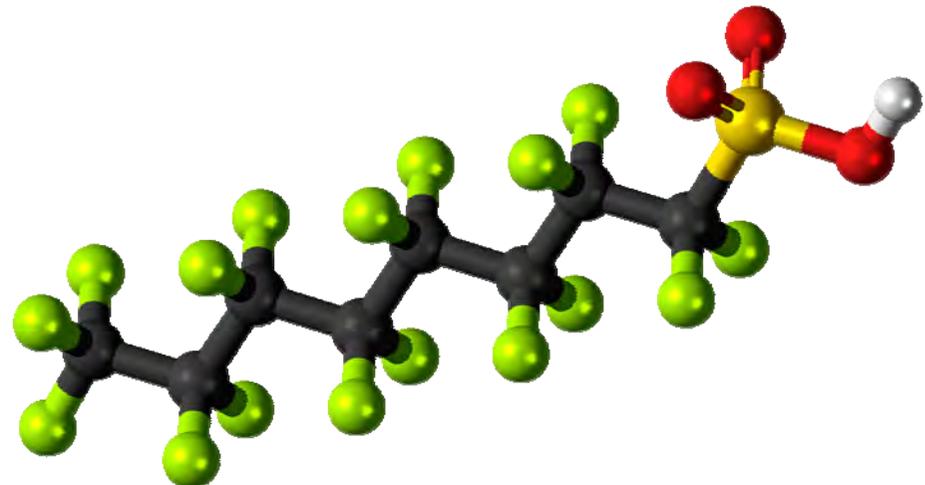


NSW EPA PFAS Strategy

Northern Rivers Forum - June 2017

Sam Waskett – Project Officer, PFAS Strategy



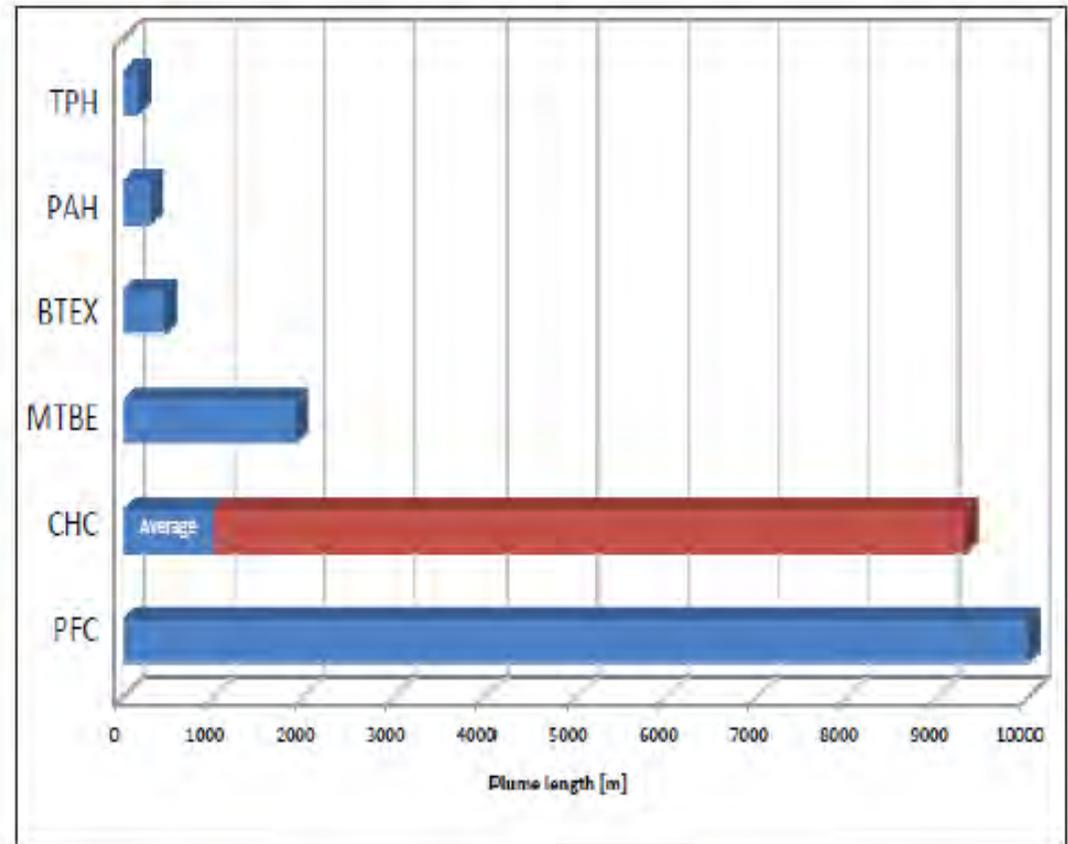
- PFAS
- How are people exposed to PFAS
- NSW EPA state-wide PFAS Strategy
- PFAS site investigations – challenges
- PFAS Priorities for 2017-2019
- Case studies

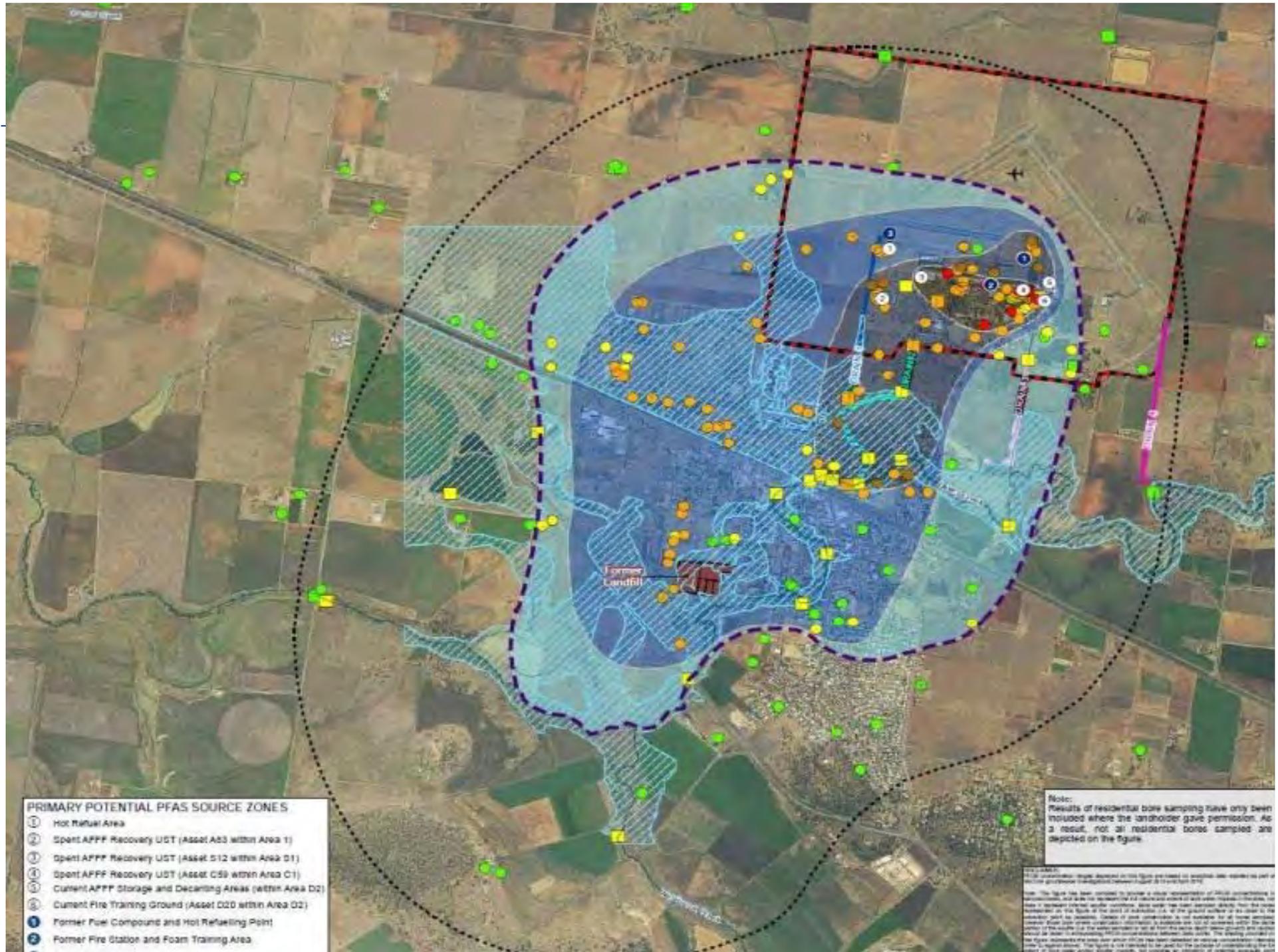
- Per-and-poly-fluoroalkyl substances (PFAS)
- Group of manufactured chemicals that contain numerous fluorine atoms - carbon-fluorine bond is exceptionally strong and stable
- Unique chemical properties = heat resistant, water and oil repellent.
- Developed in the 1950s by the 3M company
- 1964 3M starts producing **Aqueous Film Forming Foam (AFFF)**
- Also used in many other goods - waterproofing products; carpet; Scotchguard; mist suppressants; plumbing tape; food packaging; paints

- Late 1990s 3M discontinue PFAS use after studies show presence in workers blood and bioaccumulation in the environment
- Stockholm Convention on Persistent Organic Pollutants (POPs) – PFOS added in 2009
- Emerging contaminant
- Thousands of PFAS compounds – main current focus on:
 - Perfluorooctane sulfonate (PFOS);
 - Perfluorooctanoic acid (PFOA); and
 - Perfluorohexane sulfonate (PFHxS)

PFAS Characteristics

- Extreme persistence
- High water solubility – shown to travel great distances in ground and surface water
- High bioaccumulation potential
- Surfactant characteristics





- PRIMARY POTENTIAL PFAS SOURCE ZONES**
- ① Hot Refuel Area
 - ② Spent AFFF Recovery UST (Asset A63 within Area 1)
 - ③ Spent AFFF Recovery UST (Asset S12 within Area D1)
 - ④ Spent AFFF Recovery UST (Asset C59 within Area C1)
 - ⑤ Current AFFF Storage and Decanting Areas (within Area D2)
 - ⑥ Current Fire Training Ground (Asset D20 within Area D2)
 - ⑦ Former Fuel Compound and Hot Refueling Point
 - ⑧ Former Fire Station and Foam Training Area

Note: Results of residential bore sampling have only been included where the landholder gave permission. As a result, not all residential bores sampled are depicted on the figure.

PFAS concentrations displayed on this figure are based on available data reported as part of routine environmental monitoring between August 2019 and April 2020.

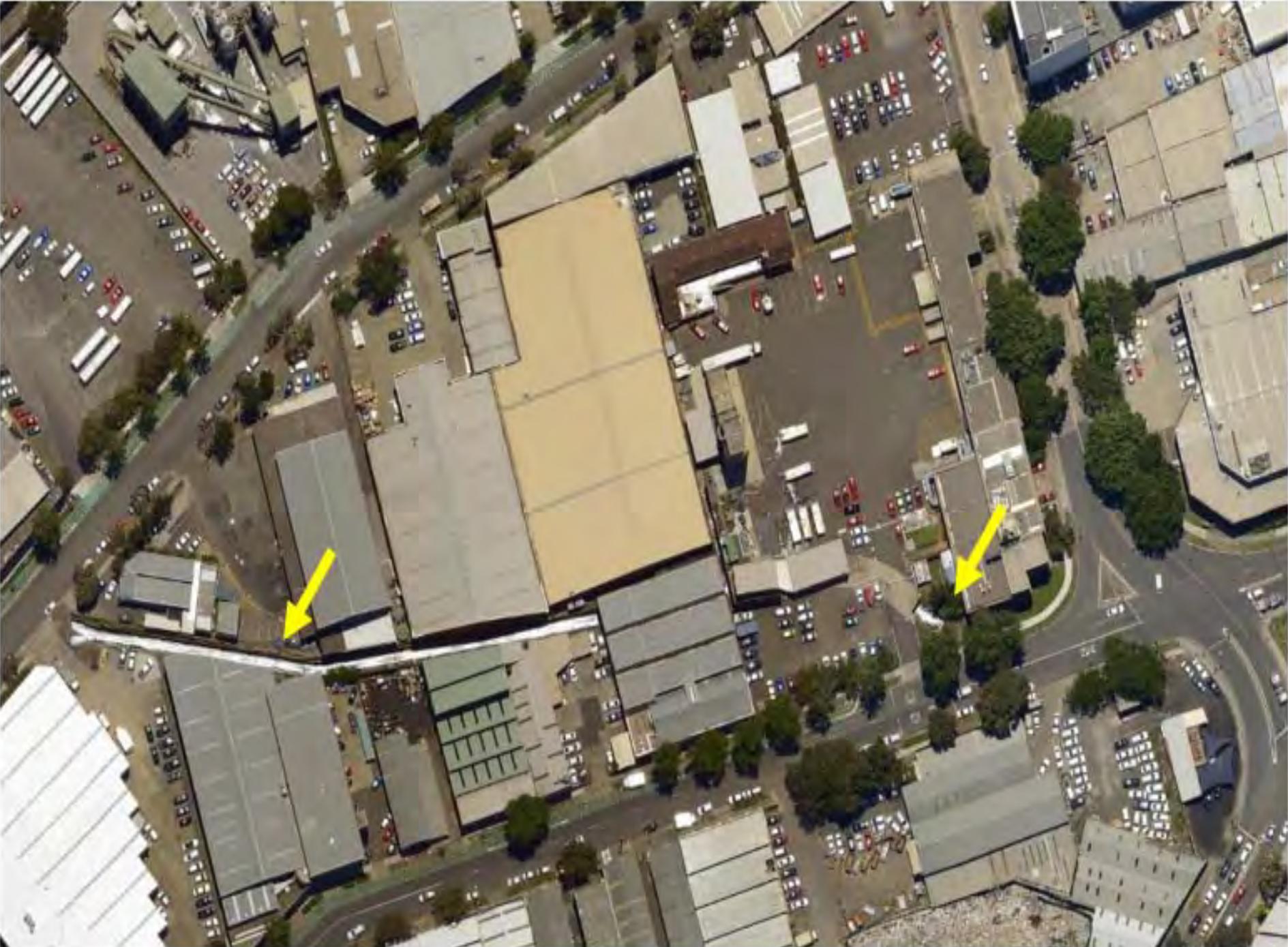
This figure has been compiled to provide a clear representation of PFAS concentrations in groundwater, and does not represent the full extent of all water bodies in the site, nor does it represent the full extent of all water bodies in the site, nor does it represent the full extent of all water bodies in the site. The figure is intended to provide a clear representation of PFAS concentrations in groundwater, and does not represent the full extent of all water bodies in the site, nor does it represent the full extent of all water bodies in the site.

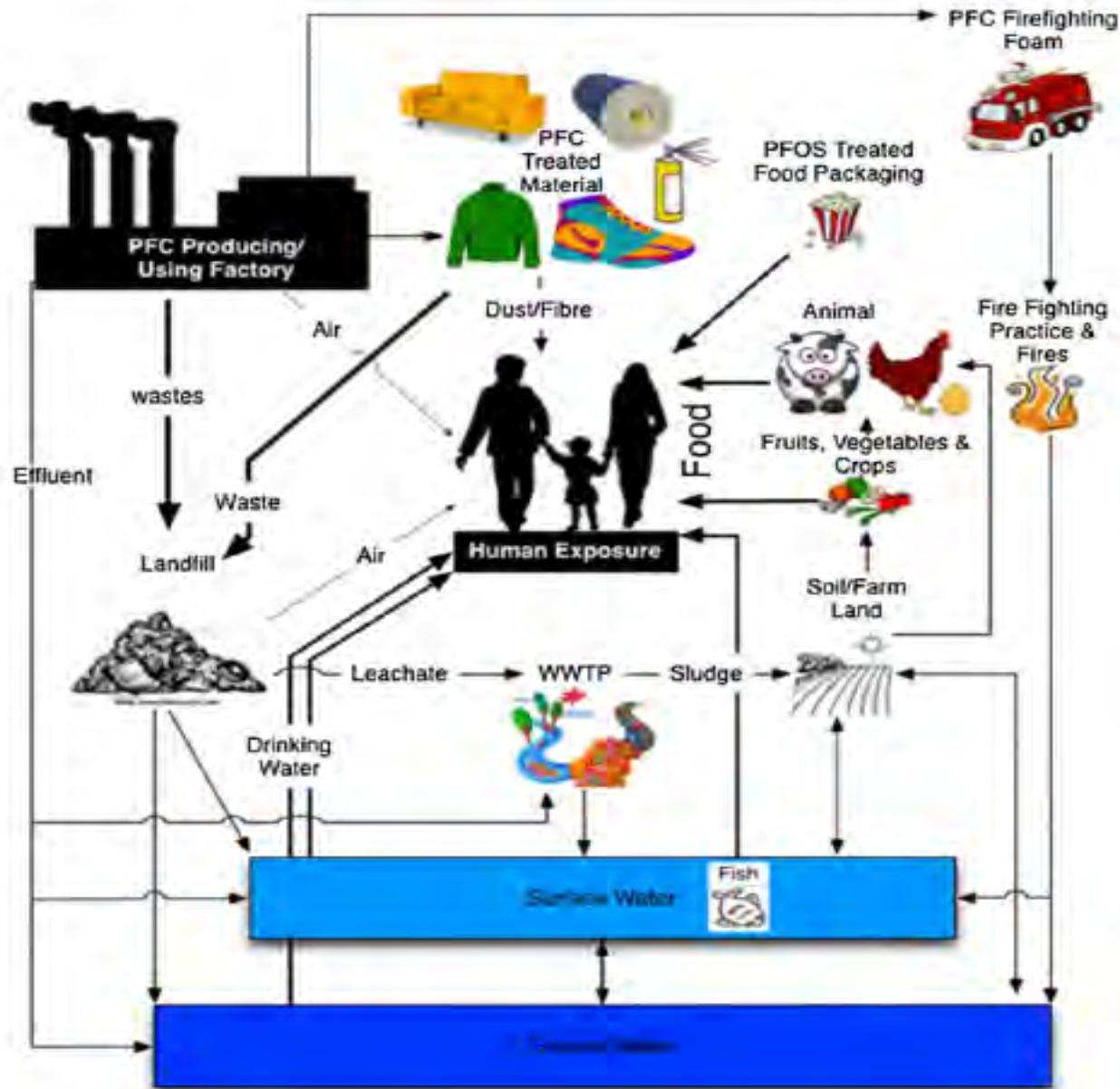
How are people exposed to PFAS?

- Commonly found in the global environment, typically in low concentrations
- Widespread use of PFAS means virtually everyone is exposed to low levels of PFAS from the air, indoor dust, food, water, and various consumer products.
- People living close to fire-training grounds likely to be more exposed than most
- AFFF training widespread across the world and foams largely uncontained
- Easy route into the environment
- Major pathways of concern = contaminated drinking water and food (seafood, livestock, eggs, vegetables)









The PFAS web

Olfaei et al. Environ. Sci. Pollut Res (2013) 20: 1877-1992

Is PFAS harmful to health?

- PFAS accumulates in the bodies of living organisms
- Studies show toxicity to fish and some animals
- Current research is inconclusive and it is not known if exposure to PFAS causes any significant health problems in humans
- **But the potential for adverse health effects cannot be ignored**
- Precautionary approach – led to NSW EPA state-wide PFAS Strategy



Origins of the EPA state-wide PFAS Strategy

- On 3 September 2015...



- 19 February 2016 NSW EPA launched state-wide PFAS Strategy. Desire to:
 - Better understand the extent of PFAS use in NSW
 - To find out who had been using PFAS
 - To identify significant current and historical releases of PFAS to the environment.
 - Initial focus on sites where likely significant use of PFAS-based fire fighting foams were used.
 - AFFF training grounds – emergency services

Where have we been looking?

- Firefighting training sites:
 - Emergency services
 - Airports
 - Power stations
 - Petrochemical manufacturing and storage
 - Ports
 - Mines / Mines Rescue Services
- Foam deluge systems
- Metal plating

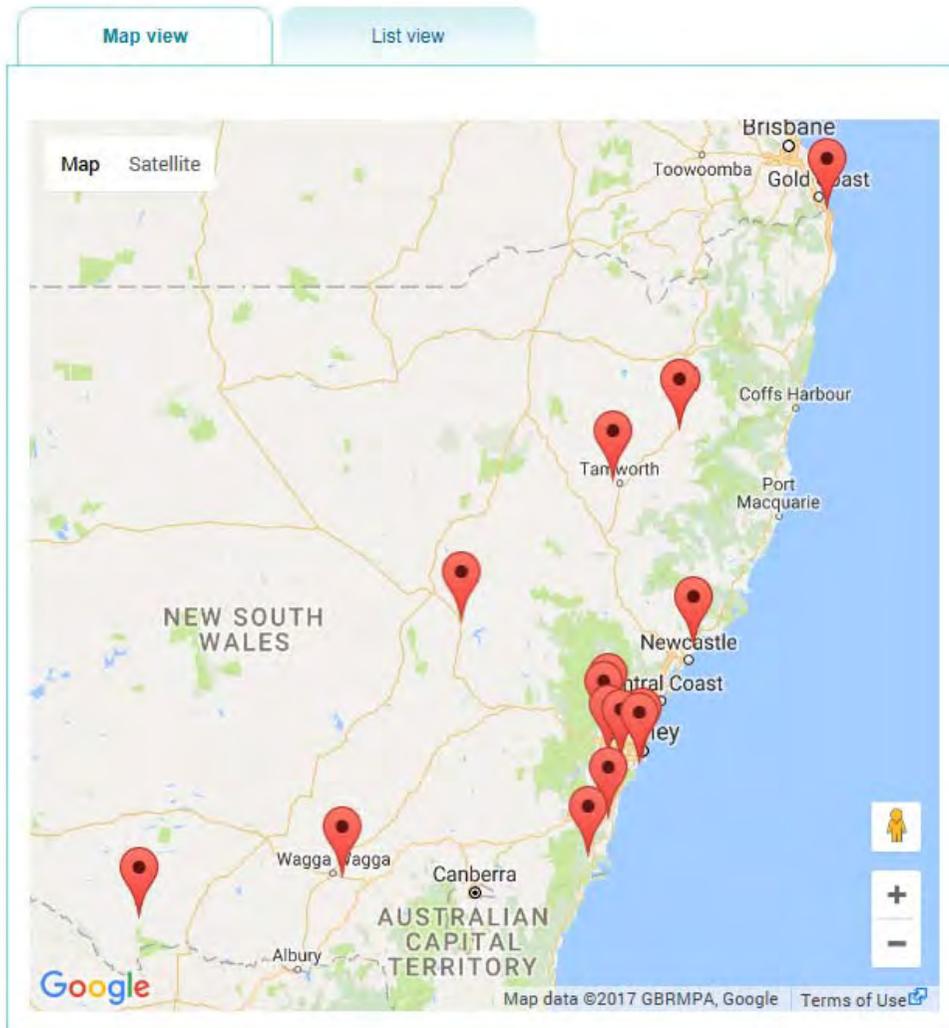
- Involved:
 - Identifying sites likely to have used / stored AFFF or other PFAS-products
 - Interviews with site personnel
 - Establishing types, volumes used or stored on site
 - Investigate whether PFAS is likely to have been released into the environment.
 - Screening samples (earlier sites)
 - Understand if sites of interest had pathways to human exposure

PFAS Strategy Site Identification

- Desktop investigation of 250+ sites
- 60 sites suggest use of AFFF for fire fighting training
- 40 sites with AFFF deluge systems or storage
- A number of polluters have multiple sites of concern:
 - Defence;
 - Air Services Australia;
 - Fire & Rescue NSW; and
 - Rural Fire Service



Current investigations NSW



Organisation	Address	Details
Armidale Fire and Rescue NSW	10 Mann Street, Armidale, 2350	More information
Tamworth Regional Airport	Shand Cir, Tamworth, 2340	More information
Londonderry TestSafe & Fire and Rescue NSW	667 The Northern Road, Londonderry, 2753	More information
Deniliquin Fire and Rescue NSW	Cobb Highway, Deniliquin, 2710	More information
Albion Park Fire and Rescue NSW	Airport Road, Albion Park, 2527	More information
Wellington Fire and Rescue NSW	67 Falls Road, Wellington, 2820	More information
Gold Coast Airport	Eastern Avenue, Coolangatta, QLD 4225	More information
HMAS Albatross	Nowra Hill, 2540	More information
Williamtown RAAF Base	49 Medowie Road, Williamtown, 2314	More information
Wagga Wagga RAAF Base	Sturt Highway, Wagga Wagga, 2650	More information
Holsworthy Barracks	Macarthur Drive, Holsworthy, 2173	More information
Richmond RAAF Base	Middleton Avenue, Richmond, 2753	More information
Botany Industrial Park	Dent Street, Botany, 2019	More information
Kemps Creek RFS training site	245 Devonshire Road	More information
Botany Bay area		More information

- Various guidelines / screening values
- PFAS characteristics are different to other common contaminants and affect the design of site investigations
- Requires more than traditional NEPM approach - environmental fate and transport models cannot predict fate of PFAS with confidence
- Means investigations need to be based on measurement of PFAS in all relevant parts of the environment



Table 1: Human health screening criteria supported by OEH Contaminants and Risk, Environment Protection Science Branch (as of 20/04/2017)

Toxicity reference value	PFOS + PFOAs	PFOA	Source	Comment
TDI (µg/kgbw/d)	0.02	0.16	FSANZ 2017a	Drinking water and recreational water values might be replaced by values from NHMRC in the future.
Drinking water (µg/L)	0.07	0.56	Health 2017	
Recreational (µg/L)	0.7	5.6		
Finfish, crustacea & molluscs ¹ (µg/kg biota ww)	5.2	41	FSANZ 2017b	These values may not be protective of very high consumers of seafood such as some commercial fishers and their families or where multiple exposure pathways are present
For all soil screening values: these values should only be used in conjunction with other investigation to account for potential leaching, off-site transport, bioaccumulation and secondary exposure				
Soil: rural	Values under consideration			Site-specific risk assessment required until appropriate GVs can be derived
Soil: residential (mg/kg)	0.009	0.1	DEH/NSW Health 2017 ^{2,4}	These values include accounting for bioaccumulation and consumption of plants only. Consumption of eggs or home-slaughtered livestock is not considered.
Soil: high density residential (mg/kg)	2	20	DEH/NSW Health 2017 ^{2,4}	Industrial/commercial GVs may not be suitable for fire training sites due to unusual activities at these sites.
Soil: industrial/commercial (mg/kg)	20	100	DEH/NSW Health 2017 ^{2,4}	

¹ FSANZ 2017b included separate trigger values for Finfish and Crustaceans/molluscs. OEH recommends using the Finfish trigger value for both seafood groups to be better protective of high consumers of some crustaceans such as prawns

² Based on 20% of TDI, i.e. up to 80% of exposure is assumed to come from other pathways

³ ASC NEPM HL-A assumptions with home-grown produce as plants included

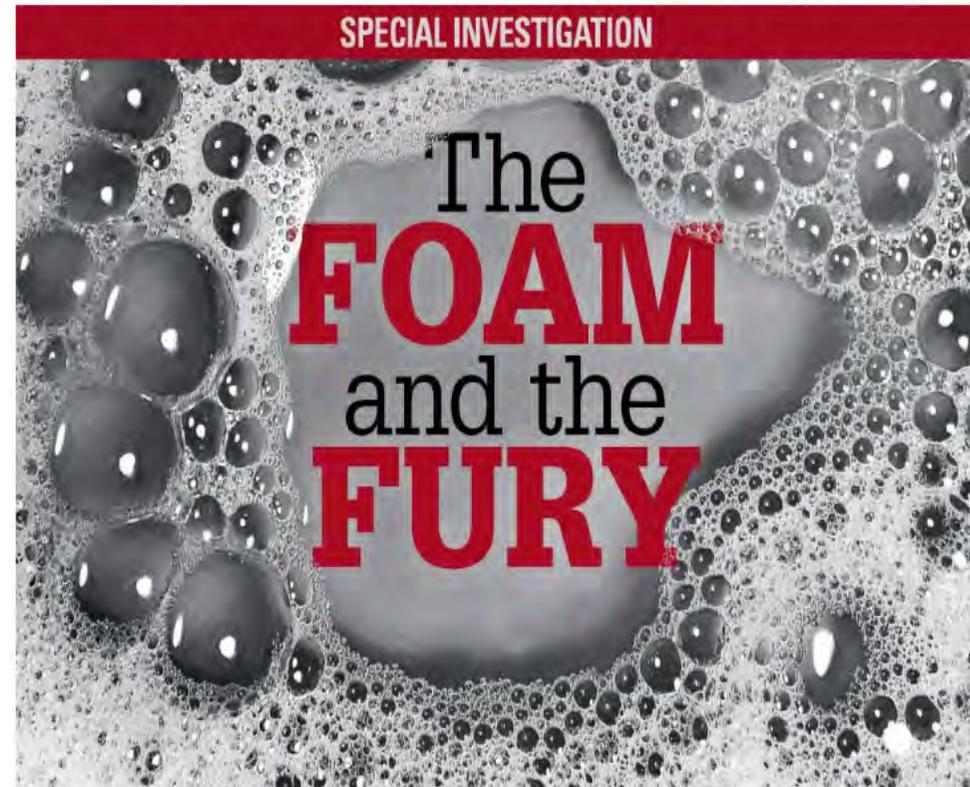
⁴ ASC NEPM HL-B assumptions

⁵ ASC NEPM HL-D assumptions including 8 hrs time spent indoors and 1 hr spent outdoors at an industrial/commercial site

- PFAS extremely leachable – if on-site, assume it has migrated off-site **unless solid evidence shows otherwise**
- Surface water concentrations variable – single ‘nil detect’ not enough evidence to rule out pathway
- If PFAS found in rivers/creeks near site, assume in biota **unless evidence to show otherwise**
- Potential for PFAS bioaccumulation makes edible biota sampling essential

- Provides **NSW EPA recommended** guideline values (GVs) for human health and ecological PFAS risk assessment
- Screening levels for:
 - Drinking water
 - Recreational water
 - Soil
 - Aquatic biota
 - Ecological protection
- Will assist with Tier 1 site assessments for PFAS

- High profile
- Emerging issues
- Multiple stakeholders
- Engaged communities
- Public vs Private
- Inability to regulate main polluter (Commonwealth)



Michael McGowan and Carrie Fellner explore how the RAAF base contamination scandal is changing lives.



EPA PFAS Communication Activities

- Consolidated strategy
- Key messages
- Letterbox drops / doorknocks / water-use surveys
- Fact sheets
- FAQs
- Website
- Site map
- Media releases/media interviews/media briefings
- Multi-agency public meetings

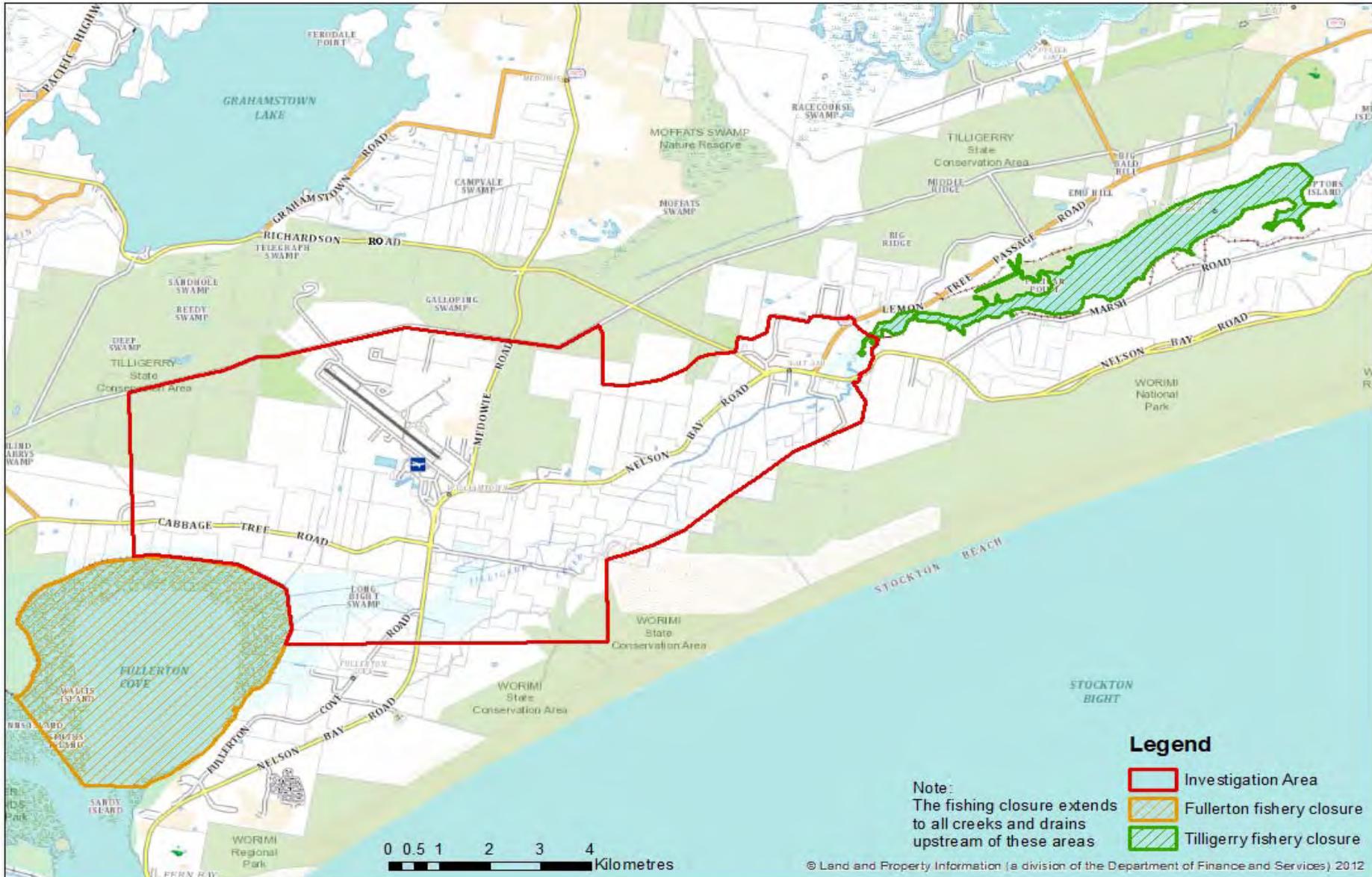
PFAS Policy and Priorities 2017-19

- National PFAS management plan through HEPA working group – recent Summit to progress plan
- AFFF foam stockpile management – QLD & SA banned AFFFs. NSW to engage stakeholders and consider phase out
- PFAS waste – solid waste guidelines, but work needed on liquid waste, GAC
- Remediation and treatment options
- Transition into CLM Act framework

- Continued focus on known sites of concern
- Proactive identification of other sites of concern:
 - STPs – discharge to rivers
 - Biosolids – land applied for agriculture
 - Landfill - leachate
 - EPL sites
 - Other foam users
 - CLM sites (past and present)

- Williamtown RAAF Base
- Gold Coast Airport
- Tamworth Airport
- Armidale FRNSW

RAAF Base Williamstown



Enormous use of uncaptured AFFF +

Multiple PFAS source areas +

High water table +

Sandy soils +

Flood prone area +

Complex system of open surface water drains +

Widespread community groundwater use +

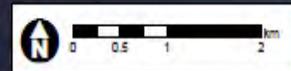
Rural / residential lifestyle

= Perfect PFAS storm



KEY

- RAAF Base Williamstown
- NSW EPA Investigation Area
- Off-site open channel
- State Conservation Area
- Fullerton fishery closure
- Tilligerry fishery closure
- Indicative Extent of Southern Area
- Onsite PFAS Source Areas
- Former Fire Station and Current Fire Station (Facility 185)
- Former DEMS Landfill (Facility 394)
- North Eastern Landfill
- Disused Fire Training Pit (Facility 479).
- Lake Cochran
- Trade Waste Treatment Plant (Facility 480)
- Sewage Treatment Plant (Facility 410)



AECOM

SCALE 1:50,000
 DATE 1 of 1
 PROJECT 00A 1094 MGA Zone 58
 SHEET A3

Figure F3: On Site PFAS Source Areas

- Defence aware of issue with AFFF since 2003
- NSW Government agencies since 2012/13
- Public made aware September 2015
- Enormous community and media backlash
- Crisis management
- Precautionary advice given - Bottled and tankered water provided to residents
- Commercial and recreational fishing closed September 2015 (eventually re-opened October 2016)

Precautionary advice

- Do not use groundwater, bore water or surface water for drinking or cooking.
- Avoid swallowing groundwater or surface water when bathing, showering, swimming and paddling.
- Avoid eating home grown food produced using contaminated water, including home slaughtered meat, eggs, milk, poultry, fruit and vegetables.
- Moderate intake of, and seek further advice, regarding home produce that was grown within the area but was not produced with contaminated water.
- People who personally source and eat fish and seafood from a body of water where the water is contaminated, such as fishers and local residents, should moderate the number of servings of individual species.

Recommended maximum intake based on eating a single species caught from the Hunter River Estuary, Fullerton Cove and Tilligerry Creek

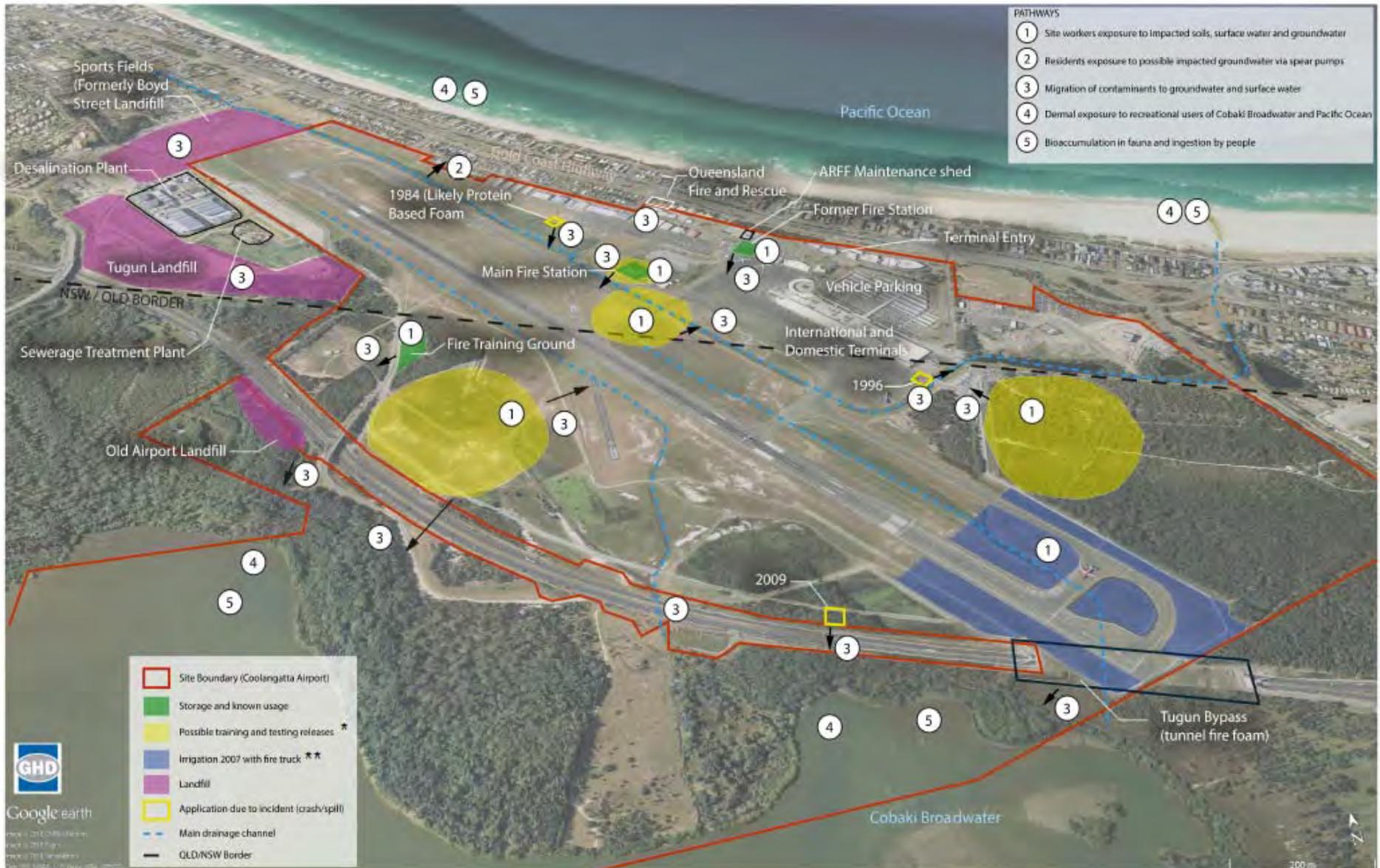
Number of serves	Children – 2 to 6 year old		All other age groups	
	Fish	Crustacea	Fish	Crustacea
<0.5 serves total per week		School Prawns* Blue Swimmer Crab		
0.5 serves total per week	Dusky Flathead Luderick Mulloway	Mud Crab		Blue Swimmer Crab
1 serves total per week	Sea Mullet Silver Biddy Sand Whiting		Dusky Flathead Luderick Mulloway	School Prawns Mud Crab
Up to 4 serves total per week	Yellowfin Bream		Sea Mullet Silver Biddy	
Up to 8 serves total per week			Sand Whiting Yellowfin Bream	

* If recreational fishers capture School Prawn from the Hunter River, it is recommended that they follow the advice above.

NB:

- This table lists the number of serves of a single species that can be eaten each week to result in an exposure to half of the health based guideline value.
- Serving size = 150 grams
- Species specific information is for when a single species of fish is eaten per week. Eating multiple species would result in a greater exposure.

- Highly engaged community / media
 - Blood testing
 - Air monitoring
 - Foam in drains
 - Foaming trees
 - Soil stockpiling
 - Property prices
- Community Reference Group (CRG)
- Community drop-ins
- Class action
- Bottled and tankered water initially provided to residents – now drinking water reticulation program



- Airservices Australia fire training base
- Site largely in QLD, but fire training ground and Cobaki Broadwater located in NSW
- Surface and groundwater flow from fire training ground towards Cobaki Broadwater
- Recreational and commercial fishing
- EPA requested seafood sampling program – NSW DPI Fisheries provided sampling plan
- All results in seafood below detection limit

- Fire training historically conducted at airport
- Tamworth Regional Council owns the site but did not conduct AFFF training
- Water use-surveys showed a number of residents closeby use groundwater / surface water for vegetable watering
- One-on-one meetings held and precautionary advice given
- Creeks and rivers also effected – edible fish sampling undertaken by DPI Fisheries
- Council resolved not to fund any further investigations – call for Federal government assistance
- Notices served on potential polluters



- Fire and Rescue NSW training site
- PFAS confirmed onsite and offsite in soil and surface waters
- Minimal use of groundwater or surface water for consumption purposes
- However, considerable concern about property values
- Armidale has history of contamination issues – community aware of impacts, and prefer minimal publicity

██████████
@redzonensw @60Mins @abcnews @UNEP TOO ██████████ LATE.
MY KIDS HAVE BEEN SWIMMING IN IT ALL THEIR LIVES!

