagnification potential.
- Toxicity (both acute and chronic effects).
- Biochemical oxygen demand and biodegradability.

### 6.1 Fluorine-free firefighting foams

(see Explanatory Notes §8)

Although fluorine-free foams may not contain highly persistent fluorinated organic compounds the potential to cause environmental harm and the need for management, containment and protective measures and procedures must be fully assessed. Particular regard should be paid to potential impacts from acute toxicity, biochemical oxygen demand and the biodegradability characteristics of the foam.

Fluorine-free firefighting foam users must be able to demonstrate that they are able to adequately manage, contain, treat or properly dispose of the foam, firewater, wastewater, runoff from activities or incidents on the site such that any release to the environment is not likely to cause significant environmental harm. For example, foam used for vapour and spark suppression on a roadside hydrocarbon spill where the only significant contaminant released is the firefighting foam may be contained on site by temporary bunding to prevent it entering an environmentally sensitive area such as a water body and may be disposed of by:

- irrigation onto adjacent land to soak in and degrade *in situ*
- holding in on-site ponds or drains for 28 days to degrade\*\*
- soaking into soil along a roadside drainage line to degrade *in situ* (clear of any waterway)
- pumping out and disposal to sewer or wastewater treatment plant.

The disposal of firewater that contains significant levels of contaminants, such as hydrocarbons, chemicals or fire combustion products, in addition to fluorine-free firefighting foam needs to be considered on a case-by-case basis.

#### 6.1.1 Direct releases to land of fluorine-free foam

(see Explanatory Notes §8)

Where fully-biodegradable, fluorine-free firefighting foam is released to land, away from waterways, such as when used by Rural Fire Brigades for ignition prevention, fire control, extinguishment, damping-down and training on vegetation fires, it is expected that no adverse effects will occur from the application of small amounts of foam (e.g. <500 L of concentrate). For the normal application of foam across a wide area or fire front away from waterways the foam will rapidly soak into the soil and biodegrade in-situ. Significant releases of foam directly to, or within 50 metres of a permanent waterway during rural firefighting should be avoided where possible (e.g. >50 L of concentrate in a watercourse or close to it).

Concentrated and repeated applications of fluorine-free foam, such as on an intensively-used bare-earth training area, should have firewater control measures in place to prevent immediate releases to adjacent waterways. Where a volume of firewater is generated, beyond that which can readily soak into the soil or be irrigated to adjacent land to soak in, control measures such as

\*\* Decomposition of organic matter causing elevated BOD is likely to have progressed to completion by 28 days.



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bunding or ponds should be used to hold the water for at least 28 days to allow it to degrade before release and/or to evaporate.

### **6.1.2 Direct releases to waterways of fluorine-free foam** *(see Explanatory Notes §2.2, 8)*

Where a discharge directly to a waterway, or to a place where contaminants may then travel to a waterway, is unavoidable, particular consideration should be given to the potential extent of impacts from acute toxicity and BOD in the affected waterway when selecting a fluorine-free foam type (e.g. foam from a firefighting tug, other vessel, shipping berth or wharf where hydrocarbons are transferred).

Testing, training, certification and maintenance activities are recognised as essential and necessary to maintain fire protection standards and proficiency and may result in unavoidable releases of foam directly to the environment. These activities should be undertaken and managed in such a way as to minimise the potential for pollution or environmental harm to be caused. For example:

- avoid discharging to environmentally sensitive areas (where plant is mobile)
- avoid or minimise discharges to confined waterways where water turnover is limited
- block drains and pump out wastewater to adjacent land where it can soak in and degrade
- limit the quantity of foam used in tests
- wash down of decks and hardstands with large volumes of water to dilute discharges
- use only water for testing or lower toxicity training foam
- test systems in segments spread over a time period to allow dispersion of foam
- time activities to coincide with large outgoing tidal flows to dilute and disperse foam.

### **6.2 Fluorinated firefighting foams** *(see Explanatory Notes §7, 7.1, 7.2)*

Fluorinated foam is any foam that has in its composition any fluorinated organic compound or compounds (see Definitions). If foams containing fluorotelomers are to be used for firefighting (subject to the purity standards – see Definitions) then the user must be aware of the composition of the foam in terms of:

- The presence and concentration of fluorinated organic compounds with a perfluorinated 6-carbon chain length and shorter including 6:2 fluorotelomers.
- The presence and overall concentration of fluorinated organic compounds with a perfluorinated 7-carbon chain length and longer including PFOS, PFOA, 8:2 fluorotelomers and their higher homologues.

Where there is any potential for spill or release of foam containing fluorotelomers the user must be able to demonstrate that they are able to fully and completely contain and properly dispose of the concentrate, foam solution, produced foam, firewater, wastewater, runoff, contaminated soils and other materials. This includes spills or releases produced during the testing and maintenance of fixed or mobile equipment.

#### **6.2.1 Foams containing PFOS** *(see Explanatory Notes §3, 3.1, 7.2, 7.4)*

Use of foams that contain the fluorinated organic compound PFOS (perfluoro octane sulphonic acid) as well as its salts or any compound that degrades or converts to PFOS at a concentration of greater than that listed in [Table 6.2.2 A](#) in foam concentrate must no longer be used and must be withdrawn from service as soon as possible, including legacy stock.

#### **6.2.2 Foams containing PFOA & PFOA precursors to be withdrawn** *(see EN§3.2, 7.2, 7.4)*

Firefighting foams that contain PFOA, PFOA precursor compounds or their higher homologues, where the total organic fluorine content equivalent to PFOA and higher homologues exceeds that listed in [Table 6.2.2 A](#) in foam concentrate must be withdrawn from service as soon as practicable

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and any held stocks (and any other related wastes) must be secured pending disposal. These materials are to be managed and disposed of as regulated waste.

PFOA precursor compounds and their higher homologues include any compounds that potentially degrade or convert to PFOA, such as 8:2 fluorotelomer derivatives, or the higher homologous perfluoroalkyl carboxylic acids (PFCAs) as well as their precursors, such as 10:2 and 12:2 fluorotelomer derivatives.

**Table 6.2.2 A – Fluorinated organic compounds limits in concentrates**

Compound(s)	Limit (mg/kg)
PFOS (Perfluoro-octane sulfonic acid)	10 <sup>††</sup>
PFOA (Perfluoro-octanoic acid) and higher homologues, and PFOA precursors and higher homolog PFCAs as total organic fluorine	50 <sup>‡‡</sup>
<sup>§§</sup> PFCAs and precursors expressed as free PFOA equivalent)	(73)

### 6.2.3 Disposal of foam containing PFOS, PFOA, precursors & higher homologues (§3–3.2)

Foam concentrate that contains the fluorinated organic compound PFOS, PFOA, 6:2 FtS, their precursors or their higher homologues at greater than the limits in Table 6.2.2 A, or any compound that degrades or converts to those compounds, must not be on-sold, traded, exported or otherwise provided to any person other than for the purposes of proper disposal. Wastewater from the cleaning of such contaminants from equipment and pipe-work must be fully contained and removed for disposal to an approved facility.

A disposal plan for waste fluorinated foam concentrate containing PFOS, PFOA, their precursors and their higher homologues (at greater levels than those in Table 6.2.2 A) must be drawn up as soon as is practical but nonetheless within 6 months of the Policy being approved. Existing stocks of such foams must be held securely and disposed of to an approved facility *without undue delay*. Such foams must not be used in training, maintenance, testing or other activities that may result in their release to the environment on or off the user's site.

### 6.2.4 Foams containing short-chain fluorotelomers (see Explanatory Notes §7, 7.1–7.5)

Foam containing short-chain fluorotelomers (C6 or shorter perfluorinated moieties) can be used if it is found to be the only viable option, after firefighting effectiveness, health and safety risks, environmental protection and property protection characteristics have all been appropriately considered, however, the following requirements must be met:

- The foam must be C6 purity compliant foam (see Definitions).
- No releases directly to the environment (e.g. to unsealed ground, soakage pits, waterways or uncontrolled drains).
- All releases must be fully contained on site.
- Containment measures such as bunds and ponds must be controlled, impervious and must not allow firewater, wastewater, runoff and other wastes to be released to the environment (e.g. to soils, groundwater, waterways stormwater, etc.).
- All firewater, wastewater, runoff and other wastes must be disposed of as regulated waste to a facility authorised to accept such wastes.

### 6.2.5 Hand-held extinguishers & mobile plant extinguishers—Special considerations (§4.4)

It is acknowledged that for the time being there are limited foam types (mainly long-chain C8/8:2Ft fluorine-containing AFFF) approved for use in hand-held and mobile plant foam-type fire

<sup>††</sup> Environment Agency UK, 2011– PFOS Fire Fighting Foams. Use and disposal information.

EU Commission Regulation No. 757/2010

<sup>‡‡</sup> U.S. EPA PFOA Stewardship Program

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extinguishers (e.g. those portable extinguishers used in commercial premises and mounted on large earthmoving vehicles). However, there is a high probability that foam from these extinguishers will be discharged directly into the environment with no control of dispersal by users with limited knowledge.

Fire extinguishers that use foams containing the fluorinated organic compound PFOS at a concentration greater than 10 mg/kg (relative to concentrate) are not to be used and must be withdrawn from service as soon as possible.

Despite the relatively small quantities of foam solution in individual hand-held and mobile plant extinguishers there are very large numbers in use, involving a large total volume of foam, with a significant potential for health and environmental impacts if the discharges and wastes are not managed properly. Hand-held and mobile plant extinguishers are subject to the following restrictions:

- Foam concentrate must not have a concentration of PFOS or PFOA in it higher than the limits in [Table 6.2.2 A](#).
- Foam concentrate must not have a concentration of PFOA precursors or higher homologues in it higher than the limit in [Table 6.2.2 A](#) unless there is no other fluorine-free or *C6 purity compliant foam* certified for the particular use.
- All discharges of foam containing fluorinated organic compounds and the associated contaminated water, soils and other materials must be collected and contained for proper disposal as regulated waste whether discharges were from operational use or from testing and maintenance activities.
- Disposal of foams and wastewater containing fluorinated organic compounds must not be by discharge to the ground, drains or waterways.
- Disposal of foams and wastewater containing fluorinated organic compounds must not be to sewer or general wastewater treatment facilities. Disposal must only be to facilities capable of properly disposing of such wastes and the facility operator is made aware that the wastes contain fluorinated organic compounds.

### 6.2.6 Training and testing foams

For the purposes of this policy "training foams" are regarded as the same as firefighting foams for all intents and purposes. Foams used for training, testing or maintenance purposes must not contain any fluorinated organic compounds with the exception that if there is a defined requirement for testing with the operational foam the foam must be fully *C6 purity-compliant*. Any firewater, wastewater, runoff and other wastes containing fluorinated organic compounds must be able to be fully contained and disposed of as regulated waste.

Where a training foam may be released to the environment a low impact foam should be used and its release must be in a controlled manner and managed in such a way so as not to cause environmental harm by acute or chronic toxicity or BOD effects in waterways.

### 6.3 Environmental acceptability

(see Explanatory Notes §5)

Environmental acceptability of any foam to be held for use or used must be assessed in terms of overall impact upon the environment including consideration of all of the following:

- Persistence in the environment.
- Biopersistence, bioconcentration, bioaccumulation and biomagnification potential.
- Toxicity (both acute and chronic impacts).
- Biochemical oxygen demand and biodegradability.

## Policy Management of Firefighting Foam

Environmental acceptability related tests should be conducted against standards and methodologies, such as those accepted and recognised in Australia, the USA, Canada, New Zealand and OECD, by an independent laboratory or organisation.

This assessment must be undertaken for the combined formulation of all the ingredients, that is, the concentrate as is normally formulated and marketed, and intended for final use, and not just the principal or selected ingredients in isolation. Note that assessment of toxicity must include both chronic longer-term toxicity as well as acute toxicity.

It is the manufacturer's and/or supplier's responsibility to undertake such testing and provide the results to the user in the SDS for the product. SDS for any firefighting foam product intended to be used or stored on a site must be held and readily available for inspection on that site.

### 6.3.1 Persistence and bioaccumulation

(see Explanatory Notes §2.5, 2.5.1, 2.6–2.8)

Persistence and bioaccumulation data should be derived from accepted and recognised best practice Australian, USEPA or OECD methods or tests, for example but not limited to:

- **Persistence** – OECD (2008), *Test No. 314: Simulation Tests to Assess the Biodegradability of Chemicals Discharged in Wastewater*, OECD Guidelines for the Testing of Chemicals, Section 3.
- **Bioaccumulation** – OECD (2012), *Test No. 305: Bioaccumulation in Fish: Aqueous and Dietary Exposure*, OECD Guidelines for the Testing of Chemicals, Section 3.
- **Bioaccumulation** – OECD (2010), *Test No. 317: Bioaccumulation in Terrestrial Oligochaetes*, OECD Guidelines for the Testing of Chemicals, Section 3.

Highly persistent degradation products must also be identified together with relevant persistence, bioaccumulation and toxicity (PBT) data. The tests must be conducted by an internationally certified laboratory accredited for the relevant tests in order to demonstrate what the firefighting foam ALARP bioaccumulation and persistence risks to the environment are<sup>§§</sup>.

### 6.3.2 Acute toxicity testing

(see Explanatory Notes §2, 2.4)

Toxicity testing should be conducted in accordance with standards and methodologies, such as those accepted and recognised in Australia, the USA, Canada, New Zealand and OECD, by an independent laboratory or organisation. Australian or equivalent test species should include fresh water and marine species, for example but not limited only to:

- 48-hour acute (immobilisation) test using a freshwater species, e.g. the daphnid *Ceriodaphnia dubia* (using USEPA 2002 method) or Australian or equivalent test species.
- 72-hour micro-algal growth inhibition (cell yield) tests using, e.g. freshwater alga *Selenastrum capricornutum* (using USEPA Method 1003.0) or Australian or equivalent test species.
- 96-hour fish imbalance tests using a freshwater fish species, e.g. Rainbow fish *Melanotaenia splendida splendida* (based on OECD Method 203) or Australian or equivalent test species.
- 72-hour micro-algal growth inhibition tests using *Isochrysis aff. galbana* or *Nitzschia closterium* (based on USEPA Method 1003.0 and Stauber *et. al.* 1996 for the National Pulp Mills Research Program) or Australian or equivalent test species.

<sup>§§</sup> Civil Aviation Authority (UK)–Foam and the Environment, Information Paper IP-6, 2008, Aviation Fire Fighting Foam – Performance Testing and Environmental Impact, IP-04, 2012

## Policy Management of Firefighting Foam

- 96-hour acute toxicity tests using juvenile tiger prawn *Penaeus monodon* (based on USEPA OPPTS 850.1045), or the amphipod *Melita plumulosa* should tiger prawns not be available or Australian or equivalent test species.

### 6.3.3 Chronic toxicity testing

(see Explanatory Notes §2, 2.7)

Chronic toxicity data should be derived from accepted and recognised best practice Australian, USEPA or OECD methods or tests, for example but not limited to:

- OECD (1992), *Test No. 210: Fish, Early-Life Stage Toxicity Test*, OECD Guidelines for the Testing of Chemicals, Section 2.

### 6.3.4 Biochemical oxygen demand and biodegradability\*\*\*

(see Explanatory Notes §2.2, 2.3, 2.8)

Biochemical oxygen demand (BOD) has the potential to cause severe depletion of oxygen levels in waterways. The SDS for any foam held for use or stored on a site must include information on its BOD, COD (chemical oxygen demand) and biodegradability.

The BOD must be expressed as biochemical oxygen demand measured at least for 5 day and 28 day periods in milligrams per litre - i.e., BOD<sub>5</sub> and BOD<sub>28</sub> values. The values cited for BOD must be reported in the SDS relative to foam concentrate (as sold) and additionally for the normal concentrations recommended by the manufacturer for the finished foam, e.g. at 1%, 3% and/or 6%. A value for chemical oxygen demand must also be reported in milligrams per litre relative to the foam concentrate.

The biodegradability of the foam must be expressed as the ratio of the 28 day BOD to the total chemical oxygen demand (COD) for foam concentrate. The 28 day BOD is considered to be an appropriate indicator of likely overall impact in the environment and biodegradability given that it would be expected that for most commercially available foam formulations 90% or more of the BOD impact should occur within 28 days. This implies a normal half-life for BOD, as measured by standard protocols, of 7 to 10 days. Where the BOD curve departs substantially from that normally expected it is recommended that additional intermediate values for BOD, or a representation of the BOD as a graphed curve, are reported to assist users and responders plan for potential impacts in the early stages of a release.

## 6.4 Disposal of fluorinated organic compound wastes

(see Explanatory Notes §3)

All solid and liquid wastes that contain fluorinated organic compounds (e.g. concentrates, firewater, wash-water, run-off, soils, absorbents, etc.), including those from *C6 purity-compliant foam*, are regarded as regulated wastes and must only be disposed of through a facility that is licensed to take regulated wastes. For water contamination criteria see limits in [Table 6.4.2 A](#).

Waste materials not containing persistent hazardous materials may be disposed of by the appropriate means according to the contaminants present.

### 6.4.1 Contaminated sites and contaminated soil disposal

(see Explanatory Notes §3)

Where investigation of a site suspected of being contaminated finds significant concentrations of fluorinated organic compounds in soils such that there is the potential to cause pollution or environmental harm a detailed site investigation should be carried out in accordance with the guidance in the National Environment Protection (Assessment of Site Contamination) Measure to determine the nature and extent of the contamination. Assessment criteria for contaminated soils assessment and disposal are to be considered separately from this Policy.

\*\*\* Civil Aviation Authority (UK)–Foam and the Environment, Information Paper IP-6, 2008

## Policy Management of Firefighting Foam

Where soils contaminated with fluorinated organic compounds are to be stockpiled on a site, (e.g. as part of a remediation plan for a site while awaiting transport or disposal) they shall be contained and covered in such a way as to prevent the release of contaminants in leachate, runoff, sediment or dust that may lead to contamination of land, waterways or groundwater.

### 6.4.2 Waste foam concentrate and contaminated water disposal *(see Explanatory Notes §3)*

Notwithstanding that firefighting foams containing PFOS and PFOA must not be held or used, water contaminated by fluorinated organic compounds must not be released to the environment if the levels of fluorinated organics exceed the levels in [Table 6.4.2 A](#). These release limits are interim levels until more robust criteria can be developed by the National Policy Action Group (National Project Action Group Technical Committee) or evidence of more appropriate standards for the protection of environmental and other values become apparent.

**Table 6.4.2 A – Contaminated water criteria**

Compound(s)	Water trigger value (µg/L) <sup>†††</sup>
PFOS	0.3
PFOA, PFOA precursors and higher homologues	0.3
Perfluorinated carbon chain length 6 carbon atoms or smaller	0.3

It shall not be acceptable to artificially dilute contaminated water to make it suitable for release. Disposal of contaminated water must be in a way that prevents its release to the air, waterways, soils or groundwater. For example, by treatment to capture the fluorinated organic compounds and/or high temperature (>1,100°C) destruction with scrubbing of HF from the flue gasses.

Firefighting foam concentrate, foam solution, firewater or other wastewater containing fluorinated organic compounds must not be discharged to sewer or similar waste treatment facility. Standard sewage and wastewater treatment facilities have been shown to be ineffective at removing fluorinated organic compounds, resulting in their release to the environment, e.g. via contaminated bio-solids applied to land as soil conditioner or treated effluent discharges to land or waterways.

## 7 Implementation

*(see Explanatory Notes §9)*

It is recognised that for some users immediate compliance with the requirements of the *Environmental Protection Act 1994* as defined by the provisions in this policy may not be practically achievable. Given the diversity of facilities and foam protection systems it is also recognised that some users will be able to achieve compliance much more readily than others. Nevertheless all foam users are expected to achieve compliance as soon as is reasonably practicable.

### 7.1 Effective date

*(see Explanatory Notes §9.1, 9.2)*

Notwithstanding that the requirements of the *Environmental Protection Act 1994* are already in force, this policy will be in effect from the date of approval.

<sup>†††</sup> Minnesota Health Based Value 2007 <http://www.health.state.mn.us/divs/eh/hazardous/topics/pfcs/drinkingwater.html>

## Policy Management of Firefighting Foam

### 7.2 Interim measures

(see Explanatory Notes §9.2)

Where it is not practical for a foam user to be able to achieve immediate full compliance with this policy they shall put in place interim measures to appropriately manage the risk of release of firefighting foam to the environment until such time as they put in place fully compliant permanent measures. Such interim measures may include things such as:

- Temporary bunding and containment facilities for a spill or firewater.
- Temporary modifications to existing facilities to control, transfer or contain a spill or firewater.
- Arrangements or procedures for measures to be put in place in a timely manner in the event of a spill or foam use.

### 7.3 Full compliance

(see Explanatory Notes §9.2)

Full compliance with this policy shall be achieved *within two years of the date of approval of the policy*. Users unable to achieve full compliance with the provisions of this policy within the specified time for practical reasons are advised to apply for approval of their implementation plan and specific timelines under other relevant provisions of the *Environmental Protection Act 1994*.

## 8 Review

This policy may be reviewed and amended on the basis of any significant new information or changes in technology or best practice that become evident. This policy will be reviewed no later than five years after the date of approval.

## 9 Further information

For further information please contact the Policy Branch of the Queensland Department of Environment and Heritage Protection.

Approved by:

Signature

Date

Dean Ellwood  
Deputy Director-General  
Environmental Services and Regulation

<sup>i i</sup> Weiner, B. *et al* 2013. Organic fluoride content in aqueous film forming foams (AFFFs) and biodegradation of the foam component 6:2 fluorotelomermercaptoalkylamido sulfonate (6:2FTSAS)

## Janet Cumming

---

**From:** Peter Boland  
**Sent:** Thursday, 28 May 2015 10:43 AM  
**To:** Janet Cumming  
**Subject:** RE: 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD [SEC=UNCLASSIFIED]

Thanks Janet.

**Peter Boland**  
**Manager Environmental Health | Darling Downs Public Health Unit**  
**Darling Downs Hospital and Health Service**

Ground Floor, Browne House  
Baillie Henderson Hospital  
Cnr Tor & Hogg Street  
PO Box 405  
TOOWOOMBA QLD 4350

**P:** 07 4699 8252 | **F:** 07 4699 8477

**M:**

**E:** [Peter.Boland@health.qld.gov.au](mailto:Peter.Boland@health.qld.gov.au)

**Web:** <http://www.health.qld.gov.au/darlingdowns/>

---

**From:** Janet Cumming  
**Sent:** Tuesday, 26 May 2015 2:26 PM  
**To:** HProtSD\_dchocorro; Sophie Dwyer; Greg Jackson; Penny Hutchinson; Peter Boland; Suzanne Huxley; Rebecca Richardson  
**Subject:** FW: 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD [SEC=UNCLASSIFIED]

FYI. More minutes from Mark O'Connell

---

**From:** O'Connell, Mark MR 2 [<mailto:mark.oconnell2@defence.gov.au>]  
**Sent:** Tuesday, 26 May 2015 2:20 PM  
**To:** Janet Cumming  
**Subject:** Fw: 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD [SEC=UNCLASSIFIED]

Classification: Unclassified

Janet  
EHP attached, any questions please let me know.  
Regards

Mark O'Connell  
Base Support Manager - Darling Downs  
Defence Support and Reform Group  
Swartz Barracks Oakey  
Tel: (07)45777100  
Mob:   
Email: [mark.oconnell2@defence.gov.au](mailto:mark.oconnell2@defence.gov.au)



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---

**From:** Callinan, Scott MR 1  
**Sent:** Tuesday, May 26, 2015 01:24 PM  
**To:** O'Connell, Mark MR 2  
**Subject:** RE: 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD [SEC=UNCLASSIFIED]

UNCLASSIFIED

cheers

---

**From:** O'Connell, Mark MR 2  
**Sent:** Tuesday, 26 May 2015 13:21  
**To:** Callinan, Scott MR 1  
**Subject:** Re: 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD [SEC=UNCLASSIFIED]

Classification: Unclassified

Scott  
Do you also have the EHP minutes please?

Mark O'Connell  
Base Support Manager - Darling Downs  
Defence Support and Reform Group  
Swartz Barracks Oakey  
Tel: (07)45777100  
Mob:   
Email: [mark.oconnell2@defence.gov.au](mailto:mark.oconnell2@defence.gov.au)

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---

**From:** Callinan, Scott MR 1  
**Sent:** Monday, May 25, 2015 04:31 PM  
**To:** O'Connell, Mark MR 2  
**Subject:** 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD [SEC=UNCLASSIFIED]

UNCLASSIFIED

Hi Mark  
As requested.

cheers  
*Scott Callinan*  
ADDERP  
02 6266 8076

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RTI Release

**Janet Cumming**

---

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**Sent:** Tuesday, 26 May 2015 2:20 PM  
**To:** Janet Cumming  
**Subject:** Fw: 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD [SEC=UNCLASSIFIED]  
**Attachments:** DERP - EHP - Oakey Status - Minutes - 23 Apr 15.pdf

Classification: Unclassified

Janet  
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Regards

Mark O'Connell  
Base Support Manager - Darling Downs  
Defence Support and Reform Group  
Swartz Barracks Oakey  
Tel: (07)45777100  
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**UNCLASSIFIED**

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Classification: Unclassified

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Mark O'Connell  
Base Support Manager - Darling Downs  
Defence Support and Reform Group  
Swartz Barracks Oakey

Tel: (07)45777100

Mob:

Email: [mark.oconnell2@defence.gov.au](mailto:mark.oconnell2@defence.gov.au)

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*Scott Callinan*

ADDERP

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RTI Release



<i>Project Name:</i>	Army Aviation Centre Oakey (AACO) Groundwater Investigation		
<i>Date of Meeting:</i>	23 April 2015	<i>Location:</i>	400 George Street, Brisbane
<i>Minutes Prepared By:</i>	Kate Griffiths and Fran Mitchell		

<b>Title of Meeting</b>
Department Information Session – Queensland Department of Environment and Heritage Protection (EHP)

<b>Attendance at Meeting</b>		
<b>Name</b>		
Scott Callinan (Cth DERP)	Helen Blain (Acting Assistant Secretary Environment & Engineering)	Michael Lysewycz (Defence Legal Special Counsel)
Dr Ian Gardner (Defence Senior Physician in Occupational & Environmental Medicine)	Mark O'Connell (BSM Darling Downs)	Fran Mitchell (Golder)
Kate Griffiths (Golder)	Kelly Gleeson (QLD EHP) – Manager Contaminated Land Unit	Karen Trainor (Clayton Utz)
Chris Hill (QLD EHP) – Director with responsibility for Contaminated Land Unit.	David Cook (QLD EHP)	
<b>Apology</b> - Lindsay Delzoppo (QLD EHP)		

<b>Discussion / Action Items</b>		
<b>Item</b>	<b>Description of Discussion</b>	<b>Action?</b>
1.	<p><b>Information Presentation by Scott Callinan (SC) (PowerPoint slides and handout provided)</b></p> <p><b>Additional Points</b></p> <ul style="list-style-type: none"> <li>• This presentation is a modified version from the community presentation given in July last year.</li> <li>• A policy has been in place since 2008 that prohibits the use of products containing PFOS PFOA in firefighting activities.</li> <li>• Defence considers this a long term project. <ul style="list-style-type: none"> <li>○ Question (Chris Hill, CH): What is "long term" to Defence? <ul style="list-style-type: none"> <li>▪ Response (SC): Too early to tell, some other Defence remediation projects are at the 14 year mark where another 10-20 years are expected.</li> </ul> </li> </ul> </li> <li>• Tender process currently in place to re-engage the current, or engage a new, lead consultant for the new phase of works. Lead consultant to be engaged by late May/early June.</li> <li>• Community meetings: Initial meeting was ~8 community members; the latest meeting in Dec 2014 was ~100 community members. <ul style="list-style-type: none"> <li>○ There will be a fifth community meeting this year (middle of 2015)</li> </ul> </li> <li>• Decision tree in place to determine which bores needed to be tested.</li> <li>• PFOS Map is formed by joining dots of concentration levels. The base has high concentrations. Some are around a current fire training pad (location yellow 6 on provided plan) which drains to a waste water tank (yellow 4 location on provided plan). Some overflow incidents which seem to be the primary source of the contamination.</li> <li>• PFOA and PFOS act in different ways, pH levels result in different flow rates through the water for each contaminant.</li> </ul>	



Project Name:	Army Aviation Centre Oakey (AACO) Groundwater Investigation		
Date of Meeting:	23 April 2015	Location:	400 George Street, Brisbane
Minutes Prepared By:	Kate Griffiths and Fran Mitchell		

**Discussion / Action Items**

Item	Description of Discussion	Action?
2.	<ul style="list-style-type: none"> <li>• There is no current use of the contaminants so all sources are residual only.</li> <li>• Current activities have included cleaning of tanks, connection to town water, cleaning swimming pools.</li> </ul> <p><b>Discussion</b></p> <ul style="list-style-type: none"> <li>• Question (CH): It seems much of the focus has been on groundwater, and perhaps less of soil and sediment sampling. Do you have a feel for surface water impacts and surface soil impacts? <ul style="list-style-type: none"> <li>○ Response (SC): The chemical is highly mobile and has penetrated through the soils and to depth. Impacts may have also entered surface water systems. There has been some limited sampling of surface water drainage systems including sediment sampling. With respect to soil, the work to date has indicated that impacts are at depth in soil, but not at the surface.</li> </ul> </li> <li>• Question (CH): Have samples been taken from Oakey Creek? <ul style="list-style-type: none"> <li>○ Response (SC): Yes, and there have been detections at the entry points where drainage channels meet the creek</li> </ul> </li> <li>• Question (CH): Is it spreading through surface water? How far off the base? <ul style="list-style-type: none"> <li>○ Response (Helen Blain): Monitoring plans are in place to determine this.</li> </ul> </li> <li>• Question (CH): When is the next community consultation? <ul style="list-style-type: none"> <li>○ Response (SC): Once the new lead consultant is appointed, expecting the next meeting to be held in July. There is also some limited blood sampling results to come in which will hopefully be available for the next meeting.</li> </ul> </li> <li>• Question (Kelly Gleeson, KG): What other state agencies have been engaged? <ul style="list-style-type: none"> <li>○ Response (SC): Just met this morning with DNRM, DAF and Safe Food Qld. Previous meetings have been held with QLD Health and regional councils.</li> </ul> </li> <li>• Question (KG): EHP would like to formalise regular update from Defence on the project. <ul style="list-style-type: none"> <li>○ Response (Helen Blain, HB): DERP agreed to have a regular briefing (phone).</li> <li>○ <b>Action: SC to arrange regular update schedule with DEHP.</b></li> <li>○ Comment (SC): There is an inter-departmental Commonwealth working group for PFOS/PFOA to establish assessment criteria. Representation from Defence, Air Services Australia, Dept of Environment (Cth) and Dept of Infrastructure and Regional Development (Cth). Likely that interim criteria from this group will come later in 2015. In parallel, CRC CARE is working towards development of national criteria. GHD have appointed to do this work via CRC CARE. Likely this national criteria may be available from CRC CARE by end of 2015/early 2016, then individual state governments will need to endorse as appropriate to their jurisdiction. <ul style="list-style-type: none"> <li>▪ Comment (David Cook, DC): EHP's Tony Bradshaw and Nigel Holmes from EHP are involved with the CRC CARE project.</li> </ul> </li> </ul> </li> <li>• Question (HB): Is DEHP's draft paper about guiding the use of fire fighting foam (led by Nigel Holmes) focussed on pollution prevention or does it consider legacy groundwater issues? e.g., someone extracting and re-releasing the contaminant into the environment. <ul style="list-style-type: none"> <li>○ Response (DC): It is about the current use of fire fighting foams and pollution prevention. DC doesn't think that Nigel had considered the re-release of existing contaminants. That was not the original focus.</li> <li>○ Comment (HB): Current fire fighting materials do not contain these PFC</li> </ul> </li> </ul>	



<i>Project Name:</i>	Army Aviation Centre Oakey (AACO) Groundwater Investigation		
<i>Date of Meeting:</i>	23 April 2015	<i>Location:</i>	400 George Street, Brisbane
<i>Minutes Prepared By:</i>	Kate Griffiths and Fran Mitchell		

Discussion / Action Items		
Item	Description of Discussion	Action?
	<p>contaminants, however there may be additional chemicals of concern that are the focus of the EHP policy.</p> <ul style="list-style-type: none"> <li>o Comment (HB): Defence would like to explore if there may be potential for an exemption in the policy related to defence support to the civil community during bushfire events?</li> <li>o Comment (DC): Any guidance that is posted on the EHP website is available for formal comment.</li> </ul> <ul style="list-style-type: none"> <li>• Question (SC): There have been murmurs in the Oakey community regarding extraction exclusion. From discussions this morning DNRM do not intend implementing an extraction exclusion in the area. Does this impact EHP in any way? <ul style="list-style-type: none"> <li>o Response (CH): EHP needs to form a view about what position they need to take and what actions may be appropriate. The EP Act, 1994 has <i>Area Management Advice</i> provisions that could be considered.</li> <li>o Comment (HB &amp; Mark O'Connell, MO): There are concerns in the community about the residential/rural private properties being listed on the environmental management /contaminated land register.</li> </ul> </li> <li>• Comment (DC): PFOS and PFOA are not currently listed as Prescribed Contaminants under EP Act so potentially may not meet definition of Hazardous Contaminant to be listed on the EMR. <ul style="list-style-type: none"> <li>o Question (SC): Can DERP look to EHP for further dialog on how to disperse that message to the community?</li> <li>o Response (DC): EHP groundwater specialists would need to review the data and provide a recommendation up to the Director General or Minister for this to be pursued. As such, the door to EMR listing is still open for consideration by the DEHP. In an ideal world, residential properties should not end up on the EMR given the difficulty in these sites being managed.</li> </ul> </li> <li>• Action (CH): EHP to have a discussion after the meeting. CH advised that DEHP can provide something in writing for Defence to review and provide comment.</li> <li>• <b>Action: It was agreed that EHP would do this by July, 2015.</b> <ul style="list-style-type: none"> <li>o Comment (HB): The messaging to the community is that there are currently no EMRs intended over this land.</li> <li>o Response (DC): Have to be careful in how this message is relayed. The situation is that the private land is not listed right now, but may end up there in future.</li> </ul> </li> </ul>	

**Janet Cumming**

---

**From:** O'Connell, Mark MR 2 <mark.oconnell2@defence.gov.au>  
**Sent:** Tuesday, 26 May 2015 1:23 PM  
**To:** Janet Cumming  
**Subject:** Fw: 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD [SEC=UNCLASSIFIED]  
**Attachments:** 20150423 - Department Information Session Minutes - DNRM, DAF & Safe Food QLD.pdf

Classification: Unclassified

Janet

Thanks for your time last week, it was a good discussion. Attached are the minutes from the DNRM meeting with the EHP to follow.

Regards

Mark O'Connell  
Base Support Manager - Darling Downs  
Defence Support and Reform Group  
Swartz Barracks Oakey  
Tel: (07)45777100  
Mob:   
Email: [mark.oconnell2@defence.gov.au](mailto:mark.oconnell2@defence.gov.au)

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**Sent:** Monday, May 25, 2015 04:31 PM  
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**UNCLASSIFIED**

Hi Mark  
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cheers  
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ADDERP  
02 6266 8076

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## Suzanne Huxley

---

**From:** SANDERS Paul <Paul.Sanders@dnrm.qld.gov.au>  
**Sent:** Wednesday, 5 October 2016 6:30 PM  
**To:** Sophie Dwyer  
**Cc:** HOGAN Stephenie; WELLER Jim; TEMPLAR Tessa; KEARNAN Wally; Suzanne Huxley  
**Subject:** FW: For DNRM re Oakey  
**Attachments:** ministerial-briefing-note oakey v5.docx

Hi Sophie,  
Just checking if you have any comments before we send this up the line please.  
Thanks  
Paul

---

**From:** SANDERS Paul  
**Sent:** Tuesday, 4 October 2016 12:28 PM  
**To:** CONNOR Andrew <Andrew.Connor@ehp.qld.gov.au>; MILLER Elton <Elton.Miller@daf.qld.gov.au>; Sophie Dwyer (Sophie.Dwyer@health.qld.gov.au) <Sophie.Dwyer@health.qld.gov.au>; Suzanne Huxley <Suzanne.Huxley@health.qld.gov.au>; ROUTLEY Richard <Richard.Routley@daf.qld.gov.au>; Virginia Berry (Virginia.Berry@premiers.qld.gov.au) <Virginia.Berry@premiers.qld.gov.au>; adrian.jeffreys@premiers.qld.gov.au; HILL Chris <Chris.Hill@ehp.qld.gov.au>; Don Bletchley (donald.w.bletchly@tmr.qld.gov.au) <donald.w.bletchly@tmr.qld.gov.au>  
**Cc:** 'Kearnan Wally (wally.kearnan@dnrm.qld.gov.au)' <wally.kearnan@dnrm.qld.gov.au>  
**Subject:** FW: For DNRM re Oakey

Hi all,  
Further refinement since our last IDC meeting. Feel free to provide me with any comments/thoughts.  
Thanks  
Paul

---

**From:** WELLER Jim  
**Sent:** Monday, 3 October 2016 11:15 AM  
**To:** [sophie.dwyer@health.qld.gov.au](mailto:sophie.dwyer@health.qld.gov.au)  
**Cc:** HOGAN Stephenie <[Stephenie.Hogan@dnrm.qld.gov.au](mailto:Stephenie.Hogan@dnrm.qld.gov.au)>; SANDERS Paul <[Paul.Sanders@dnrm.qld.gov.au](mailto:Paul.Sanders@dnrm.qld.gov.au)>; Suzanne Huxley ([Suzanne.Huxley@health.qld.gov.au](mailto:Suzanne.Huxley@health.qld.gov.au)) <[Suzanne.Huxley@health.qld.gov.au](mailto:Suzanne.Huxley@health.qld.gov.au)>  
**Subject:** RE: For DNRM re Oakey

Hello Sophie and Suzanne

Thanks for the advice

As per discussions with Suzanne last Thursday, DNRM have prepared a Min brief (draft attached) on using the Water Act provisions to limit the purpose for which groundwater could be used in the investigation area. The brief is for noting only and doesn't propose any action on DNRM's part.

The brief includes advice provided by Qld Health and we would appreciate any comment you may have before we finalise.

Note Paul is back from leave this week so he will resume his role on the IDC.

Regards

Jim

---

**From:** Suzanne Huxley [<mailto:Suzanne.Huxley@health.qld.gov.au>]  
**Sent:** Thursday, 29 September 2016 3:22 PM  
**To:** WELLER Jim  
**Subject:** FW: For DNRM re Oakey

Hi Jim

We would not expect fish from Oakey Creek to form a primary/major food source for members of the community.

Based on the advice provided in the HHRA incidental recreational activity in Oakey Creek would be expected to be low risk. There are some riders over this advice though:

1. The extent of sampling on which the HHRA was based is limited and the IDC has advised that further biota testing is warranted.
2. We know some people in Oakey have elevated blood levels of PFASs. The advice for these people is to minimise exposure as much as possible. So exposures which we could consider acceptable for the general public may not apply to these people. A diet containing a significant component of fish from PFAS contaminated water may not be advisable for someone who wants to limit their exposure as much as possible.

There are potential risks associated with the consumption of fish from inland waterways, such as elevated mercury levels and cyanobacteria toxins. Preliminary work undertaken by Queensland Health suggests that limiting consumption of fish from inland waterways to manage these risks would be protective for PFAS as well. We are in the process of finalising advice relating to recreational fishing in inland waters and can provide this when it is completed.

Regards

Suzanne

---

**From:** WELLER Jim [<mailto:Jim.Weller@dnrn.qld.gov.au>]  
**Sent:** Thursday, 22 September 2016 11:50 AM  
**To:** Suzanne Huxley  
**Cc:** Sophie Dwyer  
**Subject:** RE: For DNRM re Oakey

Thanks Suzanne

We have also had discussions about signage on Oakey Creek. My readings of the report plus your advice are that there are low risks in this area from incidental recreational activities, ie, fishing, swimming?

Also are you able to confirm Qld Health believe the risks are being managed adequately and haven't identified any other urgent action necessary at this stage.

Regards

Jim

---

**From:** Suzanne Huxley [<mailto:Suzanne.Huxley@health.qld.gov.au>]  
**Sent:** Thursday, 22 September 2016 11:25 AM  
**To:** WELLER Jim  
**Cc:** Sophie Dwyer  
**Subject:** For DNRM re Oakey

Hi Jim

I have discussed this with Sophie and below are some points you may find useful.

- The most prominent exposure source for people in contaminated sites is the intake of contaminated water, in the case of Oakey contaminated groundwater.
- The Department of Defence has provided alternative drinking water supplies to those people who were previously using groundwater for household purposes. This has been an important step in minimising future exposure.
- In addition, the Human Health Risk Assessment – Army Aviation Centre Oakey report provides useful and targeted recommendations on ways residents living in the areas with contaminated ground water can minimise their exposure. This information has been made available to all community members.
- The risk to human health arises if contaminated bore water is not used in accordance with the advice provided in the Human Health Risk Assessment – Army Aviation Centre Oakey report.
- There was concern expressed by some community members at the Oakey public meeting held on Monday 5 September 2016 that people would may continue to use the bores in a manner inconsistent with this advice and further that use of the bores would continue to contaminate the local environment.

Also Jim, just for you information:

- In response to the request of the Department of Defence (Defence) of 19 July 2016 that the Queensland Government identify the key items relevant departments would prefer to see included in any additional scope of work in relation to the Army Aviation Centre at Oakey (AACO), the Queensland Government Perfluorinated Firefighting Foam Interdepartmental Committee included a request that there needs to be consideration given to the provision of alternate water supplies to people whose use of water is precluded by the contamination. This should apply to all existing uses, as well as realistic future uses, of water protected under *The Environmental Protection Act 1994* and *Environmental Protection Water Policy 2009*.

Regards

Suzanne

---

**From:** Sophie Dwyer  
**Sent:** Wednesday, 21 September 2016 1:21 PM  
**To:** WELLER Jim; Suzanne Huxley  
**Subject:** Re: Oakey Army Av Centre

Jim  
I am tied up in a meeting today. Suzanne may be able to advise. Her phone number is 0733289606.

Regards  
Sophiw

Sent from my BlackBerry 10 smartphone on the Telstra Mobile network.

---

**From:** WELLER Jim  
**Sent:** mercredi 21 septembre 2016 13:06  
**To:** Sophie Dwyer  
**Subject:** Oakey Army Av Centre

Hello Sophie

I am currently standing in for Paul Sanders whilst he is on leave and that includes progressing tasks related to Oakey Groundwater contamination.

DNRM are currently in discussions about placing a restriction on groundwater under the Water Act 2000 and I would like to catch up with you to get Health's view.

I don't have a contact number. Are you able to give me a call when convenient please?

Thanks

Jim

Jim Weller

Manager, Water Services, South Region  
Department of Natural Resources and Mines  
Ph 07 45291397  
Mobile   
Email [jim.weller@dnrm.qld.gov.au](mailto:jim.weller@dnrm.qld.gov.au)

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RTI Release

**Department of Natural Resources and Mines  
MINISTER'S BRIEFING NOTE – Dr Anthony Lynham MP**

**SUBJECT:** Fire fighting foam groundwater contamination –  
Interdepartmental committee review of Human  
Health Risk Assessment, Army Aviation Centre  
Oakey  
**TIMING:** Routine

Policy Advisor.....OK  
Chief of Staff .....OK

**Approved / Not approved / Noted**

**Minister** .....  
**Dated**...../...../.....

**RECOMMENDATION:**

It is recommended that you:

- a. **Note** the attached Human Health Risk Assessment report (attachment A) prepared for the Commonwealth Department of Defence, which:
  - Concludes that there is potentially an elevated risk to human health resulting from consumption of contaminated groundwater within the Oakey groundwater contamination investigation area (the investigation area – shown in attachment B); and
  - Recommends that, as a precautionary measure, surface and groundwater within the investigation area not be used for human consumption.
- b. **Note** that the Department is working with the Queensland Government Perfluorinated Firefighting Foam Interdepartmental Committee (IDC) on Oakey groundwater contamination to review the recommendations of the report and coordinate an appropriate whole-of-government response.
- c. **Note** that ~~neither~~ the Department of Health (Queensland Health) ~~or Towoomba Regional Council~~ havehas not considered it necessary to take action under their powers, on the basis that the measures currently put in place by the Commonwealth Department of Defence are adequately managing the risk to human health.
- d. **Note** that the Minister has an option to make a public notice or regulation under sections 22 or 23 of the *Water Act 2000* requiring water users to not take water for human consumption.

**KEY ISSUES:**

1. The Commonwealth Department of Defence is continuing to investigate the risks to human health associated with groundwater contamination in Oakey resulting from their historical use of fire fighting chemicals.
2. The attached report prepared for the Department of Defence dated 1 September 2016 indicates a potential elevated risk to human health as a result of direct consumption (~~for~~ drinking or cooking) of groundwater within the investigation area.
3. The report also indicates a potentially elevated risk associated with consumption of eggs from chickens watered using groundwater within the investigation area, as well as potentially elevated risk associated with indirect consumption of water (incidental to non-consumptive indoor and outdoor water use e.g. bathing, swimming) within Zone 2 of the investigation area.
4. The report indicates a low and acceptable level of risk associated with all other potential exposure pathways investigated, such as consumption of produce grown within the investigation area (fruit, vegetables, beef, sheep, fish) as well as from incidental contact or ingestion resulting from a range of indoor and outdoor, non-consumptive water uses outside Zone 2 of the investigation area.
5. The report recommends that, as a precautionary measure, surface and groundwater should not be used for human consumption within the investigation area. It also recommends that water with detectable concentrations of the key contaminant (poly-fluorinated alkyl substance or PFAS) not be used for watering chickens within the investigation area or for non-consumptive domestic or recreational use within Zone 2 of the investigation area.
6. The Department of Defence has made alternate arrangements for residents so they don't have to drink contaminated water.
7. The Department understands that the Department of Defence advice since 2014 to people in the affected area has been not to drink groundwater in the investigation area and that affected residents are generally well aware of the potential risks associated with the consumption of contaminated groundwater.
8. However, concerns have been raised by some community members at an Oakey public meeting

Author:	Recommended – ED:	Endorsed – DDG:	Endorsed - DG
Name: Title/Business Group: Telephone: Date:	Name: Title/Business Group: Telephone: Date:	Name: Title/Business Group: Telephone: Date:	At direction of Minister's Office, DG, or DDG. Delete this column if DG endorsement not required.

held on Monday 5 September 2016 that some water users may be unwilling to change their water use practices.

9. The Department of Defence consultation on the issue has included a number of community presentations, provision of information via a website and making fact sheets available for distribution. There is also a community hotline being operated by the Department of Defence.
10. Ultimately, matters relating to public health for drinking water supplies are most appropriately considered under the *Public Health Act 2005* (Public Health Act), however the *Water Act 2000* section 22 allows the Minister for Natural Resources and Mines to prohibit the taking or interfering with water, including groundwater, if satisfied 'urgent' action should be taken because 'there is a thing in harmful quantities in water'.
11. It could be argued that there is a thing (the contaminants) in harmful quantities in the groundwater based on the Human Health Risk Assessment from the Department of Defence. In terms of the 'urgency' for action, the Department has sought the advice of Queensland Health about whether there is an urgent need for regulatory intervention under the Water Act.
12. ~~The~~ Queensland Health has advised that under the Public Health Act the contaminated groundwater at Oakey would be a 'local government public health risk'. Therefore, where water users are unwilling to change their water use practices, Toowoomba Regional Council has the authority to issue a public health order, under the Public Health Act, to require the person to cease the use of contaminated groundwater to prevent exposure to humans and animals/produce for human consumption.
13. The Queensland Health also advises that the Public Health Act contains provisions to enable Toowoomba Regional Council to request Queensland Health regulate specified public health risks on their behalf where Queensland Health agrees to do so.
14. In the absence of regulatory action having been taken under the ~~under the~~ Public Health Act, and with the actions being taken by the Department of Defence managing the elevated risks identified in the Human Health Risk Assessment report, there would appear to be no immediate urgency that would necessitate intervention from a water resource management perspective under the Water Act.
15. The Department will continue to engage proactively in IDC discussions on this matter and will advise the Minister of any change in circumstance that would warrant an alternative approach.
16. ~~Note that it~~ there is potential for other incidents of groundwater contamination resulting from historical use of firefighting chemicals at airports and firefighting training facilities across Queensland and these are being investigated by the Department of Environment and Heritage Protection.

**BACKGROUND:**

17. CTS17750/16, CTS15454/16 and CTS13302/16 provide further background information on this issue.
18. Section 22 provides for such a prohibition to be made by public notice, for a period of not more than 21 days, and is intended to be used as an urgent interim measure until such time as a regulation can be made under section 23. A prohibition made by regulation under section 23 may be in force for a period of no more than one year.
19. The issue of contaminated groundwater continues to receive attention from the media, including an ABC article of 28 September 2016.
20. Queensland Health and the IDC were consulted in preparing this brief and support the approach.

**ATTACHMENTS:**

21. Attachment A – Stage 2C Environmental Investigation – Human Health Risk Assessment, Army Aviation Centre Oakey, Executive Summary.
22. Attachment B – Oakey groundwater contamination investigation area
23. Attachment C – Recent ABC article

## Suzanne Huxley

---

**From:** WELLER Jim <Jim.Weller@dnrm.qld.gov.au>  
**Sent:** Monday, 3 October 2016 11:15 AM  
**To:** Sophie Dwyer  
**Cc:** HOGAN Stephenie; SANDERS Paul; Suzanne Huxley  
**Subject:** RE: For DNRM re Oakey  
**Attachments:** ministerial-briefing-note oakey v5.docx

Hello Sophie and Suzanne

Thanks for the advice.

As per discussions with Suzanne last Thursday, DNRM have prepared a Min brief (draft attached) on using the Water Act provisions to limit the purpose for which groundwater could be used in the investigation area. The brief is for noting only and doesn't propose any action on DNRM's part.

The brief includes advice provided by Qld Health and we would appreciate any comment you may have before we finalise.

Note Paul is back from leave this week so he will resume his role on the IDC.

Regards

Jim

---

**From:** Suzanne Huxley [mailto:Suzanne.Huxley@health.qld.gov.au]  
**Sent:** Thursday, 29 September 2016 3:22 PM  
**To:** WELLER Jim  
**Subject:** FW: For DNRM re Oakey

Hi Jim

We would not expect fish from Oakey Creek to form a primary/major food source for members of the community.

Based on the advice provided in the HHRA incidental recreational activity in Oakey Creek would be expected to be low risk. There are some riders over this advice though:

1. The extent of sampling on which the HHRA was based is limited and the IDC has advised that further biota testing is warranted.
2. We know some people in Oakey have elevated blood levels of PFASs. The advice for these people is to minimise exposure as much as possible. So exposures which we could consider acceptable for the general public may not apply to these people. A diet containing a significant component of fish from PFAS contaminated water may not be advisable for someone who wants to limit their exposure as much as possible.

There are potential risks associated with the consumption of fish from inland waterways, such as elevated mercury levels and cyanobacteria toxins. Preliminary work undertaken by Queensland Health suggests that limiting consumption of fish from inland waterways to manage these risks would be protective for PFAS as well. We are in the process of finalising advice relating to recreational fishing in inland waters and can provide this when it is completed.

Regards

Suzanne



---

**From:** WELLER Jim [<mailto:Jim.Weller@dnrm.qld.gov.au>]  
**Sent:** Thursday, 22 September 2016 11:50 AM  
**To:** Suzanne Huxley  
**Cc:** Sophie Dwyer  
**Subject:** RE: For DNRM re Oakey

Thanks Suzanne

We have also had discussions about signage on Oakey Creek. My readings of the report plus your advice are that there are low risks in this area from incidental recreational activities, ie, fishing, swimming?

Also are you able to confirm Qld Health believe the risks are being managed adequately and haven't identified any other urgent action necessary at this stage.

Regards

Jim

---

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**Sent:** Thursday, 22 September 2016 11:25 AM  
**To:** WELLER Jim  
**Cc:** Sophie Dwyer  
**Subject:** For DNRM re Oakey

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- The most prominent exposure source for people in contaminated sites is the intake of contaminated water, in the case of Oakey contaminated groundwater.
- The Department of Defence has provided alternative drinking water supplies to those people who were previously using groundwater for household purposes. This has been an important step in minimising future exposure.
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- The risk to human health arises if contaminated bore water is not used in accordance with the advice provided in the Human Health Risk Assessment – Army Aviation Centre Oakey report.
- There was concern expressed by some community members at the Oakey public meeting held on Monday 5 September 2016 that people would may continue to use the bores in a manner inconsistent with this advice and further that use of the bores would continue to contaminate the local environment.

Also Jim, just for you information:

- In response to the request of the Department of Defence (Defence) of 19 July 2016 that the Queensland Government identify the key items relevant departments would prefer to see included in any additional scope of work in relation to the Army Aviation Centre at Oakey (AACO), the Queensland Government Perfluorinated Firefighting Foam Interdepartmental Committee included a request that there needs to be consideration given to the provision of alternate water supplies to people whose use of water is precluded by the contamination. This should apply to all existing uses, as well as realistic future uses, of water protected under *The Environmental Protection Act 1994* and *Environmental Protection Water Policy 2009*.

Regards

Suzanne

**From:** Sophie Dwyer  
**Sent:** Wednesday, 21 September 2016 1:21 PM  
**To:** WELLER Jim; Suzanne Huxley  
**Subject:** Re: Oakey Army Av Centre

Jim  
I am tied up in a meeting today. Suzanne may be able to advise. Her phone number is 0733289606.  
Regards  
Sophiw

Sent from my BlackBerry 10 smartphone on the Telstra Mobile network.

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**Sent:** mercredi 21 septembre 2016 13:06  
**To:** Sophie Dwyer  
**Subject:** Oakey Army Av Centre

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I am currently standing in for Paul Sanders whilst he is on leave and that includes progressing tasks related to Oakey Groundwater contamination.

DNRM are currently in discussions about placing a restriction on groundwater under the Water Act 2000 and I would like to catch up with you to get Health's view.

I don't have a contact number. Are you able to give me a call when convenient please?

Thanks

Jim

Jim Weller

Manager, Water Services, South Region  
Department of Natural Resources and Mines  
Ph 07 45291397  
Mobile   
Email [jim.weller@dnrm.qld.gov.au](mailto:jim.weller@dnrm.qld.gov.au)

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RTI RELEASED

**Department of Natural Resources and Mines  
MINISTER'S BRIEFING NOTE – Dr Anthony Lynham MP**

**SUBJECT:** Fire fighting foam groundwater contamination –  
Interdepartmental committee review of Human  
Health Risk Assessment, Army Aviation Centre  
Oakey  
**TIMING:** Routine

Policy Advisor.....OK  
Chief of Staff .....OK

**Approved / Not approved / Noted**

**Minister** .....  
**Dated**...../...../.....

**RECOMMENDATION:**

It is recommended that you:

- a. **Note** the attached Human Health Risk Assessment report (attachment A) prepared for the Commonwealth Department of Defence, which:
  - Concludes that there is potentially an elevated risk to human health resulting from consumption of contaminated groundwater within the Oakey groundwater contamination investigation area (the investigation area – shown in attachment B); and
  - Recommends that, as a precautionary measure, surface and groundwater within the investigation area not be used for human consumption.
- b. **Note** that the Department is working with the Queensland Government Perfluorinated Firefighting Foam Interdepartmental Committee (IDC) on Oakey groundwater contamination to review the recommendations of the report and coordinate an appropriate whole-of-government response.
- c. **Note** that neither the Department of Health (Queensland Health) or Towoomba Regional Council have considered it necessary to take action under their powers, on the basis that the measures currently put in place by the Commonwealth Department of Defence are adequately managing the risk to human health.
- d. **Note** that the Minister has an option to make a public notice or regulation under sections 22 or 23 of the *Water Act 2000* requiring water users to not take water for human consumption.

**KEY ISSUES:**

1. The Commonwealth Department of Defence is continuing to investigate the risks to human health associated with groundwater contamination in Oakey resulting from their historical use of fire fighting chemicals.
2. The attached report prepared for the Department of Defence dated 1 September 2016 indicates a potential elevated risk to human health as a result of direct consumption (for drinking or cooking) of groundwater within the investigation area.
3. The report also indicates a potentially elevated risk associated with consumption of eggs from chickens watered using groundwater within the investigation area, as well as potentially elevated risk associated with indirect consumption of water (incidental to non-consumptive indoor and outdoor water use e.g. bathing, swimming) within Zone 2 of the investigation area.
4. The report indicates a low and acceptable level of risk associated with all other potential exposure pathways investigated, such as consumption of produce grown within the investigation area (fruit, vegetables, beef, sheep, fish) as well as from incidental contact or ingestion resulting from a range of indoor and outdoor, non-consumptive water uses outside Zone 2 of the investigation area.
5. The report recommends that, as a precautionary measure, surface and groundwater should not be used for human consumption within the investigation area. It also recommends that water with detectable concentrations of the key contaminant (poly-fluorinated alkyl substance or PFAS) not be used for watering chickens within the investigation area or for non-consumptive domestic or recreational use within Zone 2 of the investigation area.
6. The Department of Defence has made alternate arrangements for residents so they don't have to drink contaminated water.
7. The Department understands that the Department of Defence advice since 2014 to people in the affected area has been not to drink groundwater in the investigation area and that affected residents are generally well aware of the potential risks associated with the consumption of contaminated groundwater.
8. However, concerns have been raised by some community members at an Oakey public meeting

Author:	Recommended – ED:	Endorsed – DDG:	Endorsed - DG
Name: Title/Business Group: Telephone: Date:	Name: Title/Business Group: Telephone: Date:	Name: Title/Business Group: Telephone: Date:	At direction of Minister's Office, DG, or DDG. Delete this column if DG endorsement not required.

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15. The Department will continue to engage proactively in IDC discussions on this matter and will advise the Minister of any change in circumstance that would warrant an alternative approach.
16. Note that there is potential for other incidents of groundwater contamination resulting from historical use of firefighting chemicals at airports and firefighting training facilities and these are being investigated by the Department of Environment and Heritage Protection.

**BACKGROUND:**

17. CTS17750/16, CTS15454/16 and CTS13302/16 provide further background information on this issue.
18. Section 22 provides for such a prohibition to be made by public notice, for a period of not more than 21 days, and is intended to be used as an urgent interim measure until such time as a regulation can be made under section 23. A prohibition made by regulation under section 23 may be in force for a period of no more than one year.
19. The issue of contaminated groundwater continues to receive attention from the media, including an ABC article of 28 September 2016.
20. Queensland Health were consulted in preparing this brief and support.

**ATTACHMENTS:**

21. Attachment A – Stage 2C Environmental Investigation – Human Health Risk Assessment, Army Aviation Centre Oakey, Executive Summary.
22. Attachment B – Oakey groundwater contamination investigation area
23. Attachment C – Recent ABC article

## Suzanne Huxley

---

**From:** Suzanne Huxley  
**Sent:** Thursday, 29 September 2016 3:22 PM  
**To:** jim.weller@dnrm.qld.gov.au  
**Subject:** FW: For DNRM re Oakey

Hi Jim

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Based on the advice provided in the HHRA incidental recreational activity in Oakey Creek would be expected to be low risk. There are some riders over this advice though:

1. The extent of sampling on which the HHRA was based is limited and the IDC has advised that further biota testing is warranted.
2. We know some people in Oakey have elevated blood levels of PFASs. The advice for these people is to minimise exposure as much as possible. So exposures which we could consider acceptable for the general public may not apply to these people. A diet containing a significant component of fish from PFAS contaminated water may not be advisable for someone who wants to limit their exposure as much as possible.

There are potential risks associated with the consumption of fish from inland waterways, such as elevated mercury levels and cyanobacteria toxins. Preliminary work undertaken by Queensland Health suggests that limiting consumption of fish from inland waterways to manage these risks would be protective for PFAS as well. We are in the process of finalising advice relating to recreational fishing in inland waters and can provide this when it is completed.

Regards

Suzanne

---

**From:** WELLER Jim [<mailto:Jim.Weller@dnrm.qld.gov.au>]  
**Sent:** Thursday, 22 September 2016 11:50 AM  
**To:** Suzanne Huxley  
**Cc:** Sophie Dwyer  
**Subject:** RE: For DNRM re Oakey

Thanks Suzanne

We have also had discussions about signage on Oakey Creek. My readings of the report plus your advice are that there are low risks in this area from incidental recreational activities, ie, fishing, swimming?

Also are you able to confirm Qld Health believe the risks are being managed adequately and haven't identified any other urgent action necessary at this stage.

Regards

Jim

---

**From:** Suzanne Huxley [<mailto:Suzanne.Huxley@health.qld.gov.au>]  
**Sent:** Thursday, 22 September 2016 11:25 AM

**To:** WELLER Jim  
**Cc:** Sophie Dwyer  
**Subject:** For DNRM re Oakey

Hi Jim

I have discussed this with Sophie and below are some points you may find useful.

- The most prominent exposure source for people in contaminated sites is the intake of contaminated water, in the case of Oakey contaminated groundwater.
- The Department of Defence has provided alternative drinking water supplies to those people who were previously using groundwater for household purposes. This has been an important step in minimising future exposure.
- In addition, the Human Health Risk Assessment – Army Aviation Centre Oakey report provides useful and targeted recommendations on ways residents living in the areas with contaminated ground water can minimise their exposure. This information has been made available to all community members.
- The risk to human health arises if contaminated bore water is not used in accordance with the advice provided in the Human Health Risk Assessment – Army Aviation Centre Oakey report.
- There was concern expressed by some community members at the Oakey public meeting held on Monday 5 September 2016 that people would may continue to use the bores in a manner inconsistent with this advice and further that use of the bores would continue to contaminate the local environment.

Also Jim, just for you information:

- In response to the request of the Department of Defence (Defence) of 19 July 2016 that the Queensland Government identify the key items relevant departments would prefer to see included in any additional scope of work in relation to the Army Aviation Centre at Oakey (AACO), the Queensland Government Perfluorinated Firefighting Foam Interdepartmental Committee included a request that there needs to be consideration given to the provision of alternate water supplies to people whose use of water is precluded by the contamination. This should apply to all existing uses, as well as realistic future uses, of water protected under *The Environmental Protection Act 1994* and *Environmental Protection Water Policy 2009*.

Regards

Suzanne

---

**From:** Sophie Dwyer  
**Sent:** Wednesday, 21 September 2016 1:21 PM  
**To:** WELLER Jim; Suzanne Huxley  
**Subject:** Re: Oakey Army Av Centre

Jim

I am tied up in a meeting today. Suzanne may be able to advise. Her phone number is 0733289606.

Regards  
Sophiw

Sent from my BlackBerry 10 smartphone on the Telstra Mobile network.

---

**From:** WELLER Jim  
**Sent:** mercredi 21 septembre 2016 13:06  
**To:** Sophie Dwyer  
**Subject:** Oakey Army Av Centre

Hello Sophie

I am currently standing in for Paul Sanders whilst he is on leave and that includes progressing tasks related to Oakey Groundwater contamination.

DNRM are currently in discussions about placing a restriction on groundwater under the Water Act 2000 and I would like to catch up with you to get Health's view.

I don't have a contact number. Are you able to give me a call when convenient please?

Thanks

Jim

Jim Weller

Manager, Water Services, South Region  
Department of Natural Resources and Mines  
Ph 07 45291397  
Mobile   
Email [jim.weller@dnrm.qld.gov.au](mailto:jim.weller@dnrm.qld.gov.au)

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RTI Release

## Suzanne Huxley

---

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**Subject:** For DNRM re Oakey

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**To:** WELLER Jim; Suzanne Huxley  
**Subject:** Re: Oakey Army Av Centre

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Sent from my BlackBerry 10 smartphone on the Telstra Mobile network.

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Jim

Jim Weller

Manager, Water Services, South Region  
Department of Natural Resources and Mines  
Ph 07 45291397  
Mobile   
Email [jim.weller@dnrm.qld.gov.au](mailto:jim.weller@dnrm.qld.gov.au)

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RTI REQUEST

**Suzanne Huxley**

---

**From:** MCKAY Adrian <Adrian.Mckay@dnrm.qld.gov.au>  
**Sent:** Monday, 8 August 2016 3:33 PM  
**To:** Chris McKenna; Sophie Dwyer; Janet Cumming; BRADSHAW Tony; VENTURA Simone; KIND Peter K; WATTS Richard J; David Larkings; Suzanne Huxley  
**Cc:** Justin Carpenter; Virginia Berry; SANDERS Paul  
**Subject:** RE: Technical Working Group - HHRA Preliminary Working Group Comments  
**Attachments:** Technical Working Group - Technical Report Summary of Comments - HHRA\_DNRM.docx

Chris,

DNRM comments

Regards

Adrian McKay  
Principal Project Officer (Groundwater)  
Queensland Department of Natural Resources and Mines  
Toowoomba

Ph: 07 4529 1341  
Mb:   
Fax: 07 4529 1555  
[www.dnrm.qld.gov.au](http://www.dnrm.qld.gov.au)

RTF Release

---

**From:** Chris McKenna [<mailto:Chris.McKenna@premiers.qld.gov.au>]  
**Sent:** Monday, 8 August 2016 11:44 AM  
**To:** Sophie Dwyer; [Janet.Cumming@health.qld.gov.au](mailto:Janet.Cumming@health.qld.gov.au); BRADSHAW Tony; VENTURA Simone; KIND Peter K; WATTS Richard J; MCKAY Adrian; [david.larkings@health.qld.gov.au](mailto:david.larkings@health.qld.gov.au); Suzanne Huxley  
**Cc:** Justin Carpenter; Virginia Berry  
**Subject:** Technical Working Group - HHRA Preliminary Working Group Comments

All

As discussed, please complete the attached template and return to myself ASAP today.

I will collate for Sophie as a whole of government discussion supporter at tomorrow's IDC.

Please keep your dots high level and succinct.

Regards

**Chris McKenna**



**Environment Policy**  
Department of the Premier and Cabinet  
P 07 3003 9324  
Executive Building, Level 14, 100 George Street, Brisbane QLD 4000  
PO Box 15185, City East, QLD 4002

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RTI Release

## Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam

### Technical Working Group Preliminary Summary of Comments Department of Defence Oakey Human Health Risk Assessment

#### DNRM

#### Report Conclusions

##### No Issues

- The risk characterisation and conclusions are supported based upon the assessments carried out to date.

##### Not Supported

- That the risk characterisation and conclusions are absolute and are still to be potentially determined by other processes not studied to date. i.e. wind mobilisation

#### Points of Contention

- There has been no assessment of contamination in the Main Range Volcanics and Great Artesian Basin Aquifers. Drinking groundwater is identified as one of the predominant pathways for potential health effects. Residents have been advised not to drink groundwater, however, it is not clear whether this only applies to the Oakey Creek Alluvial aquifer
- No assessment of the potential pathway associated with wind and the potential for movement via dust onto roofs and potential consequent concentration in rainwater tanks. Likewise, the assessment of the exposure pathway associated with the drinking of surfacewater has not been identified or assessed.

#### Limitations

- Limited understanding of the movement of the contaminant into the aquifer. Concentrations in the upper aquifer are higher than the lower aquifer over a large area suggesting movement via surface/overland flow into and through the soil, however, current conclusions are that soil concentrations don't correspond with concentrations in groundwater at the same site.
- Uncertainty around the influence of wind as a transport mechanism. This creates confusion as the predominant wind direction is to the West/Southwest, similar to surfacewater flow directions
- Uncertainty around use of contaminated water for irrigation. Limited work to date suggests that irrigation of contaminated water can influence detections in irrigated soil. The report identifies that insufficient information was available to understand the relationships associated with irrigation practice and detectable levels of the contaminant in soil.
- Assessment of the exposure pathway associated with the irrigation of surfacewater for plant produce. While the pathway has been identified in Table 22, no assessment of the extent or potential for contamination has been undertaken

**Suzanne Huxley**

---

**From:** Rezek, Kurt MR 1 <kurt.rezek1@defence.gov.au>  
**Sent:** Thursday, 1 September 2016 1:02 PM  
**To:** Sophie Dwyer; Suzanne Huxley; Janet Cumming  
**Cc:** Pearce, Vicki MS 1; Harvey, Renee MS  
**Subject:** RE: QLD Health Fact Sheet - Department of Defence Community Information Session - Oakey 5-6 Sep 16 [SEC=UNCLASSIFIED]

**UNCLASSIFIED**

Hi Sophie,

Thankyou, acknowledged and agreed.

The Defence environmental contractor is bringing their toxicologist (Dr Roger Drew) to answer questions stakeholders have on this issue.

Kindest regards,

Kurt

---

**From:** Sophie Dwyer [mailto:Sophie.Dwyer@health.qld.gov.au]  
**Sent:** Tuesday, 30 August 2016 16:21  
**To:** Rezek, Kurt MR 1; Suzanne Huxley; Janet Cumming  
**Cc:** Pearce, Vicki MS 1; Harvey, Renee MS  
**Subject:** RE: QLD Health Fact Sheet - Department of Defence Community Information Session - Oakey 5-6 Sep 16 [SEC=UNCLASSIFIED]

That is fin, Kurt. It is also important to reiterate that if any breastfeeding mother should discuss their concerns with their GP. It is important not to dismiss people's worries.

**Sophie Dwyer PSM**

Executive Director, Health Protection Branch  
Prevention Division, Department of Health | Queensland Government  
15 Butterfield Street, QLD  
t. 07 33289266 m.   
e. [sophie.dwyer@health.qld.gov.au](mailto:sophie.dwyer@health.qld.gov.au) | [www.health.qld.gov.au](http://www.health.qld.gov.au)



---

**From:** Rezek, Kurt MR 1 [mailto:kurt.rezek1@defence.gov.au]  
**Sent:** Monday, 29 August 2016 7:58 PM  
**To:** Sophie Dwyer; Suzanne Huxley; Janet Cumming  
**Cc:** Pearce, Vicki MS 1; Harvey, Renee MS



**Subject:** QLD Health Fact Sheet - Department of Defence Community Information Session - Oakey 5-6 Sep 16  
[SEC=UNCLASSIFIED]

**UNCLASSIFIED**

Good evening Ladies,

I am from the Dept of Defence team working on the investigation into PFAS at the Army Aviation Centre Oakey.

As you may be aware, Defence will be releasing the Human Health Risk Assessment (HHRA) to the public in the near future. Defence will also be conducting Community Information Sessions to support and supplement the release over the period 5-6 September 2016.

Defence will be providing a range of fact sheets for the public to take away from the sessions. Defence would like to provide copies of the QLD Health fact sheet "Breastfeeding - Best for baby and for Mum" which is available on the QLD Health website. I have attached a copy of the sheet to this email.

Before providing copies at the Information Sessions, Defence is seeking QLD Health support and agreement/approval to print the sheet and provide copies for any who may want it. May I ask if it is appropriate to seek that agreement/approval?

Please let me know if you have any questions.

Kindest regards,

Kurt

Kurt Rezek  
Contractor to Defence

PFAS Site Environmental Assessment and Management  
Department of Defence

[Redacted]

BP3-02-B008  
Brindabella Circuit  
Brindabella Business Park  
PO Box 7925 Canberra BC 2610

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## Suzanne Huxley

---

**From:** Harvey, Renee MS <renee.harvey@defence.gov.au>  
**Sent:** Tuesday, 30 August 2016 8:14 AM  
**To:** 'Virginia Berry'  
**Cc:** Huck, Josephine MS; Pearce, Vicki MS 1; 'Justin Carpenter'; 'Darcy Garlick-Kelly'; 'Adrian Jeffreys'; 'Andrew Connor'; 'Chris Hill'; 'Don Bletchley'; 'Drew Ellem'; 'Elton Miller'; 'Paul Sanders'; 'Richard Routley'; Sophie Dwyer; Suzanne Huxley  
**Subject:** RE: Queensland Government Response to Oakey HHRA Final [SEC=UNCLASSIFIED]

UNCLASSIFIED

Thank you Virginia.

We have received the comments and are working through them.

Many thanks,  
Renee

Renee Harvey

Contractor to Defence

M:

-----Original Message-----

From: Virginia Berry [<mailto:Virginia.Berry@premiers.qld.gov.au>]

Sent: Monday, 29 August 2016 13:55

To: Harvey, Renee MS

Cc: Huck, Josephine MS; Pearce, Vicki MS 1; Justin Carpenter; Darcy Garlick-Kelly; Adrian Jeffreys; Andrew Connor; Chris Hill; Don Bletchley; Drew Ellem; Elton Miller; Paul Sanders; Richard Routley; Sophie Dwyer; Suzanne Huxley  
Subject: Queensland Government Response to Oakey HHRA Final

Hi Renee.

Please find attached our comments on the latest version of the Oakey HHRA.

If you have any questions, feel free to contact me.

With regards,

Virginia

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## Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam

### Response to Department of Defence Oakey Human Health Risk Assessment

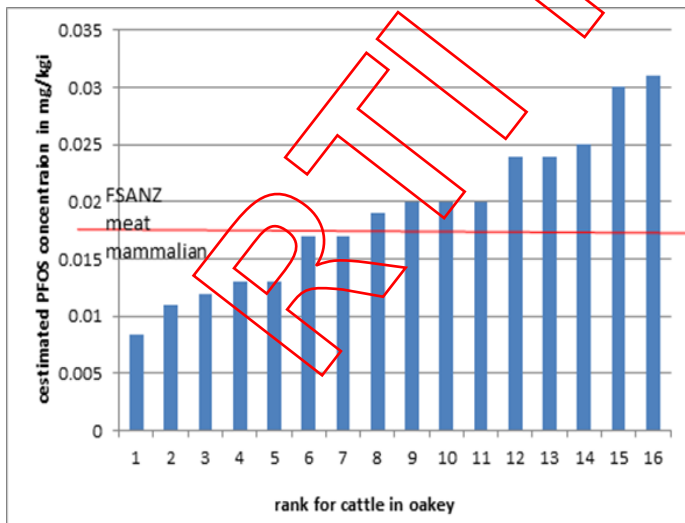
Following the previous response to the draft Oakey Human Health Risk Assessment (HHRA) report provided on 11<sup>th</sup> August 2016, the Interdepartmental Committee offers further comment on the latest version of the HHRA. A number of the concerns raised in the previous response have been addressed, however relevant Queensland Government agencies have provided additional comments listed below.

#### 1. Additional Comments

- The HHRA has stated an objective of assessing the “potential risks” associated with “current and ongoing use of the site”. The HHRA does not take into account that the population at Oakey has historic exposures to the contaminants at the site, and many people already have elevated serum concentrations of PFOS/PFHxS due to that exposure. The HHRA does not address measures that the community should take to reduce their PFOS/PFHxS serum concentrations. For example, it appears that the advice on consumption of certain foods, particularly beef, eggs and fish, is designed to prevent a consumer exceeding the TDI. It is not clear that this level of exposure would enable someone with an already elevated serum concentration to lower that concentration and thus reduce their risk.
- Where it says, for example on p.70, “...where the sum of the sum of PFOS, PFOA, PFHxS and PFHxA ranged between approximately 65-70% of the detected PFAS” , it should be changed to “where the sum of the sum of PFOS, PFOA, PFHxS and PFHxA ranged between approximately 65-70% by mass of the tested PFAS analytes detected”. Similar change needs to be made wherever concentrations are summed, or compared as percentages.
- It is noted that enHealth is looking further at the issue of breastfeeding and exposure to PFAS. It is recognised that this may affect advice to the community, based on the information provided on blood serum levels.
- There are questions over the following statement - “Because maximum concentrations in surface water are lower than maximum concentrations in groundwater, PFAS concentrations in plants or animals exposed to PFAS in surface water would not be expected to have greater than PFAS concentrations in tissues” (p. 62). It suggests that this statement is for terrestrial animals rather than aquatic animals because aquatic exposures appear to be driven by surface water as the hydrological models indicate Oakey Creek is a losing system. Some caution needs to be exercised about the way this assumption is stated. Groundwater concentrations of PFAs are likely to be reasonably stable because movement of the groundwater is slow. By contrast, surface water concentrations are likely to be a function of the amount of precipitation and the volume of the receiving waters (which means that the concentrations change over the course of a flow event and are different between events). It is unclear how the surface waters were collected or if they are representative of the median exposure, but it is highly probable that the first flush of a contaminated drain will be higher in concentration of PFAs than groundwater.

Opportune sampling by affected residents in drains could easily demonstrate this point. The statement should articulate that it is chronic consumption that is important.

- The new table ES3 uses the term ‘consumption of meat’ when the footnote refers to offal as well as meat. It is recommended that the report clearly distinguish between meat and offal when discussing specific risks and where it is appropriate to refer to them collectively that they are referred to in manner similar to mammalian animal tissues.
- It is noted that in ES3 there is not a recommendation for consumption of poultry tissues. Perhaps it is not a complete pathway at present, but residents need to have an understanding of the risk of any potential consumption practices they may engage in at some future juncture.
- It is noted that table ES3 indicates there is no suggested precaution for consuming meat from cattle and sheep. The HHRA comes to its conclusion based on the data for cattle aged between 1 and 2 years. As indicated in the previous comments, the median estimated PFOS concentration in cattle meat (all data) is approximately the same as the FSANZ guidance value (Refer to Graph1 below). The serum concentration of PFOS equivalent to the FSANZ guidance value (meat mammalian, 2-6 year old) would be ~0.18 mg/L. Graph 2 (below) suggests that only cattle below 2 years of age would be below the FSANZ guidance value. The report acknowledges that older animals may have higher concentrations, but does not offer any precaution about chronic consumption of older animals.
- The report discusses the general community consumptions of cattle meat (p. 91) but this is out of context to Table ES3 which is an assessment of different classes of receptors. General community consumption assumptions may not be appropriate for the receptor group of commercial agriculture workers and subsistence farmers. Some level of precaution appears to be warranted for this receptor group.



Graph 1

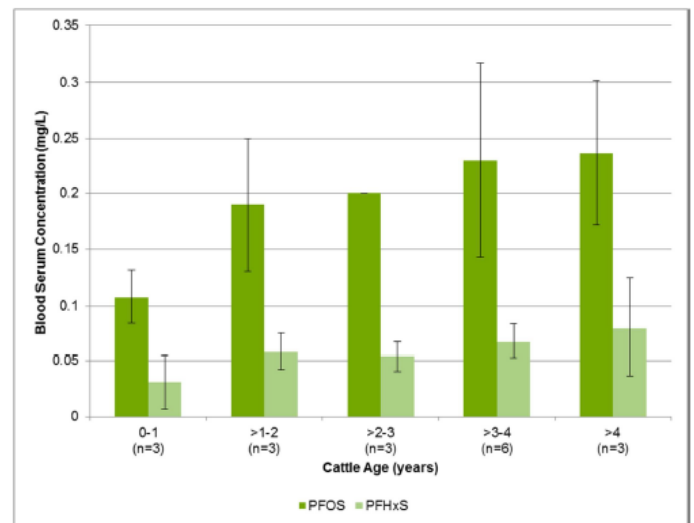


Figure 3 Average PFOS and PFHxS concentrations in cattle blood serum by age group (error bars = 1 standard deviation)

Graph 2

- The HHRA should acknowledge that its scope does not fully comply with the requirements of the *Environmental Protection Act 1994* and schedule B6 of the *National Environmental Protection (Assessment of Contamination) Measure 1999* to evaluate impact on environmental values protected under the *Environmental Protection (Water) Policy 2009*. This would require it to assess impact to values of groundwater onsite as well as future potential use of waters off-site e.g. freshwater aquaculture.
- It is recommended that this clarification of scope be included in the section detailing the objective in the executive summary rather than inferring full consistency with the above legislation. For example, the summary could advise that the scope did not encompass assessment of potential impacts on health of all potential uses of water on and off site.
- Risks of consumption of groundwater are related to whether consumption would cause exceedance of the tolerable daily intake. Based on the enHealth 2016 advice that drinking water be allocated 10% as a relative source contribution of the TDI, it is recommended that an additional line be drawn on Figure 4 Estimated PFOS + PFHxS intakes for residents based on typical exposure parameters (p. 79) that represents the recommendations of enHealth. This would be located at a point equivalent to 10% of the TDI. This would give readers of the report an indication of the degree to which the water quality is in excess of relevant health recommendations. It would also reinforce the later recommendation against not drinking the groundwater in any areas showing concentrations in excess of the enHealth guidance.
- Given that the Oakey community has experienced past exposures and some members present with higher than average serum concentrations, the objective should be that water suitability be evaluated at least against the enHealth guidance rather than the TDI (which is based on all source contributions, not just drinking water).
- The risk assessment for cattle is based on analysis of blood serum data from stock that have consumed contaminated groundwater. Review of the animal tissue sampling results shows that for rabbits and fish, a wider range of PFAS are detected, particularly longer chain homologues. As the longer chain compounds are of lower solubility than PFOS, PFOA, PFHxS and PFHxA, it would appear that this pattern of exposure relates to contaminated sediment being a more important exposure route. Ingestion of drain sediment containing the more commonly occurring PFAS (e.g. PFHxS and PFOS is also not considered).
- It is considered that the risk assessment does not address risks to sheep, cattle and other stock that may consume water and any entrained soil particles from stormwater drains and other surface waters flowing from contaminated areas of the base. This would differ from stock that consumed clean groundwater from a trough. It is recommended that the risk assessments for stock note this limitation and that this risk be evaluated in the near future.
- It is further recommended that this assessment clarify whether the stock that were sampled also consumed forage irrigated with PFAS contaminated groundwater or not. That is, were the predictions related solely to groundwater exposure or is potentially contaminated forage also included?

- The HHRA has a number of limitations that have been noted in the report. It is recommended that, where there are limitations, these be included in the summary table. These would include:
  - For consumption of yabbies – no data obtained and hence provide a precautionary recommendation e.g. avoid if have elevated serum concentrations (Note the Queensland Department of Environment and Heritage Protection has previously provided comment that yabby contamination concentrations may be greater than fish).
  - For use of ground water for aquaculture – no risk assessment undertaken and hence provide a precautionary recommendation.
  - For consumption of home grown poultry watered with contaminated groundwater or in contact with contaminated soil - no data obtained and hence provide a precautionary recommendation.
  - For consumption of stock that access stormwater drains flowing off the base for water or forage - no data obtained and hence provide a precautionary recommendation.
- The HHRA monitored a restricted suite of PFAS in sampling contamination in drainage from the site. Ansilite, the foam used by the Defence Department following the phase out of 3M light water, is a fluorotelomer based AFFF that contains PFAS. An example analysis is provided in the 2013 paper by Backe, Day & Field showed a more comprehensive analysis of Ansilite foam circa 2005 with a PFAS content totalling 7,726 mg/L (~ppm) or 0.72%. It is noted that onsite drainage shows material concentrations of fluorotelomers, indicative of use of the current foam.
- To comply with the general environmental duty under the *Environmental Protection Act 1994*, all site assessments need to evaluate commonly identified PFAS as well as those unidentified in standard tests that will ultimately transform to end-point compounds of concern such as PFOA and other fluororoalkyl carboxylic acids (PFCAs) and perfluoroalkyl sulfonates (PFASs).
- The Department of Environment and Heritage Protection's Operational Policy for the Environmental Management of Firefighting Foam and associated explanatory notes provide pertinent advice on this issue:  
<http://www.ehp.qld.gov.au/assets/documents/regulation/firefighting-foam-policy-notes.pdf>
- To accurately assess what PFCs are present and the probable level of risk, it is not sufficient to analyse only for the current limited suite of about 20 to 28 standard fluorinated organic compounds as it is highly likely that many compounds of concern and their precursors will remain completely undetected. The explanatory notes advise that the recommended analytical suite incorporate:
  - the standard suite of PFCs (including key sulfonates); and
  - total oxidisable precursor assay reported as the analyses for the resulting perfluorinated carboxylates for C4 to C14 carbon chain length (TOP C4-C14).
- There is uncertainty in the HHRA about exposures presented by stormwater runoff from the base. It is recognised that this analysis is a recent development. It is recommended that Defence ensures testing be carried out to assess risks due precursors, including use of the current foam, in accordance with the advice in the above Queensland Government policy.



**Suzanne Huxley**

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**From:** Rezek, Kurt MR 1 <kurt.rezek1@defence.gov.au>  
**Sent:** Monday, 29 August 2016 7:58 PM  
**To:** Sophie Dwyer; Suzanne Huxley; Janet Cumming  
**Cc:** Pearce, Vicki MS 1; Harvey, Renee MS  
**Subject:** QLD Health Fact Sheet - Department of Defence Community Information Session - Oakey 5-6 Sep 16 [SEC=UNCLASSIFIED]  
**Attachments:** 2016 08 26 - QLD Hlth Factsheet - Breastfeeding - best for baby and for Mum.pdf

**UNCLASSIFIED**

Good evening Ladies,

I am from the Dept of Defence team working on the investigation into PFAS at the Army Aviation Centre Oakey.

As you may be aware, Defence will be releasing the Human Health Risk Assessment (HHRA) to the public in the near future. Defence will also be conducting Community Information Sessions to support and supplement the release over the period 5-6 September 2016.

Defence will be providing a range of fact sheets for the public to take away from the sessions. Defence would like to provide copies of the QLD Health fact sheet "Breastfeeding - Best for baby and for Mum" which is available on the QLD Health website. I have attached a copy of the sheet to this email.

Before providing copies at the Information Sessions, Defence is seeking QLD Health support and agreement/approval to print the sheet and provide copies for any who may want it. May I ask if it is appropriate to seek that agreement/approval?

Please let me know if you have any questions.

Kindest regards,

Kurt

Kurt Rezek  
Contractor to Defence

PFAS Site Environmental Assessment and Management  
Department of Defence

BP3-02-B008  
Brindabella Circuit  
Brindabella Business Park  
PO Box 7925 Canberra BC 2610

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# Breastfeeding

## Best for baby and for Mum

### Remember...

- Breastmilk gives your baby the best start in life.
- It is the only food your baby needs for about the first six months.
- Breastmilk is always natural, fresh, clean and the right temperature.
- Your breastmilk will change over time to suit your baby's changing needs.
- Breastmilk helps protect your baby against illnesses, allergies and other diseases.
- Infant formula isn't the same as breastmilk.
- Breastfeeding is best for you and your baby.

Nature has provided mothers with the perfect food for babies – breastmilk. You can give your baby something that no one else can, and it's natural, free and environmentally friendly. Breastfeeding gives your baby the best possible start in life. Support from family and friends is a really important part of establishing and continuing breastfeeding.

Breastfeeding is more than providing food for your baby. Holding your baby close during breastfeeding builds a close, loving bond between you, by the feel, smell and visual image imprinting on you and your baby.

Breastfeeding provides the perfect natural mix of nutrients that your baby needs in a form specially designed for your baby's maturing digestive system and growing body. Breastmilk is made especially for your baby.

### Added advantages for your baby

Your breastmilk not only has all the nourishment that your baby needs, but it also reduces the risk of your baby developing infections and diseases such as:

- urinary tract infections
- gastrointestinal infections (eg. diarrhoea)
- respiratory illnesses (eg. asthma)
- some childhood cancers
- obesity, diabetes and heart disease later in life.

Breastfeeding also reduces the risk of your baby developing allergies and food intolerances, such as coeliac disease.

Breastfeeding promotes jaw development.

All the goodness in breastmilk is yet to be discovered, so it can't be replicated in infant formula. Breastfed babies are less likely to get infections and are less likely to go to hospital than formula-fed babies.

### Added advantages for you

- Breastfeeding helps your uterus return to its pre-pregnant state faster.
- Breastfeeding can help you lose weight after your baby's birth.
- Breastfeeding lessens the likelihood of ovarian cancer and premenopausal breast cancer.
- Breastfeeding lessens the likelihood of osteoporosis.
- Breastfeeding lessens the likelihood of mothers with gestational diabetes developing Type 2 diabetes.

### Convenient, safe and natural

- Breastmilk is always available and is fresh, clean and safe.
- It is the only food that your baby needs for around the first six months.
- It is good for your baby even when she or he is over 12 months old.
- It saves you time as you don't need to prepare formula and sterilise bottles.
- It is always ready for your baby.
- Breastmilk is free. The money saved could be more than \$1000 in the first year of your baby's life.

### Acknowledgements

This fact sheet is consistent with current Infant Feeding Guidelines and Dietary Guidelines for Children and Adolescents in Australia, as produced by the National Health and Medical Research Council.

It is also based on information drawn heavily from:

- Infant and Toddler Feeding Guide, Department of Nutrition and Dietetics, Royal Children's Hospital and Health Service District, 2004.
- Breastfeeding: A Simple Guide to Help You Establish Breastfeeding, Community Child Health Service, Royal Children's Hospital and Health Service District, 2004.
- Growing Strong: Feeding You and Your Baby, Public Health Services, Queensland Health, 2003.
- Optimal Infant Nutrition: Evidence Based Guidelines 2003-2008, Queensland Health, 2003.

This fact sheet is also the result of input and effort from many health professionals in Queensland. Their help with the content is greatly appreciated.

To access the full set of fact sheets, go to <http://www.health.qld.gov.au/child&youth/factsheets>.



**Suzanne Huxley**

**From:** Harvey, Renee MS <renee.harvey@defence.gov.au>  
**Sent:** Thursday, 25 August 2016 2:33 PM  
**To:** 'sophie.dwyer@health.qld.gov.au'; 'janet.cumming@health.qld.gov.au'; 'suzanne.huxley@health.qld.gov.au'; 'Richard.Watts@daf.qld.gov.au'; 'tony.bradshaw@ehp.qld.gov.au'; 'MCKAY Adrian'  
**Cc:** 'Virginia Berry'; Pearce, Vicki MS 1; Huck, Josephine MS; JTF633 FCE AMAB Q Store; 'Archer, Michael J.'; 'Derham, Stuart'; 'Mitchell, Fran'; 'Lee, Frances (Fortitude Valley)'  
**Subject:** FW: Oakey HHRA | revised QLD gov review times [SEC=UNCLASSIFIED]  
**Attachments:** 60438981-PM-012-160825\_0.pdf

**UNCLASSIFIED**

Hi all,

The next version of the Oakey HHRA for your review can be accessed at the [link below](#).

<u>File</u>	<u>Description</u>	<u>Size</u>
<a href="#">0207-AACO-EI2-2016-HHRA_RevE_Redacted.pdf</a>		28,780KB

Please note that the sections that have changed materially since the version you previously reviewed are highlighted.

Also [attached](#) is the comments log explaining how your comments on the previous version have been addressed.

Given the timing of this email, we will require any final comments back by 2pm Monday (29 August).

Many thanks,  
 Renee

Renee Harvey  
 Contractor to Defence  
 M:

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**From:** Harvey, Renee MS  
**Sent:** Wednesday, 24 August 2016 08:55  
**To:** 'sophie.dwyer@health.qld.gov.au'; 'janet.cumming@health.qld.gov.au'; 'suzanne.huxley@health.qld.gov.au'; 'Richard.Watts@daf.qld.gov.au'; 'tony.bradshaw@ehp.qld.gov.au'; 'MCKAY Adrian'  
**Cc:** 'Virginia Berry'; Pearce, Vicki MS 1; Huck, Josephine MS; 'Lee, Frances (Fortitude Valley)'; 'Archer, Michael J.'; 'Derham, Stuart'; 'Mitchell, Fran'  
**Subject:** RE: Oakey HHRA | revised QLD gov review times [SEC=UNCLASSIFIED]

**UNCLASSIFIED**

Good morning all,

Further to my email below, we expect to have the next version of the HHRA through to you by noon tomorrow (25 August).

We would appreciate any final comments back by noon on Monday (29 August).

Material changes to the report will be highlighted so you can more easily see where the main changes have been made.

Many thanks,

Renee

Renee Harvey  
Contractor to Defence  
M:

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**From:** Harvey, Renee MS  
**Sent:** Monday, 22 August 2016 16:31  
**To:** 'sophie.dwyer@health.qld.gov.au'; 'janet.cumming@health.qld.gov.au'; 'suzanne.huxley@health.qld.gov.au'; 'Richard.Watts@daf.qld.gov.au'; 'tony.bradshaw@ehp.qld.gov.au'; 'MCKAY Adrian'  
**Cc:** 'Virginia Berry'; Pearce, Vicki MS 1; Huck, Josephine MS; 'Lee, Frances (Fortitude Valley)'; 'Archer, Michael J.'; 'Derham, Stuart'; 'Mitchell, Fran'  
**Subject:** Oakey HHRA | revised QLD gov review times [SEC=UNCLASSIFIED]

**UNCLASSIFIED**

Hi all,

Thanks very much for your time last Monday at the workshop to discuss the Queensland Government comments on the Draft Oakey Human Health Risk Assessment.

We indicated at the workshop that the next version of the report addressing your comments would be provided back to you by lunch time tomorrow (23 August) and that we would require any feedback by lunch time Wednesday (24 August).

We will not be in a position to provide you with the next version of the report as planned.

I will be able to indicate a revised timing tomorrow, but wanted to flag this delay with you as soon as possible.

Many thanks,  
Renee

Renee Harvey  
Contractor to Defence  
Environmental Remediation Programs  
Department of Defence  
M:

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Brindabella Business Park  
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**AECOM (2016) Draft Human Health Risk Assessment, Army Aviation Centre Oakey**

Response to comments received 11 August 2016 from the Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam

Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
<b>Overall Comments</b>			
1	Overall	<ul style="list-style-type: none"> <li>• The Report's risk characterisation and conclusions justify ongoing and additional actions by Department of Defence to remediate contamination and reduce exposure to community members.</li> <li>• Agency comments focus on                             <ul style="list-style-type: none"> <li>o Interpretation of the available information</li> <li>o Incomplete analysis of potential exposure pathways including:                                     <ul style="list-style-type: none"> <li>o Wind</li> <li>o Adjacent aquifers</li> <li>o Irrigation using groundwater</li> <li>o Breastmilk</li> <li>o Locally grown vegetables</li> </ul> </li> </ul> </li> </ul>	Please refer to responses below
<b>Points of Contention</b>			
2	Natural Resources and Mines	<ul style="list-style-type: none"> <li>• There has been no assessment of contamination in the Main Range Volcanics and Great Artesian Basin Aquifers. Drinking groundwater is identified as one of the predominant pathways for potential health effects. Residents have been advised not to drink groundwater, however, it is not clear whether this only applies to the Oakey Creek Alluvial aquifer</li> </ul>	Groundwater data were not divided based on aquifer because the majority of private groundwater bores do not have construction details available; therefore, the screened depth and targeted aquifer cannot be verified at all locations. It was assumed that the majority of private bores are installed in the more easily accessed Oakey Creek Alluvium, because of its shallow depth and generally acceptable salinity and yield. The HHRA conclusions (Section 9) will be amended to note that the precautionary advice applies to groundwater within the Investigation Area, regardless of which aquifer it is drawn from.



Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
3	Natural Resources and Mines	<ul style="list-style-type: none"> <li>No assessment of the potential pathway associated with wind and the potential for movement via dust onto roofs and potential consequent concentration in rainwater tanks. Likewise, the assessment of the exposure pathway associated with the drinking of surface water has not been identified or assessed</li> </ul>	<p>1) The HHRA included assessment of inhalation of dust indoors and outdoors. The HHRA conceptual site model (CSM) (Section 4.8) will be amended to note that incidental ingestion and inhalation are considered to be the primary pathways by which people could be exposed to PFAS in dust, however where dust settles on rooftops and washes into rainwater tanks over a long period of time, there is also a potential for a small amount of PFAS to be transferred to tank water. Where requested by residents Defence has undertaken rain water tank emptying, cleaning and refilling with town water. This would mitigate this pathway where completed. It is also noted that where first flush diverters have been fitted to rainwater tanks (as recommended by enHealth and required within the Queensland Development Code) these will divert the initial 20L flow from a roof (which may contain dust, bird droppings and organic material) and prevent it from being taken into the tank.</p> <p>2) Because maximum concentrations in surface water are lower than maximum concentrations in groundwater, intakes from drinking surface water will be lower than intakes from drinking groundwater. The HHRA conclusions (Section 9) will be amended to note that the precautionary advice not to drink water within the Investigation Area would also apply to surface water.</p>

RTI REVIEWED

Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
4	Health	<p>• The report states (Conclusion 5.1, page 103) “The calculated MOE based on PFOS + PFHxS serum concentrations reported for the Oakey cohort by Heffernan (2015) indicated that adverse health effects are unlikely to be associated with the concentrations of PFOS and PFHxS that have been measured in the Oakey biomonitoring cohort.” However, the current blood levels of Oakey residents are not necessarily representative of past serum concentrations and exposures, and thus cannot be used to indicate that adverse health effects are unlikely.</p>	<p>The HHRA will be amended to note in the data gaps discussion (Section 4.7) that the blood serum data reported by Heffernan (2015) were collected approximately eight months after Defence had provided precautionary advice not to drink groundwater within the IA.</p> <p>Defence understands that the blood testing program targeted a representative sample group who had:</p> <ol style="list-style-type: none"> <li>1. lived within the contamination detection area, and</li> <li>2. had bores tested that indicate elevated levels of either PFOS or PFOA, and</li> <li>3. been drinking bore water on a regular basis over the last three years.</li> </ol> <p>Considering the half-life of PFOS, PFOA and PFHxS in humans range between 4.1 and 8 years, it is unlikely that blood serum concentrations would have declined substantially between July 2014 and March 2015 due to cessation of use of groundwater for drinking. It is also noted that the AECOM (2016) ESA concluded that the extent and magnitude of groundwater impacts is not changing rapidly, therefore it is unlikely that the magnitude of concentrations in groundwater for past exposure may have been greater. However no demographic data were collected to understand the period of exposure for the individuals in the cohort and it is therefore unknown whether for some of the cohort, PFAS exposure could have ceased many years prior to March 2015. The HHRA can be revisited if relevant age, gender and demographic information are collected as part of future blood serum monitoring programs.</p>

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Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
5	Health	<ul style="list-style-type: none"> <li>The data gaps outlined in Table 18 (limited soil samples, low frequency of extended suite, low numbers and low diversity in home-grown produce samples, no yabbies, etc) were largely foreseeable and preventable, and further effort should have been made to collect a more appropriate set of samples. The absence of meaningful data should be addressed through an on-going program of sampling and testing</li> </ul>	<p>The HHRA will be amended to note in the data gaps section (Section 4.7) that the biota data are limited because, as described in the AECOM (2016) Sampling, Analysis and Quality Plan (previously reviewed by Queensland Government), the sampling was targeted to characterise the potential upper end of PFAS concentrations in plants and animals, to provide data that could be used to rule out pathways unlikely to contribute significantly to cumulative PFAS intakes and identify where further targeted data collection was required. Biota samples could only be collected where biota were identified within the Detection Area to have a confirmed PFAS exposure pathway and at the time of sampling there were few properties identified where such home grown produce was consumed by residents. It is agreed that further data collection is appropriate.</p>
6	Health	<ul style="list-style-type: none"> <li>The conclusion regarding eggs is based on a very small number of samples from only one property, and the report acknowledges that this may overestimate the risk. As eggs can be an important source of nutrition, this recommendation is of concern. The additional data that the report indicates is still required should have been part of this report</li> </ul>	<p>The HHRA will be amended to note in the data gaps section (Section 4.7) that the biota data are limited because, as described in the AECOM (2016) Sampling, Analysis and Quality Plan (previously reviewed by Queensland Government), the sampling was targeted to characterise the potential upper end of PFAS concentrations in plants and animals, to provide data that could be used to rule out pathways unlikely to contribute significantly to cumulative PFAS intakes and identify where further targeted data collection was required. At the time of sampling no additional properties were identified with a confirmed PFAS exposure pathway for chickens laying eggs. It is agreed that further data collection is appropriate.</p>
7	Health	<ul style="list-style-type: none"> <li>Appendix H – Infant Ingestion of Breastmilk states in the background that: “A literature search for studies specifically investigating possible effects on infants exposed to PFAS via breast milk did not identify such information.” This statement is obviously incorrect given that a literature review relating to this is included in the Williamtown HHRA</li> </ul>	<p>An updated literature review will be prepared by ToxConsult for inclusion in Appendix H</p>

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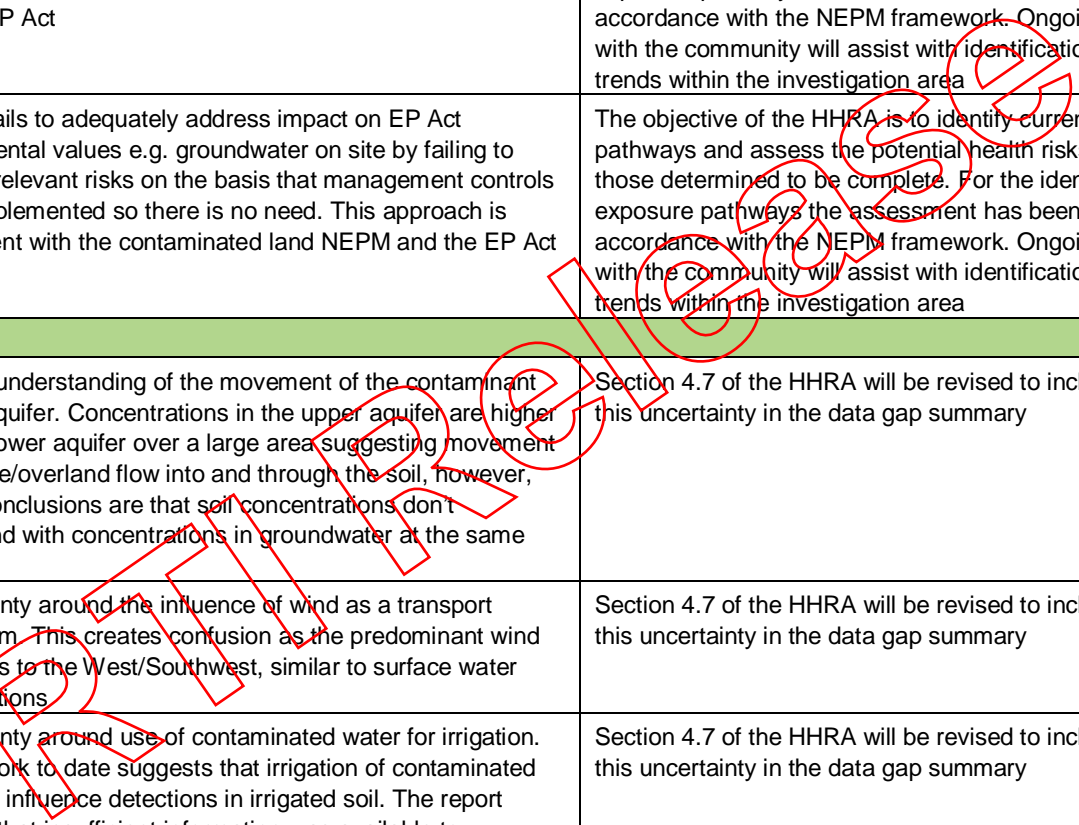
Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
8	Agriculture and Fisheries	<ul style="list-style-type: none"> <li>The risk assessment methodology used in the ToxConsult report is not the accepted practice for chemical contaminants and does not answer the question, would the exposures be expected to exceed 100% of the TDI</li> </ul>	<p>The HHRA will be updated in Section 7.1 to note that the assessment undertaken by ToxConsult follows complimentary methodology based on serum concentrations; it is not meant to be an assessment against the TDI as this has been undertaken by AECOM.</p> <p>As referenced in the ToxConsult report the margin of exposure (MOE) assessment methodology is used by Australian authorities for chemical contaminants.</p>
9	Agriculture and Fisheries	<ul style="list-style-type: none"> <li>It is difficult to draw conclusions about the potential need for risk management</li> </ul>	<p>A summary table will be added to the conclusions of the HHRA (Section 9) to clarify which exposure pathways have been identified to be associated with a low and acceptable risk, and which exposure pathways have a potential risk of health effects.</p>
10	Agriculture and Fisheries	<ul style="list-style-type: none"> <li>The AECOM approach is a site assessment and does not align well with normal food regulatory approaches</li> </ul>	<p>Noted. The HHRA was undertaken following the contaminated land framework.</p>
11	Agriculture and Fisheries	<ul style="list-style-type: none"> <li>The samples collected to assess the human dietary risks from consumption of PFAS contaminated produce is limited</li> </ul>	<p>The HHRA will be amended to note in the data gaps section (Section 4.7) that the biota data are limited because, as described in the AECOM (2016) Sampling, Analysis and Quality Plan (previously reviewed by Queensland Government), the sampling was targeted to characterise the potential upper end of PFAS concentrations in plants and animals, to provide data that could be used to rule out pathways unlikely to contribute significantly to cumulative PFAS intakes and identify where further targeted data collection was required.</p>
12	Agriculture and Fisheries	<ul style="list-style-type: none"> <li>The number of data points has been further unacceptably reduced in the risk assessment because of incorrect agricultural assumptions</li> </ul>	<p>The HHRA will be amended in Section 5.5 to note that the assessment has focussed on animals of typical age for commercial meat production. There is the potential for properties who are not commercial meat producers (e.g. hobby farmers or stud producers) to consume meat from older culled animals, which may have greater PFAS accumulation in their tissues than those that have been assessed. To supplement the assessment undertaken by AECOM, ToxConsult has evaluated ingestion exposure to a range of potential muscle tissue and liver concentrations for both sheep and cattle based on measured livestock blood serum concentrations. It is agreed that further data collection is appropriate.</p>

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Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
13	Agriculture and Fisheries	<ul style="list-style-type: none"> <li>The main AECOM report does not consider the risks from consumption of edible offal (mammalian) or from Crustacea</li> </ul>	<p>Section 5.5 of the HHRA will be amended to note that edible offal is considered in the ToxConsult assessment. It is agreed that further data collection is appropriate.</p> <p>Additional data are required to evaluate intakes of crustacea.</p>
14	Agriculture and Fisheries	<ul style="list-style-type: none"> <li>The assumptions used in the AECOM report are inconsistent in their relative conservatism, therefore there is considerable uncertainty in the comparative exposures from different pathways</li> </ul>	<p>The data gaps section of the HHRA (Section 4.7) will be amended to note that where site specific information was not available for community surveys, the human exposure assumptions were based on published data and this may result in variability in the level of conservatism relative to the actual community.</p>
15	Agriculture and Fisheries	<ul style="list-style-type: none"> <li>The hazard identified doesn't align with the EFSA hazard assessment which FSANZ has provisionally adopted</li> </ul>	<p>The hazard identification (Section 6.2) in the HHRA has been cross checked against the hazard summary presented in the FSANZ 24th Australian Total Diet Study and is considered to be consistent.</p>
16	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>Although contending all PFAS were evaluated, several PFAS detected on and off site in groundwater are not included in risk calculations e.g. PPHA, PFBS</li> </ul>	<p>Section 5.6 will be revised to note that while the combined concentrations of PFOS and PFHxS (and to a lesser extent, PFOA and PFHxA) typically contribute to at least 90% of the detected PFAS in environmental media and biota, a wider range of PFAS were detected in fish and surface water. In fish and surface water samples the sum of PFOS, PFOA, PFHxS and PFHxA ranged between approximately 65-70% of the detected PFAS.</p> <p>The HHRA conclusions would not change if it were conservatively assumed that other PFAS detected had equivalent toxicity to PFOS.</p> <p>Furthermore it is noted human biomonitoring only reported measurable serum concentrations for PFOS, PFHxS and PFOA with concentrations of PFOA being consistent with background levels.</p>

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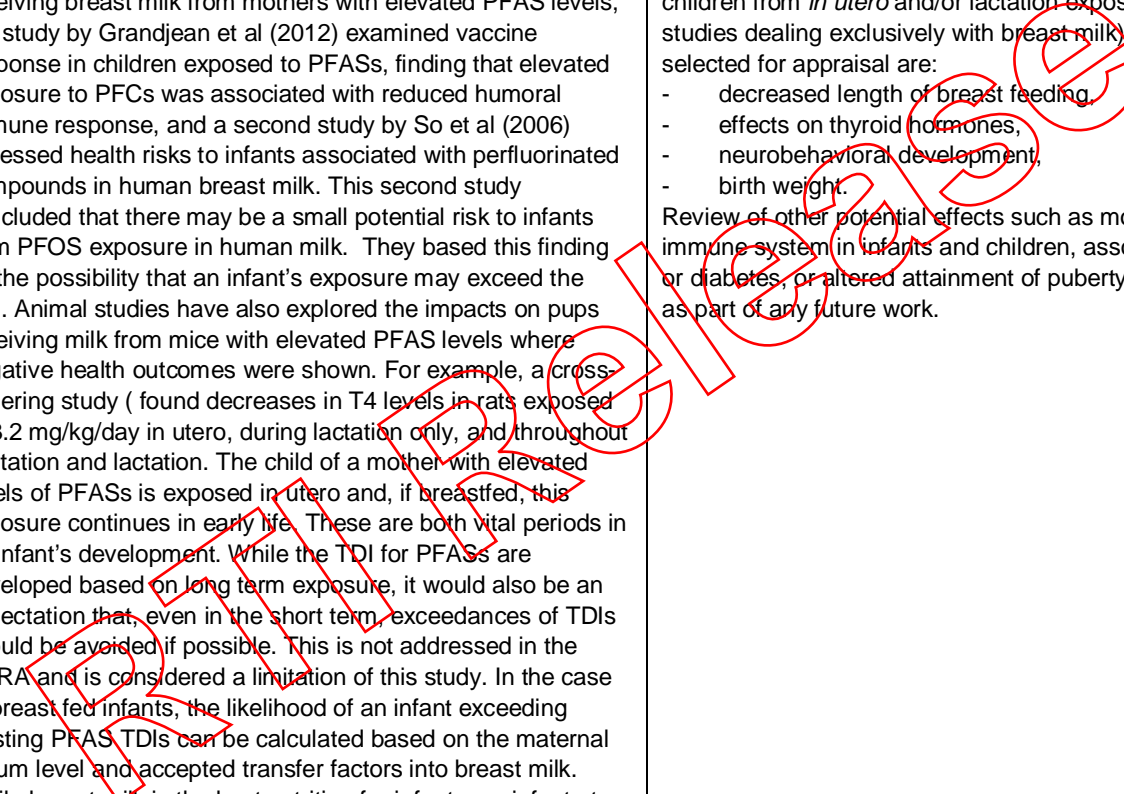
Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
17	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>The HHRA does not assess of environmental values protected under the Water EPP, only current off-site uses. This approach of excluding uses future potential use e.g. freshwater aquaculture is inconsistent with the contaminated land NEPM and the EP Act</li> </ul>	<p>The objective of the HHRA is to identify current exposure pathways and assess the potential health risks associated with those determined to be complete. For the identified complete exposure pathways the assessment has been conducted in accordance with the NEPM framework. Ongoing engagement with the community will assist with identification of water use trends within the investigation area</p>
18	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>HHRA fails to adequately address impact on EP Act environmental values e.g. groundwater on site by failing to evaluate relevant risks on the basis that management controls will be implemented so there is no need. This approach is inconsistent with the contaminated land NEPM and the EP Act</li> </ul>	<p>The objective of the HHRA is to identify current exposure pathways and assess the potential health risks associated with those determined to be complete. For the identified complete exposure pathways the assessment has been conducted in accordance with the NEPM framework. Ongoing engagement with the community will assist with identification of water use trends within the investigation area</p>
<b>Limitations of Report Content</b>			
19	Natural Resources and Mines	<ul style="list-style-type: none"> <li>Limited understanding of the movement of the contaminant into the aquifer. Concentrations in the upper aquifer are higher than the lower aquifer over a large area suggesting movement via surface/overland flow into and through the soil, however, current conclusions are that soil concentrations don't correspond with concentrations in groundwater at the same site</li> </ul>	<p>Section 4.7 of the HHRA will be revised to include discussion of this uncertainty in the data gap summary</p>
20	Natural Resources and Mines	<ul style="list-style-type: none"> <li>Uncertainty around the influence of wind as a transport mechanism. This creates confusion as the predominant wind direction is to the West/Southwest, similar to surface water flow directions</li> </ul>	<p>Section 4.7 of the HHRA will be revised to include discussion of this uncertainty in the data gap summary</p>
21	Natural Resources and Mines	<ul style="list-style-type: none"> <li>Uncertainty around use of contaminated water for irrigation. Limited work to date suggests that irrigation of contaminated water can influence detections in irrigated soil. The report identifies that insufficient information was available to understand the relationships associated with irrigation practice and detectable levels of the contaminant in soil</li> </ul>	<p>Section 4.7 of the HHRA will be revised to include discussion of this uncertainty in the data gap summary</p>



Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
22	Natural Resources and Mines	<ul style="list-style-type: none"> <li>Assessment of the exposure pathway associated with the irrigation of surface water for plant produce. While the pathway has been identified in Table 22, no assessment of the extent or potential for contamination has been undertaken.</li> </ul>	<p>The HHRA will be revised when discussing the selection of exposure point concentrations (EPC) in Section 5.4 to note that because maximum concentrations in surface water are lower than maximum concentrations in groundwater, PFAS concentrations in plants irrigated with surface water would not be expected to be greater than PFAS concentrations in plants irrigated with groundwater.</p>
23	Health	<ul style="list-style-type: none"> <li>The analysis based on the serum concentrations is interesting, but does not advance the risk assessment process. The importance of the serum data is as a baseline for assessing future protection and mitigation strategies. Emphasis in this risk assessment should be placed on assessing those aspects of exposure that will inform risk management strategies, and enable validation of such strategies into the future.</li> </ul>	<p>The HHRA will be updated in Section 7.1 to note that the assessment undertaken by ToxConsult follows complimentary methodology based on serum concentrations; it is not meant to be an assessment against the TDI as this has been undertaken by AECOM.</p> <p>As referenced in the report the margin of exposure (MOE) assessment methodology is used by Australian authorities for chemical contaminants.</p> <p>While a reference for the pros and con's of pooled serum for biomonitoring is already included in the serum HHRA (Section 9.2) this can be expanded, and also include biomonitoring for evaluation of mitigation strategies.</p>

RTI RELEASED

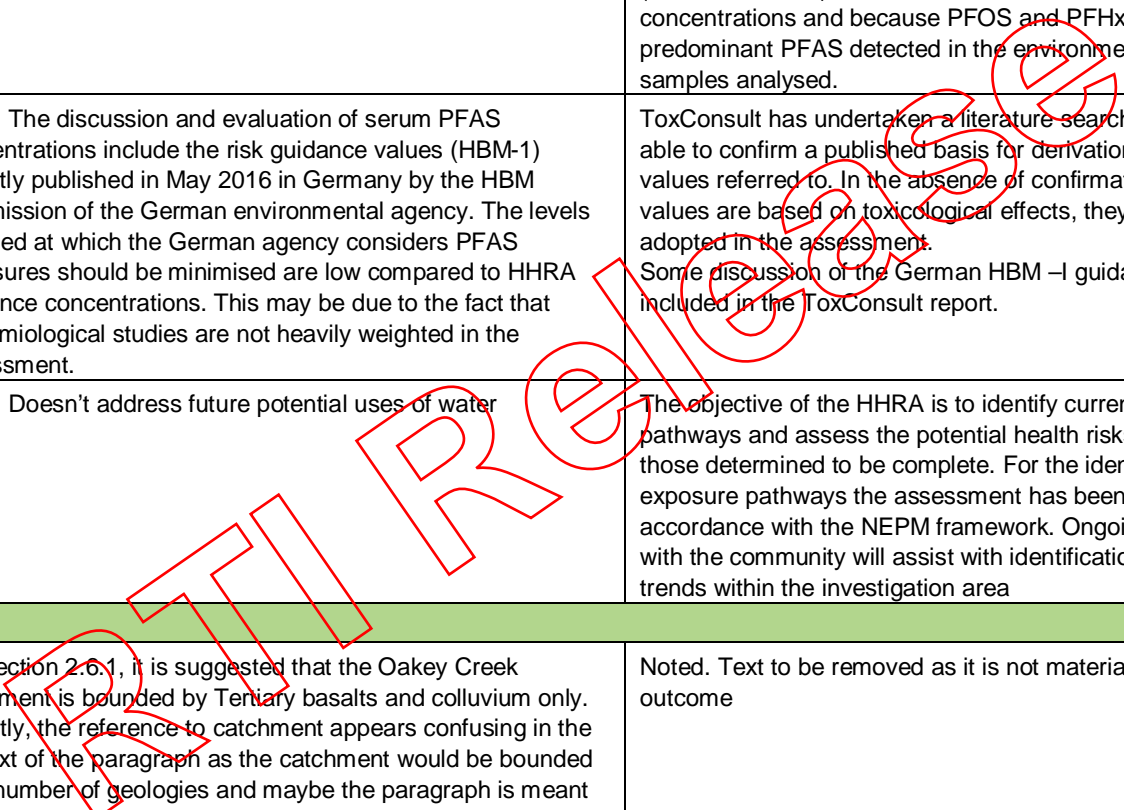
Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
24	Health	<p>AHPPC has requested that enHealth undertake a more detailed review of the evidence related to PFAS exposures during pregnancy and breastfeeding. While there is limited data from human studies in the risk to infants related to receiving breast milk from mothers with elevated PFAS levels, the study by Grandjean et al (2012) examined vaccine response in children exposed to PFASs, finding that elevated exposure to PFCs was associated with reduced humoral immune response, and a second study by So et al (2006) assessed health risks to infants associated with perfluorinated compounds in human breast milk. This second study concluded that there may be a small potential risk to infants from PFOS exposure in human milk. They based this finding on the possibility that an infant's exposure may exceed the TDI. Animal studies have also explored the impacts on pups receiving milk from mice with elevated PFAS levels where negative health outcomes were shown. For example, a cross-fostering study ( found decreases in T4 levels in rats exposed to 3.2 mg/kg/day in utero, during lactation only, and throughout gestation and lactation. The child of a mother with elevated levels of PFASs is exposed in utero and, if breastfed, this exposure continues in early life. These are both vital periods in an infant's development. While the TDI for PFASs are developed based on long term exposure, it would also be an expectation that, even in the short term, exceedances of TDIs should be avoided if possible. This is not addressed in the HHRA and is considered a limitation of this study. In the case of breast fed infants, the likelihood of an infant exceeding existing PFAS TDIs can be calculated based on the maternal serum level and accepted transfer factors into breast milk. While breast milk is the best nutrition for infants, an infant at risk of exceeding the TDI could continue to be breastfed but receive some feeds as supplemental feeding to prevent exceedances of the TDI.</p>	<p>An updated literature review has been prepared by ToxConsult for inclusion in Appendix H.</p> <p>Please note that for a preliminary review of the epidemiology literature for potential impacts of PFOS and PFHxS on infants or children from <i>in utero</i> and/or lactation exposure (there were no studies dealing exclusively with breast milk), the endpoints selected for appraisal are:</p> <ul style="list-style-type: none"> <li>- decreased length of breast feeding,</li> <li>- effects on thyroid hormones,</li> <li>- neurobehavioral development,</li> <li>- birth weight.</li> </ul> <p>Review of other potential effects such as modulation of the immune system in infants and children, associations with obesity or diabetes, or altered attainment of puberty will be considered as part of any future work.</p>



Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
25	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>There has been limited sampling of some environmental media with reduce representativeness and reliability of risk estimates e.g. eggs, root vegetables, yabbies</li> </ul>	<p>The HHRA will be amended to note in the data gaps section (Section 4.7) that the biota data are limited because, as described in the AECOM (2016) Sampling, Analysis and Quality Plan (previously reviewed by Queensland Government), the sampling was targeted to characterise the potential upper end of PFAS concentrations in plants and animals, to provide data that could be used to rule out pathways unlikely to contribute significantly to cumulative PFAS intakes and identify where further targeted data collection was required.</p>
26	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>Potential future risks for current use of PFAS containing Ansulite fire-fighting foam not adequately addressed.</li> </ul>	<p>This is considered to be a management issue, not an issue for the HHRA which addresses potential exposure to the current identified environmental impacts associated with use of legacy fire fighting foams.</p>
27	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>PFAS detected on and off site in groundwater are not included in risk calculations, which occurs in overseas jurisdictions e.g. Danish EPA.</li> </ul>	<p>Section 5.6 will be revised to note that while the combined concentrations of PFOS and PFHxS (and to a lesser extent, PFOA and PFHxA) typically contribute to at least 90% of the detected PFAS in environmental media and biota, a wider range of PFAS were detected in fish and surface water. In fish and surface water samples the sum of PFOS, PFOA, PFHxS and PFHxA ranged between approximately 65-70% of the detected PFAS.</p> <p>The HHRA conclusions would not change if it were conservatively assumed that other PFAS detected had equivalent toxicity to PFOS.</p> <p>Furthermore it is noted human biomonitoring only reported measurable serum concentrations for PFOS, PFHxS and PFOA with concentrations of PFOA being consistent with background levels.</p> <p>In addition the ToxConsult report summed all sulphonates and all acids and treated them as if they were respectively PFOS and PFOA. This is essentially the same as the Danish EPA approach where many PFAS compounds have by default been assigned the TRV for PFOS or PFOA.</p>

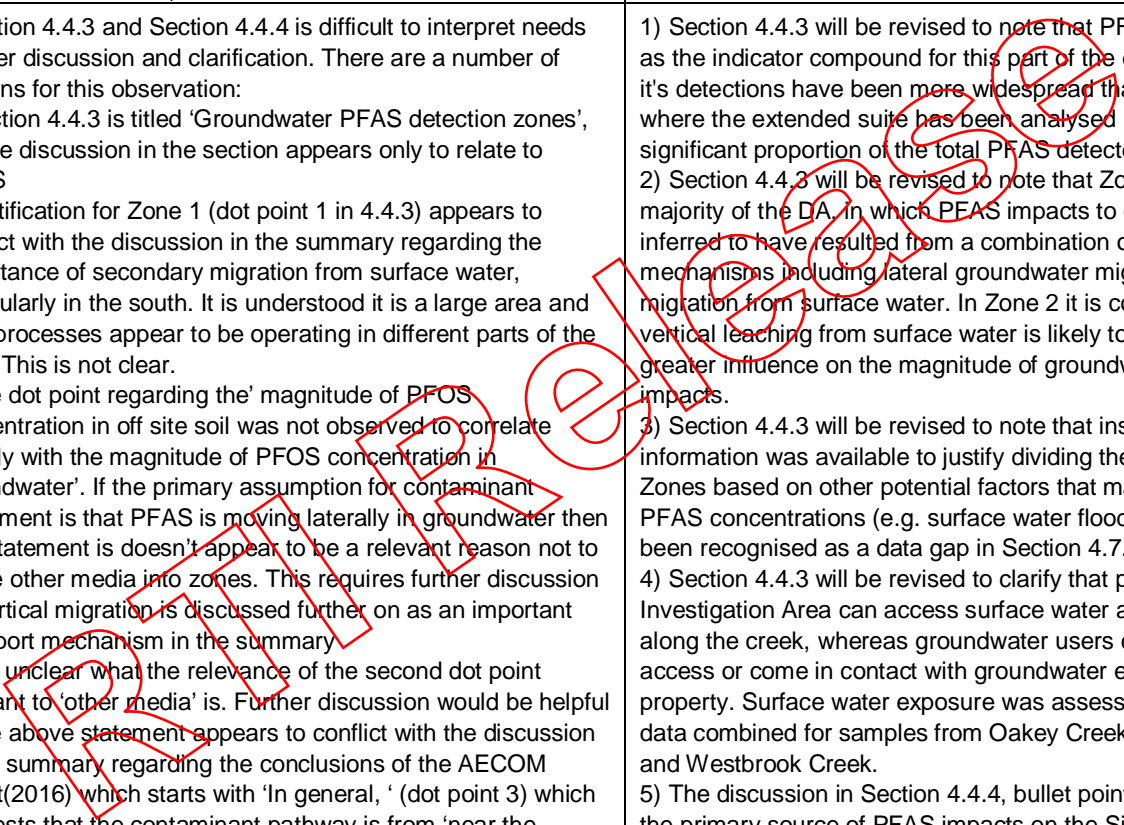
RTI REVIEWED

Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
28	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>The sensitivity assessment does not address impacts on the assessment of adopting the lower PFOA TDI/TRV adopted by the US EPA in 2016.</li> </ul>	<p>Section 8.2 will be revised to note that the sensitivity of the HHRA was not evaluated for the USEPA PFOA TRV because PFOA concentrations in blood serum from the Oakey cohort (Heffernan, 2015) were within Australian background serum concentrations and because PFOS and PFHxS were the predominant PFAS detected in the environmental and biota samples analysed.</p>
29	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>The discussion and evaluation of serum PFAS concentrations include the risk guidance values (HBM-1) recently published in May 2016 in Germany by the HBM commission of the German environmental agency. The levels adopted at which the German agency considers PFAS exposures should be minimised are low compared to HHRA guidance concentrations. This may be due to the fact that epidemiological studies are not heavily weighted in the assessment.</li> </ul>	<p>ToxConsult has undertaken a literature search but has not been able to confirm a published basis for derivation of the German values referred to. In the absence of confirmation that these values are based on toxicological effects, they have not been adopted in the assessment. Some discussion of the German HBM –I guidance values will be included in the ToxConsult report.</p>
30	Environment and Heritage Protection	<ul style="list-style-type: none"> <li>Doesn't address future potential uses of water</li> </ul>	<p>The objective of the HHRA is to identify current exposure pathways and assess the potential health risks associated with those determined to be complete. For the identified complete exposure pathways the assessment has been conducted in accordance with the NEPM framework. Ongoing engagement with the community will assist with identification of water use trends within the investigation area</p>
<b>Additional comments</b>			
31	Natural Resources and Mines	<ul style="list-style-type: none"> <li>In section 2.6.1, it is suggested that the Oakey Creek catchment is bounded by Tertiary basalts and colluvium only.               <ul style="list-style-type: none"> <li>o Firstly, the reference to catchment appears confusing in the context of the paragraph as the catchment would be bounded by a number of geologies and maybe the paragraph is meant to reference Oakey Creek Alluvium?</li> <li>o Secondly, Walloon Coal measures will also bound parts of the alluvium</li> </ul> </li> </ul>	<p>Noted. Text to be removed as it is not material to the HHRA outcome</p>





Comment #	Comment From	Queensland Government Interdepartmental Committee for Fluorinated Firefighting Foam Comment	AECOM Response 25 August 2016
32	Natural Resources and Mines	<ul style="list-style-type: none"> <li>In section 2.6.2, it is suggested that the GAB aquifers are managed under the Western Downs Sub-artesian area. These aquifers are managed under the Water Resource Plan (Great Artesian Basin) Plan 2006</li> </ul>	Noted. Text to be amended
33	Natural Resources and Mines	<ul style="list-style-type: none"> <li>Section 4.4.3 and Section 4.4.4 is difficult to interpret needs greater discussion and clarification. There are a number of reasons for this observation:               <ul style="list-style-type: none"> <li>Section 4.4.3 is titled 'Groundwater PFAS detection zones', yet the discussion in the section appears only to relate to PFOS</li> <li>Justification for Zone 1 (dot point 1 in 4.4.3) appears to conflict with the discussion in the summary regarding the importance of secondary migration from surface water, particularly in the south. It is understood it is a large area and both processes appear to be operating in different parts of the area. This is not clear.</li> <li>The dot point regarding the 'magnitude of PFOS concentration in off site soil was not observed to correlate closely with the magnitude of PFOS concentration in groundwater'. If the primary assumption for contaminant movement is that PFAS is moving laterally in groundwater then this statement is doesn't appear to be a relevant reason not to divide other media into zones. This requires further discussion as vertical migration is discussed further on as an important transport mechanism in the summary</li> <li>It is unclear what the relevance of the second dot point relevant to 'other media' is. Further discussion would be helpful</li> <li>The above statement appears to conflict with the discussion in the summary regarding the conclusions of the AECOM report(2016) which starts with 'In general, ' (dot point 3) which suggests that the contaminant pathway is from 'near the ground surface and migrating to the Upper alluvium and to a lesser extent to the lower alluvium'.</li> </ul> </li> </ul>	<ol style="list-style-type: none"> <li>Section 4.4.3 will be revised to note that PFOS was adopted as the indicator compound for this part of the evaluation because it's detections have been more widespread than PFOA and where the extended suite has been analysed it accounts for a significant proportion of the total PFAS detected.</li> <li>Section 4.4.3 will be revised to note that Zone 1 covers the majority of the DA, in which PFAS impacts to groundwater are inferred to have resulted from a combination of migration mechanisms including lateral groundwater migration and vertical migration from surface water. In Zone 2 it is considered that vertical leaching from surface water is likely to have had a greater influence on the magnitude of groundwater PFAS impacts.</li> <li>Section 4.4.3 will be revised to note that insufficient information was available to justify dividing the soil data into Zones based on other potential factors that may influence soil PFAS concentrations (e.g. surface water flooding). This has been recognised as a data gap in Section 4.7.</li> <li>Section 4.4.3 will be revised to clarify that people in the Investigation Area can access surface water at many locations along the creek, whereas groundwater users can only regularly access or come in contact with groundwater extracted at their property. Surface water exposure was assessed based on all data combined for samples from Oakey Creek, Doctor Creek and Westbrook Creek.</li> <li>The discussion in Section 4.4.4, bullet point 3 is in relation to the primary source of PFAS impacts on the Site, not the subsequent migration of PFAS impacts from secondary sources.</li> </ol>



## Suzanne Huxley

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**From:** Harvey, Renee MS <renee.harvey@defence.gov.au>  
**Sent:** Wednesday, 24 August 2016 4:36 PM  
**To:** Suzanne Huxley  
**Cc:** 'Virginia Berry'; Pearce, Vicki MS 1; Huck, Josephine MS; Sophie Dwyer; Janet Cumming  
**Subject:** RE: Oakey HHRA | proposed reference to enHealth review [SEC=UNCLASSIFIED]

UNCLASSIFIED

Thank you Suzanne,

I will pass this wording on to AECOM.

Many thanks  
Renee

Renee Harvey  
Contractor to Defence  
M:

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**From:** Suzanne Huxley [mailto:Suzanne.Huxley@health.qld.gov.au]  
**Sent:** Wednesday, 24 August 2016 14:13  
**To:** Harvey, Renee MS  
**Cc:** 'Virginia Berry'; Pearce, Vicki MS 1; Huck, Josephine MS; Sophie Dwyer; Janet Cumming  
**Subject:** RE: Oakey HHRA | proposed reference to enHealth review [SEC=UNCLASSIFIED]

Hi Renee

Suggested wording based on the outcome minutes of the AHPPC meeting is:

It is understood that AHPPC has requested that enHealth undertake a **more detailed** review of the evidence related to PFAS exposures during pregnancy and breastfeeding which, when published, may also provide relevant information for further consideration.

Regards

Suzanne

---

**From:** Harvey, Renee MS [mailto:renee.harvey@defence.gov.au]  
**Sent:** Thursday, 18 August 2016 6:45 PM  
**To:** Suzanne Huxley; Sophie Dwyer; Janet Cumming  
**Cc:** 'Virginia Berry'; Pearce, Vicki MS 1; Huck, Josephine MS  
**Subject:** Oakey HHRA | proposed reference to enHealth review [SEC=UNCLASSIFIED]

UNCLASSIFIED

Hi Sophie, Janet and Suzanne,

Thank you for your time on Monday to discuss your comments on the Draft Oakey Human Health Risk Assessment.

We are working through the comments and as agreed in the workshop, we'd like your input into some proposed wording in relation to a review by enHealth of the evidence related to PFAS exposure during pregnancy and breastfeeding.

We currently propose inclusion of the following sentence in the conclusion section of Appendix H (Infant Ingestion of Breastmilk): *It is understood that AHPPC has requested that enHealth undertake a review of the evidence related to PFAS exposures during pregnancy and breastfeeding which, when published, may also provide relevant information for further consideration.*

You indicated that you would need to refer to some meeting minutes etc to confirm if it would be suitable for Defence to include wording of this nature in the final, publically available HHRA for Oakey.

Are you able to please advise if this wording is appropriate, and if Health is comfortable with it being included in the final version of the HHRA?

We will still be providing you the next version of the HHRA to review the changes made following Monday's workshop, but we'd like to gain your feedback on this specific issue in the mean time given the time constraints.

Please don't hesitate to contact me if you would like to discuss.

Many thanks,  
Renee

Renee Harvey  
Contractor to Defence  
Environmental Remediation Programs  
Department of Defence  
M:

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BP3-2-B021  
Brindabella Circuit  
Brindabella Business Park  
PO Box 7925 Canberra BC 2610

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RTI Release

## Suzanne Huxley

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**From:** Harvey, Renee MS <renee.harvey@defence.gov.au>  
**Sent:** Wednesday, 24 August 2016 8:55 AM  
**To:** Sophie Dwyer; Janet Cumming; Suzanne Huxley; 'Richard.Watts@daf.qld.gov.au'; 'tony.bradshaw@ehp.qld.gov.au'; 'MCKAY Adrian'  
**Cc:** 'Virginia Berry'; Pearce, Vicki MS 1; Huck, Josephine MS; 'Lee, Frances (Fortitude Valley)'; 'Archer, Michael J.'; 'Derham, Stuart'; 'Mitchell, Fran'  
**Subject:** RE: Oakey HHRA | revised QLD gov review times [SEC=UNCLASSIFIED]

### UNCLASSIFIED

Good morning all,

Further to my email below, we expect to have the next version of the HHRA through to you by noon tomorrow (25 August).

We would appreciate any final comments back by noon on Monday (29 August).

Material changes to the report will be highlighted so you can more easily see where the main changes have been made.

Many thanks,  
 Renee

Renee Harvey  
 Contractor to Defence  
 M:

---

**From:** Harvey, Renee MS  
**Sent:** Monday, 22 August 2016 16:31  
**To:** 'sophie.dwyer@health.qld.gov.au'; 'janet.cumming@health.qld.gov.au'; 'suzanne.huxley@health.qld.gov.au'; 'Richard.Watts@daf.qld.gov.au'; 'tony.bradshaw@ehp.qld.gov.au'; 'MCKAY Adrian'  
**Cc:** 'Virginia Berry'; Pearce, Vicki MS 1; Huck, Josephine MS; 'Lee, Frances (Fortitude Valley)'; 'Archer, Michael J.'; 'Derham, Stuart'; 'Mitchell, Fran'  
**Subject:** Oakey HHRA | revised QLD gov review times [SEC=UNCLASSIFIED]

### UNCLASSIFIED

Hi all,

Thanks very much for your time last Monday at the workshop to discuss the Queensland Government comments on the Draft Oakey Human Health Risk Assessment.

We indicated at the workshop that the next version of the report addressing your comments would be provided back to you by lunch time tomorrow (23 August) and that we would require any feedback by lunch time Wednesday (24 August).

We will not be in a position to provide you with the next version of the report as planned.

I will be able to indicate a revised timing tomorrow, but wanted to flag this delay with you as soon as possible.

Many thanks,  
 Renee

Renee Harvey

Contractor to Defence  
Environmental Remediation Programs  
Department of Defence  
M:

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RTI Released

## Myra Thompson

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**From:** SANDERS Paul <Paul.Sanders@dnrm.qld.gov.au>  
**Sent:** Monday, 9 November 2015 7:06 PM  
**To:** Louise Mahoney; Christine Castley; CHO ESO; Jeannette Young; Penny Hutchinson; ROUTLEY Richard; LETTS Malcolm; CONNOR Andrew; HILL Chris  
**Cc:** Sophie Dwyer; SLIZANKIEWICZ Veronica; DIFFEY Lea  
**Subject:** RE: DRAFT Minutes - Oakey meeting 5 November

**Sensitivity:** Confidential

Hi Louise,

Under item 5 I thought we also agreed that we need to clarify with Defence who is providing communication to the community (i.e. they should be). This was on the basis that they have apparently been telling people that they only provide info that QG agencies say they should.

Thanks  
Paul

Paul Sanders  
Regional Manager

Water Services  
South Region

Department of Natural Resources and Mines

**Telephone:** 07 3330 4465 **Facsimile:** 07 3406 2581 **Mobile:**

**Email:** paul.sanders@dnrm.qld.gov.au

Landcentre

Cnr Main and Vulture Streets, Woolloongabba Q

GPO Box 2771, Brisbane Qld 4000

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**From:** Louise Mahoney [mailto:Louise.Mahoney@premiers.qld.gov.au]

**Sent:** Friday, 6 November 2015 10:44 AM

**To:** Christine Castley; CHO\_ESO@health.qld.gov.au; Jeannette Young (Queensland Health); Penny Hutchinson; ROUTLEY Richard; LETTS Malcolm; CONNOR Andrew; HILL Chris; SANDERS Paul

**Cc:** Sophie Dwyer; SLIZANKIEWICZ Veronica; DIFFEY Lea

**Subject:** DRAFT Minutes - Oakey meeting 5 November

**Sensitivity:** Confidential

Good Morning all

Draft minutes of yesterday's meeting attached. Please advise of any amendments or corrections (prior to our meeting with Defence if possible, please).

Regards

Louise



Queensland  
Government

Louise Mahoney

A/Director

**Social Policy**

Department of the Premier and Cabinet

P 07 3003 9353

Executive Building, Level 14, 100 George Street, Brisbane QLD 4000

PO Box 15185, City East, QLD 4002

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**From:** Louise Mahoney

**Sent:** Thursday, 5 November 2015 2:50 PM

**To:** Christine Castley <[Christine.Castley@premiers.qld.gov.au](mailto:Christine.Castley@premiers.qld.gov.au)>; 'CHO\_ESO@health.qld.gov.au' <[CHO\\_ESO@health.qld.gov.au](mailto:CHO_ESO@health.qld.gov.au)>; Jeannette Young (Queensland Health) <[Jeannette.Young@health.qld.gov.au](mailto:Jeannette.Young@health.qld.gov.au)>; 'Penny.Hutchinson@health.qld.gov.au' <[Penny.Hutchinson@health.qld.gov.au](mailto:Penny.Hutchinson@health.qld.gov.au)>; 'Richard.Routley@daf.qld.gov.au' <[Richard.Routley@daf.qld.gov.au](mailto:Richard.Routley@daf.qld.gov.au)>; 'malcolm.letts@daf.qld.gov.au' <[malcolm.letts@daf.qld.gov.au](mailto:malcolm.letts@daf.qld.gov.au)>; 'Andrew.connor@ehp.qld.gov.au' <[Andrew.connor@ehp.qld.gov.au](mailto:Andrew.connor@ehp.qld.gov.au)>; 'Chris.Hill@ehp.qld.gov.au' <[Chris.Hill@ehp.qld.gov.au](mailto:Chris.Hill@ehp.qld.gov.au)>; 'paul.sanders@dnrm.qld.gov.au' <[paul.sanders@dnrm.qld.gov.au](mailto:paul.sanders@dnrm.qld.gov.au)>

**Cc:** 'Sophie Dwyer' <[Sophie.Dwyer@health.qld.gov.au](mailto:Sophie.Dwyer@health.qld.gov.au)>; 'SLIZANKIEWICZ Veronica' <[Veronica.Slizankiewicz@daf.qld.gov.au](mailto:Veronica.Slizankiewicz@daf.qld.gov.au)>

**Subject:** Oakey meeting follow up - contributions due by midday Monday 9 November

**Sensitivity:** Confidential

Thank you everyone for your participation this morning.

As we discussed, I am circulating two documents for your comments and contributions by **midday Monday**, so we can provide advice to Defence on what we would like covered on Friday.

The first document is the “scope of work” document provided to Defence by QH. I have added two columns

- **Potential request to Defence for 13 November Briefing** – where I have made some suggestions as to what we could ask Defence to cover, based on what was suggested in the original scope of work
- **Agency comments** – for you to provide me with your comments on what I have suggested, in terms of what is current or what more you would want covered.

The second document is a table, in which I have started to document some of the areas the group has identified as areas of confusion or concern for the community, where we might recommend that Defence initiate some clearer communication.

Please add to the table as you see fit (you may be aware of other areas of confusion or concern). Please also provide your comments or advice as to what your agency considers Defence should do to allay the confusion.

As per our Terms of Reference, please treat this work as both draft and confidential. As the subject matter experts, your corrections of any errors I have made are also welcome.



I will also circulate Minutes, but I have prioritised this in order to get your feedback by Monday.

Thank you again for your help with this.

Regards << File: Scope of Work Table for Agency Feedback.docx >> << File: Oakey - communication issues.docx >>

Louise

**Louise Mahoney**

A/Director

**Social Policy**

Department of the Premier and Cabinet

P 07 3003 9353

Executive Building, Level 14, 100 George Street, Brisbane QLD 4000

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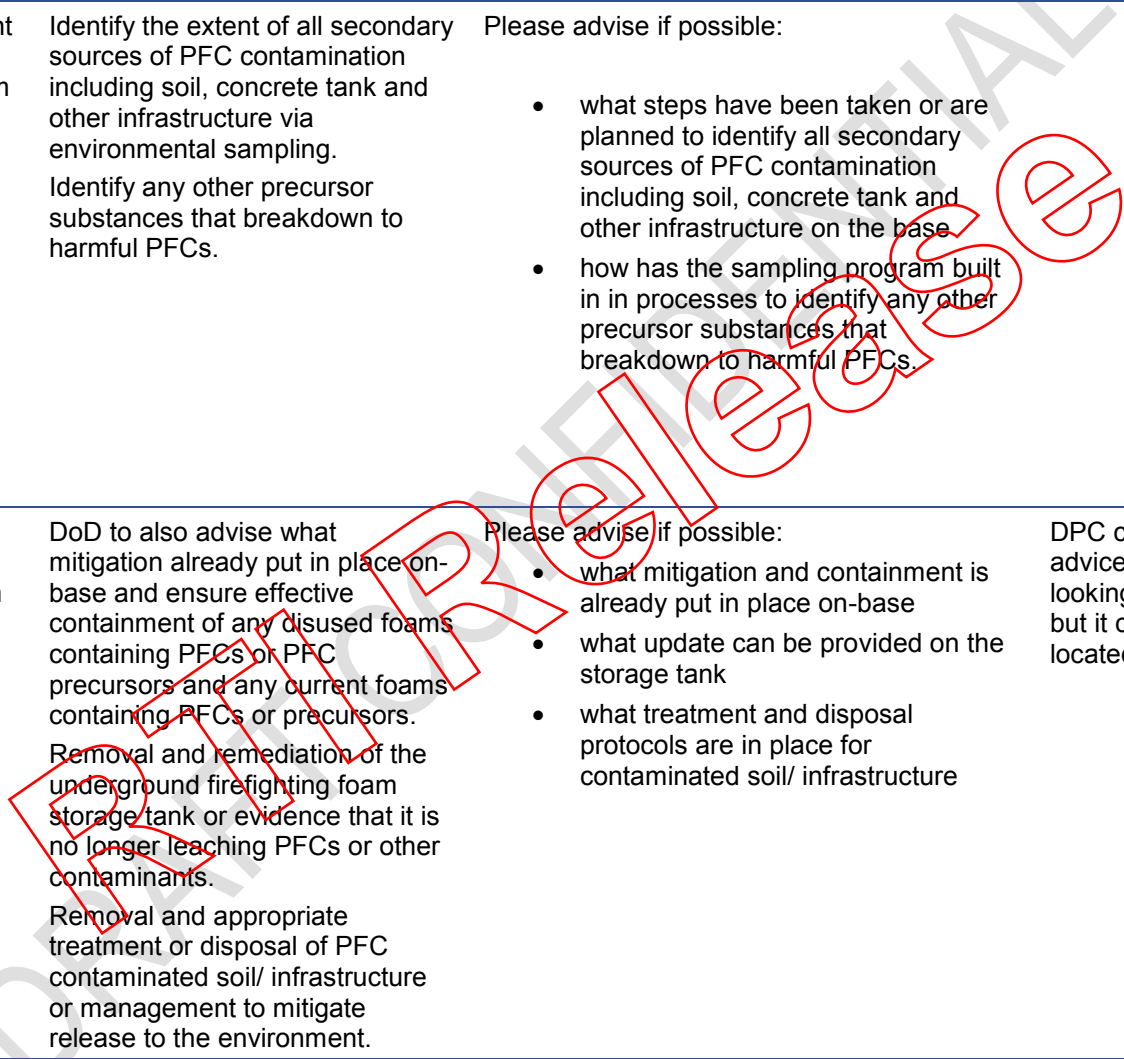
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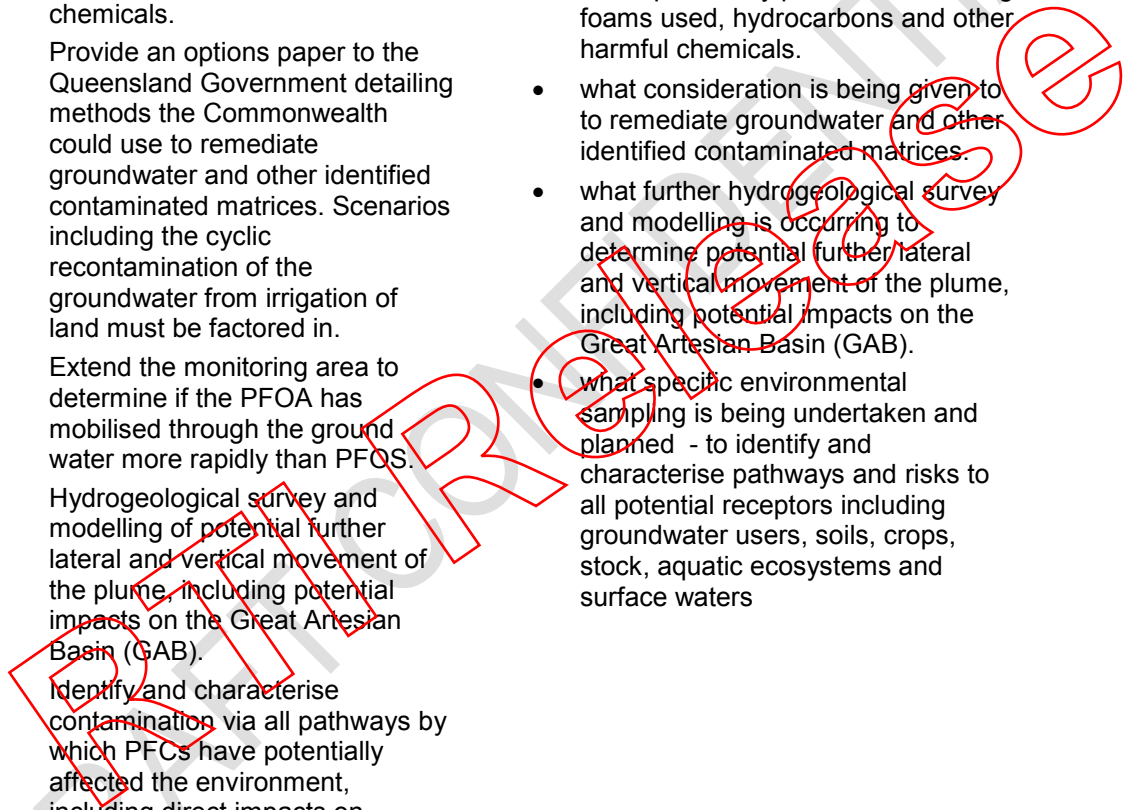
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Objective	Desired Outcome	Action	Potential request to Defence for 13 November Briefing	Agency comments
Protect groundwater, surface water, land, ecosystems, crops, livestock and people from further contamination as a result of the historical use of fire fighting foams on Commonwealth land	Establish full extent and nature of contamination from the source.	Identify the extent of all secondary sources of PFC contamination including soil, concrete tank and other infrastructure via environmental sampling. Identify any other precursor substances that breakdown to harmful PFCs.	Please advise if possible: <ul style="list-style-type: none"> <li>what steps have been taken or are planned to identify all secondary sources of PFC contamination including soil, concrete tank and other infrastructure on the base</li> <li>how has the sampling program built in in processes to identify any other precursor substances that breakdown to harmful PFCs.</li> </ul>	
	Prevent further release of contaminants from the base.	DoD to also advise what mitigation already put in place on-base and ensure effective containment of any disused foams containing PFCs or PFC precursors and any current foams containing PFCs or precursors. Removal and remediation of the underground firefighting foam storage tank or evidence that it is no longer leaching PFCs or other contaminants. Removal and appropriate treatment or disposal of PFC contaminated soil/ infrastructure or management to mitigate release to the environment.	Please advise if possible: <ul style="list-style-type: none"> <li>what mitigation and containment is already put in place on-base</li> <li>what update can be provided on the storage tank</li> <li>what treatment and disposal protocols are in place for contaminated soil/ infrastructure</li> </ul>	DPC comment – Defence provided verbal advice on 25 September that it was looking at options for the concrete tank, but it could not be removed as it was located under another building
Management,		Full characterisation of the	Please advise if possible:	



Objective	Desired Outcome	Action	Potential request to Defence for 13 November Briefing	Agency comments
	<p>mitigation and remediation of off-base contamination.</p>	<p>contaminant plume, including all PFCs potentially present considering foams used, hydrocarbons and other harmful chemicals.</p> <p>Provide an options paper to the Queensland Government detailing methods the Commonwealth could use to remediate groundwater and other identified contaminated matrices. Scenarios including the cyclic recontamination of the groundwater from irrigation of land must be factored in.</p> <p>Extend the monitoring area to determine if the PFOA has mobilised through the ground water more rapidly than PFOS.</p> <p>Hydrogeological survey and modelling of potential further lateral and vertical movement of the plume, including potential impacts on the Great Artesian Basin (GAB).</p> <p>Identify and characterise contamination via all pathways by which PFCs have potentially affected the environment, including direct impacts on surface water and secondary transfers to other environmental compartments.</p> <p>Identify and characterise risks to all potential receptors including</p>	<ul style="list-style-type: none"> <li>• what assessment is being undertaken to characterise the contaminant plume, including all PFCs potentially present considering foams used, hydrocarbons and other harmful chemicals.</li> <li>• what consideration is being given to to remediate groundwater and other identified contaminated matrices.</li> <li>• what further hydrogeological survey and modelling is occurring to determine potential further lateral and vertical movement of the plume, including potential impacts on the Great Artesian Basin (GAB).</li> <li>• what specific environmental sampling is being undertaken and planned - to identify and characterise pathways and risks to all potential receptors including groundwater users, soils, crops, stock, aquatic ecosystems and surface waters</li> </ul>	



Objective	Desired Outcome	Action	Potential request to Defence for 13 November Briefing	Agency comments
		groundwater users, soils, crops, stock, aquatic ecosystems and surface waters.		
Protection of human health	Establish exposure pathways and implement barriers to human exposure	<p>Identify the full range of community exposures by undertaking exposure surveys (both historical and current) for residents in the community. Consideration should be given to the inclusion of residents living outside the estimated contamination plume area in order to provide a control population. Provide advice to residents to avoid direct exposure to groundwater. Provide advice to community on management of risk from contaminated groundwater on their property.</p>	<p>Please provide advice if possible on the further elements defence has planned in relation to the human health risk assessment. Will this cover any further exposure surveys?</p>	<p>DPC comment – some of the issues raised in the action column cross over into work on the community issues/messages in the other document.</p>
	Monitoring of health outcomes in the community	<p>Continue the funding of pooled blood serum analysis of samples from the Oakey area and extend this funding into blood sampling of residents that have current high levels of PFOS in their blood. Discuss the possibility of a scientific cohort study being conducted in the area for opportunistic blood sampling.</p>	<p>What is Defence's position on funding of pooled blood serum analysis of samples from the Oakey area and extend this funding into blood sampling of residents that have current high levels of PFOS in their blood?</p>	
Community Engagement	Ensure that the community is fully engaged and updated.	<p>Continue to provide regular community meetings. Establish a reference group with members from Commonwealth</p>	<p>Please provide advice if possible on planned future community advice and engagement activities.</p>	

DEFENCE RELEASES

Objective	Desired Outcome	Action	Potential request to Defence for 13 November Briefing	Agency comments
		<p>and Queensland Government agencies and community representatives.</p> <p>Provide a single point of contact for all community enquiries regarding the contamination incident.</p>		
On-going Management	Safe use of firefighting foams	Identify the chemical makeup of current firefighting foams currently used by DoD in Oakey.		DPC comment – thought this might widen the scope of the briefing but please advise if this remains an issue of concern
	Monitor condition of affected environmental receptors to ensure that mitigation measures are effective.	<p>Continue to monitor the environmental impacts by implementing an agreed sampling program, and regular public reporting of the results.</p> <p>Ensuring that PFC contamination of the GAB does not occur as a result of contamination from the Oakey Army Aviation Centre.</p>	Please provide advice on how the results of the assessments will be shared publicly, and at what points this is planned to occur.	
	Review and assessment of implemented strategies.	Provide reports at agreed intervals on the outcomes of management, mitigation and remediation strategies.		DPC comment - not applicable to the briefing, but we could seek to use our reporting template to get this regular oversight?

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Community Issue Identified

QG comments/What advice should Defence be providing

I have elevated levels, can or should my family be tested?

I have elevated levels, what steps should I take to limit my exposure?

How is this different from the steps I should take if I do not have elevated levels or a history of exposure?

I have not had my blood tested. Should I consider testing?

I have heard that fisheries have been closed in Williamstown. Should advice be given to the community not to eat fish from the local area? Should signage be provided on site?

What risk is presented to human health by:  
Swimming in contaminated groundwater?  
Playing in contaminated groundwater?  
Being exposed to contaminated groundwater in the course of irrigation activities?  
Consuming crops that have been irrigated with contaminated groundwater?  
Consuming home-grown produce that has been watered with contaminated groundwater?  
Consuming meat products from livestock watered with contaminated groundwater?  
Consuming eggs from poultry in the investigation area?  
Being dermally exposed to groundwater in the course of other activities (such as washing animals or equipment)?  
Being exposed to soil in the investigation area?

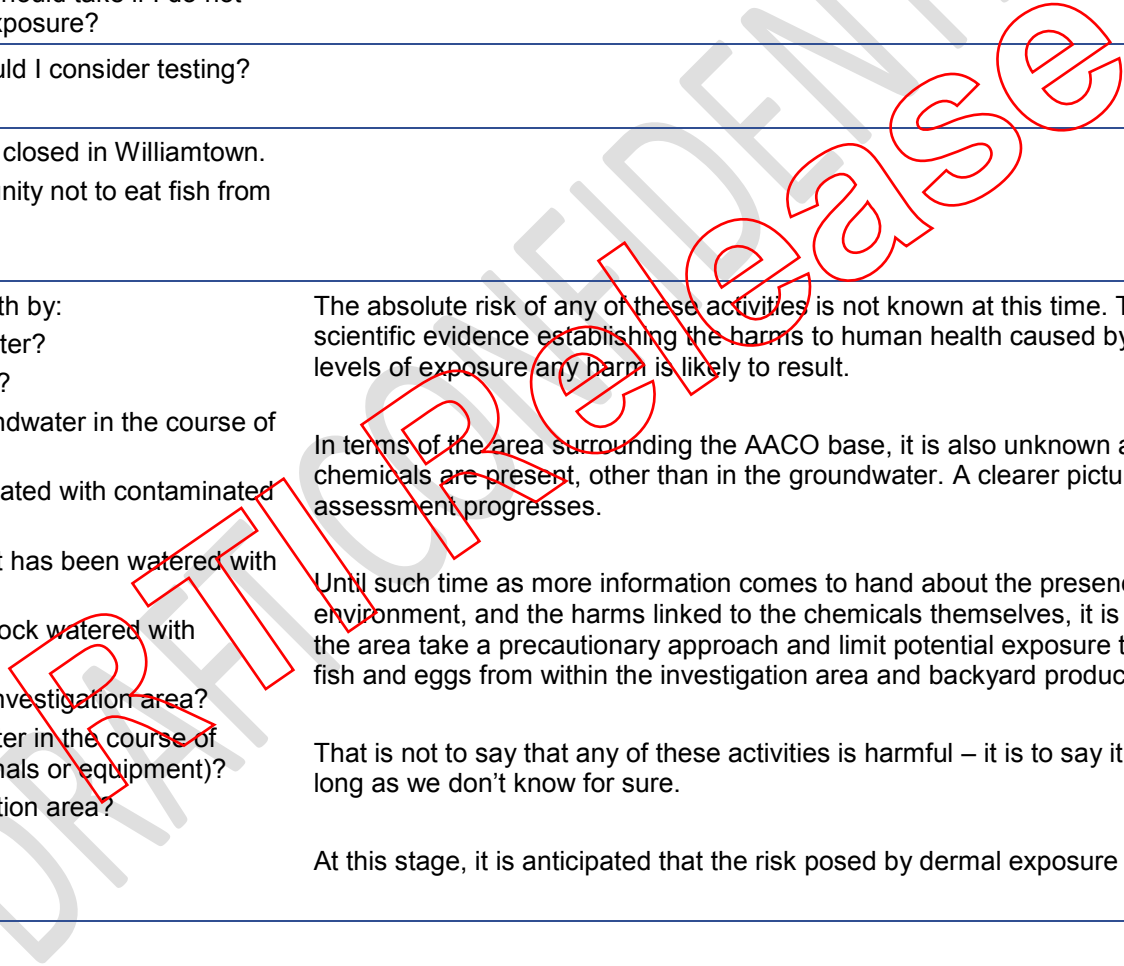
The absolute risk of any of these activities is not known at this time. This is because there is insufficient scientific evidence establishing the harms to human health caused by these chemicals, and at what levels of exposure any harm is likely to result.

In terms of the area surrounding the AACO base, it is also unknown at this time the extent to which the chemicals are present, other than in the groundwater. A clearer picture will be available as the assessment progresses.

Until such time as more information comes to hand about the presence of the chemicals in the local environment, and the harms linked to the chemicals themselves, it is recommended that residents in the area take a precautionary approach and limit potential exposure through limiting consumption of fish and eggs from within the investigation area and backyard produce watered with groundwater.

That is not to say that any of these activities is harmful – it is to say it is recommended to limit them as long as we don't know for sure.

At this stage, it is anticipated that the risk posed by dermal exposure is low.



**Community Issue Identified**

**QG comments/What advice should Defence be providing**

What risk is posed to my livestock or domestic animals from consuming contaminated groundwater?

How is this likely to affect the flora and fauna on my property?

Who is responsible for any detrimental impacts on my health or my financial standing?

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**AGENDA**  
**DEPARTMENT OF DEFENCE BRIEFING**  
**ARMY AVIATION CENTRE OAKLEY CONTAMINATION MANAGEMENT**

**Date: Friday 13 November 2015**  
**10:00am – 11:00am**

**14.09, 100 George Street, Brisbane**

**Invitees:**

Ms Alison Clifton, Assistant Secretary Environment and Engineering, Defence  
 Air Vice Marshal Greg Evans, Defence  
 Ms Christine Castley, Senior Executive Director, Department of the Premier and Cabinet  
 Dr Jeannette Young, Chief Health Officer and Deputy Director-General, QH  
 Ms Sophie Dwyer, Executive Director, Health Protection Branch, QH  
 Dr Penny Hutchinson, Public Health Physician and Director, Darling Downs Public Health Unit, QH  
 Richard Routley, Regional Director, South Queensland, DAF  
 Malcolm Letts, A/Deputy Director-General, Agriculture, DAF/Lea Diffey, Regions and Industry Development, DAF  
 Andrew Connor, Executive Director, Industry, Development and South Queensland Compliance, EHP  
 Dr Chris Hill, Director, Industry, Development and South Queensland Compliance, EHP  
 Paul Sanders, Regional Manager Water Services, NRM

Item	Key questions/areas of focus
Welcome and Introductions	
On-base activities to establish full extent and nature of contamination from the source and prevent further release of contaminants from the base.	<ul style="list-style-type: none"> <li>• Please advise if possible:                             <ul style="list-style-type: none"> <li>○ what steps have been taken or are planned to identify all secondary sources of PFC contamination including soil, concrete tank and other infrastructure on the base</li> <li>○ how has the sampling program built in in processes to identify any other precursor substances that breakdown to harmful PFCs.</li> </ul> </li> <li>• Please advise if possible:                             <ul style="list-style-type: none"> <li>○ what mitigation and containment is already put in place on-base</li> <li>○ what update can be provided on the storage tank</li> <li>○ what treatment and disposal protocols are in place for contaminated soil/ infrastructure</li> </ul> </li> </ul>
Management and mitigation off-base	<ul style="list-style-type: none"> <li>• Please advise if possible:                             <ul style="list-style-type: none"> <li>○ what assessment is being undertaken to characterise the contaminant plume, including all PFCs potentially present considering foams used, hydrocarbons and other harmful chemicals.</li> <li>○ what consideration is being given to remediate groundwater and other identified contaminated matrices.</li> <li>○ what further hydrogeological survey and modelling is occurring to determine potential further lateral and vertical movement of the plume, including potential impacts on the Great Artesian Basin (GAB).</li> <li>○ what specific environmental sampling is being undertaken and planned - to identify and characterise pathways and risks to all potential receptors including groundwater users, soils, crops, stock, aquatic ecosystems and surface waters</li> </ul> </li> </ul>



Item	Key questions/areas of focus
	<ul style="list-style-type: none"> <li>• Can these activities be expedited to provide more certainty to residents.</li> </ul>
Protection of human health	<ul style="list-style-type: none"> <li>• Please provide advice if possible on the further elements Defence has planned in relation to the human health risk assessment.</li> <li>• Will this cover any further exposure surveys?</li> <li>• What is Defence's position on funding of <b>pooled</b> blood serum analysis of samples from the Oakey area?</li> <li>• What strategies are in place to respond to anxiety related to potential health and economic impacts?</li> </ul>
Communication – planned activities	<ul style="list-style-type: none"> <li>• Please provide advice if possible on planned future community advice and engagement activities.</li> <li>• Please provide advice on how the results of the environmental assessments will be shared publicly, and at what points this is planned to occur.</li> </ul>
Communication – issues identified by the community requiring Defence clarification	<ul style="list-style-type: none"> <li>• I have elevated levels, what steps should I take to limit my exposure?</li> <li>• I have not had my blood tested. Should I consider testing?</li> <li>• If I can no longer use my water, what happens (e.g. make good arrangements and how they get activated)?</li> <li>• What risk is presented to human health by: <ul style="list-style-type: none"> <li>○ swimming in contaminated groundwater?</li> <li>○ playing in contaminated groundwater?</li> <li>○ being exposed to contaminated groundwater in the course of irrigation activities?</li> <li>○ consuming crops that have been irrigated with contaminated groundwater?</li> <li>○ consuming home-grown produce that has been watered with contaminated groundwater?</li> <li>○ consuming meat products from livestock watered with contaminated groundwater?</li> <li>○ consuming eggs from poultry in the investigation area?</li> <li>○ being dermally exposed to groundwater in the course of other activities (such as washing animals or equipment)?</li> <li>○ being exposed to soil in the investigation area?</li> </ul> </li> </ul>
Note:	
QG agencies can provide advice to Defence on these issues, but consider Defence has responsibility as the polluter to communicate with residents.	
Residents also need advice on what steps to take while assessment is still occurring, particularly testing of crops and livestock.	
	<ul style="list-style-type: none"> <li>• What risk is posed to my livestock or domestic animals from consuming contaminated groundwater?</li> <li>• How is this likely to affect the flora and fauna on my property?</li> <li>• Who is responsible for any detrimental impacts on my health or my financial standing?</li> <li>• When completing a vendor declaration do I need to disclose that there is a risk of PFC contamination in my livestock?</li> <li>• Will my stock or products (e.g. grain) be suitable for market?</li> <li>• Will I be given notice if my products/produce can no longer be sold (and how will I be told)?</li> <li>• Will I be compensated if I cannot sell my products as a result of the contamination and by whom?</li> </ul>

Item	Key questions/areas of focus
High level reporting	<ul style="list-style-type: none"><li>• Queensland would be interested in a fortnightly high-level overview of activities and could provide a reporting template for Defence</li></ul>
Update on other sites in Queensland	<ul style="list-style-type: none"><li>• Status of any investigations into other Queensland sites</li></ul>
Other business	

RTI Release

## Myra Thompson

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**From:** EDHPU  
**Sent:** Monday, 25 May 2015 12:02 PM  
**To:** Peter Boland; Clive Paige; Suzanne Huxley; Rebecca Richardson; Raquel Esteban; Janet Cumming; Greg Jackson; Penny Hutchinson; Jeannette Young; Sophie Dwyer; mark.oconnell2@defence.gov.au; ian.gardner@defence.gov.au  
**Subject:** Draft minutes from Oakey Taskforce meeting - Wednesday 22 May 2015  
**Attachments:** Oakey Taskforce Minutes.docx

Good afternoon everyone

Please find attached copy of the draft minutes from last week's Oakey Taskforce meeting

Regards  
Myra

Myra Thompson  
Executive Support Officer  
Health Protection Unit | Chief Health Officer Branch  
Health Service & Clinical Innovation Division  
Department of Health | Queensland Government  
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# Oakey Taskforce

Minutes

<b>Date/Time:</b>	20 May 2015, 11:30am to 12:30pm
<b>Venue:</b>	Conference Room, 3.2 Level 3, 15 Butterfield St, Herston
<b>Attendees:</b>	<p><b>Queensland Health</b></p> <p>Dr Sophie Dwyer (Chair), Executive Director, Health Protection Unit            Dr Jeanette Young, Chief Health Officer, Department of Health            Dr Penny Hutchinson, Public Health Medical Officer, Darling Downs Public Health Unit            Peter Boland, Manager of Environmental Health, Darling Downs Public Health Unit            Dr Suzanne Huxley, Senior Medical Officer, Health Protection Unit            Dr Janet Cumming, Advanced Environmental Health Scientist, Health Protection Unit - Water            Dr Raquel Esteban, Senior Environmental Health Scientist, Health Protection Unit - Water            Rebecca Richardson, Environmental Health Officer, Health Protection Unit - Water            Clive Paige, Team Leader EH Scientist, Health Protection Unit</p> <p><b>Australian Department of Defence</b></p> <p>Dr Ian Gardner, Senior Physician in Occupational and Environmental Medicine            Mark O'Connell, Base Support Manager - Darling Downs</p>
<b>Apologies:</b>	<p><b>Queensland Health</b></p> <p>Dr Greg Jackson, Director, Health Protection Unit - Water</p>

Agenda Item	Discussion
1.	<p><b>Welcome and Apologies</b></p> <ul style="list-style-type: none"> <li>• Apologies (Greg Jackson)</li> <li>• Ian Gardner noted that Agenda item <b>Occupational exposure and the National Firefighters</b> was not part of this briefing. To date, the PFOS/PFOA issue at Oakey has been a community issue only, with local residents expressing concern for property values and health.</li> </ul>
2.	<p><b>Briefing on timeline and current status of incident</b></p> <ul style="list-style-type: none"> <li>• Aqueous Film-Forming Foam (AFFF) can contain PFOS and PFOA. Since 1975 AFFF has been used in fire-fighting training at Oakey base. In 2005 AFFF was reformulated.</li> <li>• In mid-2010 the Canberra Environmental team detected PFOS and PFOA when conducting routine normal hydrocarbon testing in Oakey. The Department of Defence then tested 99 bores on over 80 properties and found 49 bores positive for PFOS. On-site, 57 out of 65 bores are positive for PFOS. The Department of Defence assumed water flow was EW, but now understand it to be SW, possibly due to high volume drawn by abattoir.</li> <li>• The Department of Defence has presented several community advice sessions to residents over the past few years. The first community meeting was held in December 2012 and a second in December 2013. Approximately 80 people attended in June 2014. Meetings are now held six monthly, with the most recent held in December 2014. Currently 164 bores have been tested, of which 106 have had positive detections.</li> <li>• The Department of Defence has advised residents not to drink the bore water. They are providing drinking water, either by connecting residents to the town water supply, fitting rainwater tanks, or providing bottled water.</li> <li>• Concerned residents approached local GP Dr Eric Donaldson for advice and were advised health effects were minimal. To reassure the community Dr Donaldson agreed to conduct a screening program and the Department of Defence consented to fund up to 100 tests. Test results revealed significantly elevated levels in ten out of 11 test subjects. Test sample size was small and confidentiality prevented access to information which could explain why one subject's levels were not elevated. Department of Defence offered to pay for re-testing of concerned residents. Testing has already started and is expected to conclude end of June 2015, with results to be released in July 2015. There are approximately 3,000 people in Oakey. Department of Defence will be testing 60 people located in the contamination zone (South West of Oakey). May expand testing if required.</li> <li>• Shine lawyers are representing interests of community members concerned about potential loss of property values and health issues.</li> <li>• Locals have been concerned with three issues: <ul style="list-style-type: none"> <li>– What does PFOS/PFOA do to health?</li> <li>– What does PFOS/PFOA do to my land and property value?</li> <li>– Is it safe to water my plants, and is it safe to eat produce from my plants?</li> </ul> </li> <li>• <div data-bbox="323 1787 1513 1984" style="border: 1px solid red; padding: 5px; text-align: center;">s.73 - irrelevant information</div></li> <li>• Also concern that local community members in Oakey may try to deepen existing bores, and so may contaminate the Great Artesian Basin. DNRM do not intend to put in place extraction exclusion zone.</li> <li>• <div data-bbox="308 2056 1505 2112" style="border: 1px solid red; padding: 5px; text-align: center;">s.73 - irrelevant information</div></li> </ul>

Agenda Item	Discussion
	<p style="text-align: center;">s.73 - irrelevant information</p> <ul style="list-style-type: none"> <li>• Toowoomba Regional Council has been notified and is not overly concerned as bore water is treated by reverse osmosis.</li> </ul>
<p><b>3.</b></p>	<p><b>Identification of all stakeholders</b></p> <ul style="list-style-type: none"> <li>• Australian Department of Defence</li> <li>• Queensland Health, Health Protection Unit</li> <li>• Queensland Health, FoodSafety</li> <li>• DNRM</li> <li>• DAFF, Biosecurity</li> <li>• EnTOX</li> <li>• Toowoomba Regional Council</li> <li>• DEHP</li> <li>• Safe Food Production Queensland</li> <li>• Worksafe Queensland</li> </ul>
<p><b>4.</b></p>	<p><b>Issues to be addressed</b></p> <ol style="list-style-type: none"> <li>i. Epidemiology – check of cancer registry</li> <li>ii. Consult with DNRM regarding exclusion zone</li> <li>iii. Validation of analytical results (EnTOX, NMI)</li> <li>iv. Prepare medical communication to GPs treating Oakey population re possible community concerns</li> <li>v. Consult with Biosecurity Queensland re possible food cropping in the contamination zone</li> <li>vi. Consult with EnTOX re literature review prepared for Airservices Australia</li> <li>vii. Consult with Safe Food Queensland re potential impacts on abattoir</li> <li>viii. Collate and prepare all relevant matters for briefing up (matter to note for cabinet)</li> </ol>
<p><b>5.</b></p>	<p><b>Next steps</b></p> <ul style="list-style-type: none"> <li>• Queensland Health to prepare Action Plan</li> </ul>
<p><b>6.</b></p>	<p><b>Governance</b></p> <ul style="list-style-type: none"> <li>• Sophie Dwyer is main Queensland Health contact.</li> <li>• Helen Blain is main contact for Department of Defence.</li> </ul>
<p><b>7.</b></p>	<p><b>Next Meeting</b> To be advised</p>

No.	Action	Agency	Responsible Person
1.	Epidemiology – check of cancer registry		
2.	Consult with DNRM regarding exclusion zone		
3.	Validation of analytical results (EnTOX, NMI)		
4.	Prepare medical communication to GPs treating Oakey population re possible community concerns		
5.	Consult with Biosecurity Queensland re possible food cropping in the contamination zone		
6.	Consult with EnTOX re literature review prepared for Airservices Australia		
7.	Consult with Safe Food Queensland re potential effects on abattoir		
8.	Collate and prepare all relevant matters for briefing up (matter to note for cabinet)		