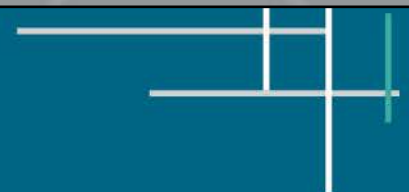


# PFAS National Environmental Management Plan

JANUARY 2018



29 May 2018  
Andrew Miller



# PFAS NEMP - outline

- What is it?
- What's in it?
- Where to next?

## PFAS National Environmental Management Plan

JANUARY 2018

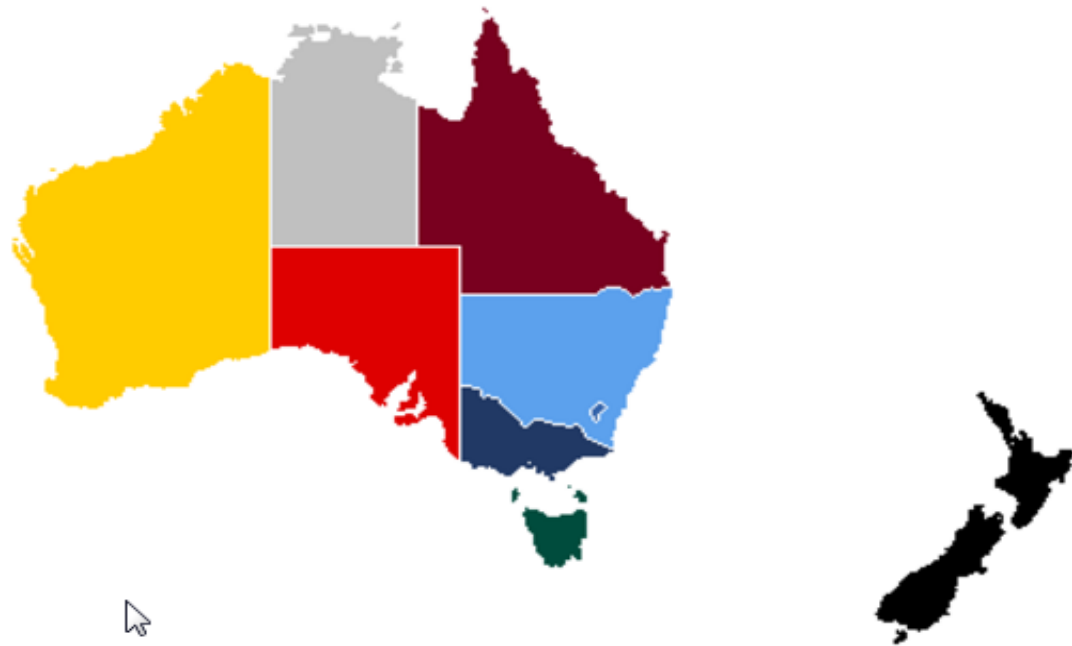


## What is it?

- Not a National Environmental Protection Measure or 'NEPM' approved by NEPC
- National Environmental Management Plan or 'NEMP' approved by HEPA

# Heads of Environmental Protection Authorities (HEPA)

‘An informal, national network bringing together the heads of **environment protection** and similar bodies.’



## · Route to adoption (1)

- PFAS NEMP endorsed by **Environment Ministers** in February 2018
- Jurisdictions will implement through their respective processes
- More information about the development and consultation process is available at [www.epa.vic.gov.au/PFAS\\_NEMP](http://www.epa.vic.gov.au/PFAS_NEMP)

# Route to adoption (2)

- Appendix to the IGA on PFAS
- came into effect February 2018
- human health & environment

## INTERGOVERNMENTAL AGREEMENT ON A NATIONAL FRAMEWORK FOR RESPONDING TO PFAS CONTAMINATION

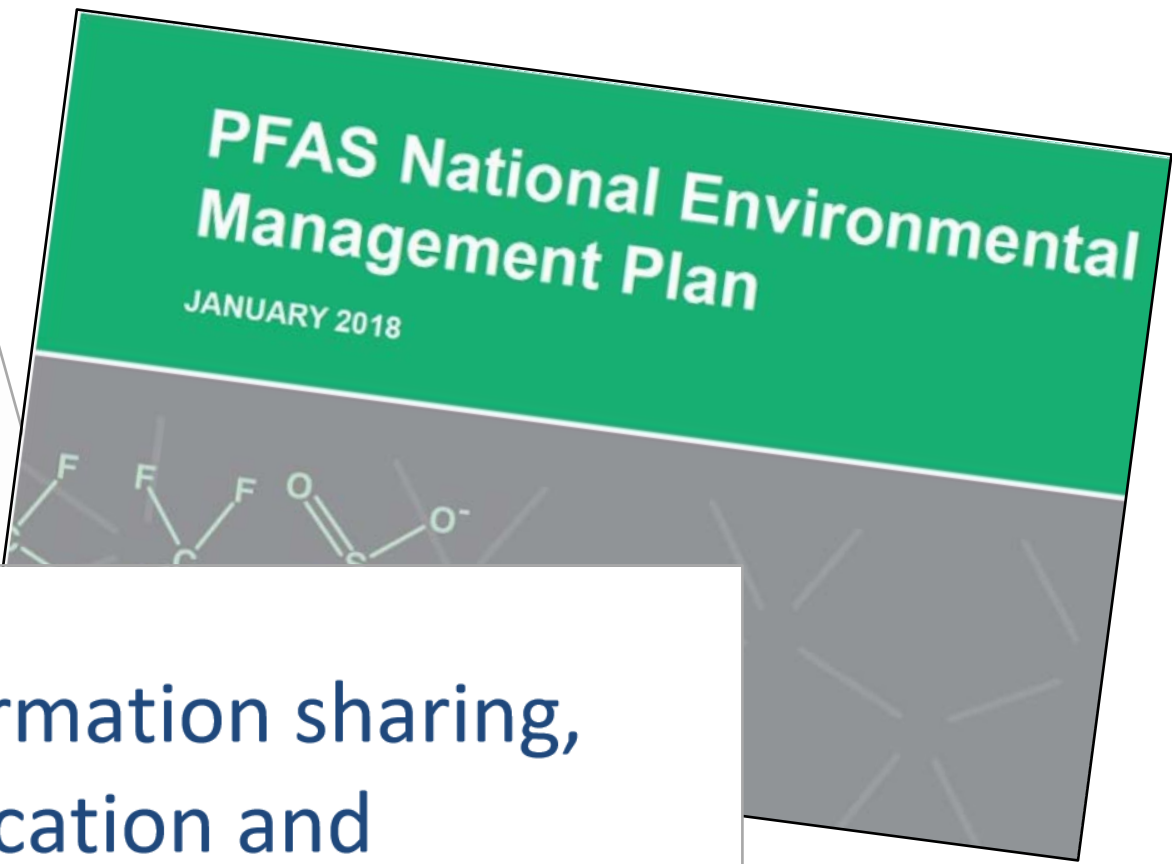
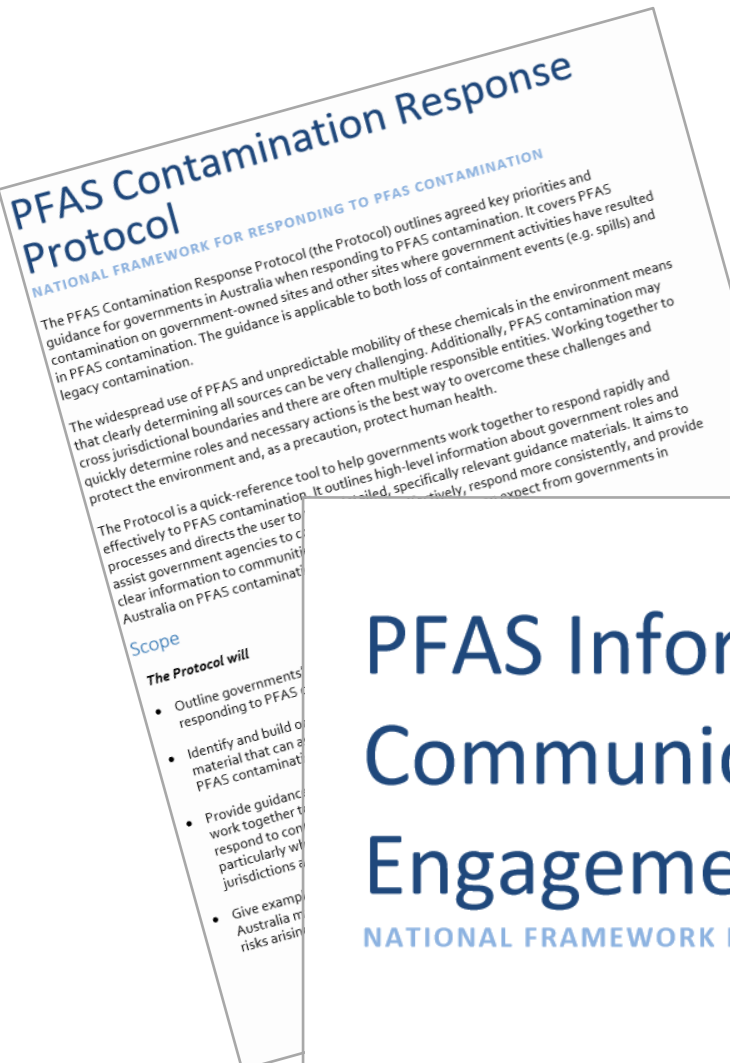
Council of  
Australian  
Governments

An agreement between

- the **Commonwealth of Australia** and
- the **states and territories**, being:
  - New South Wales
  - Victoria
  - Queensland
  - Western Australia
  - South Australia
  - Tasmania
  - Australian Capital Territory
  - Northern Territory

This agreement supports collaboration and cooperation between governments in Australia to respond consistently to per- and poly- fluoroalkyl substances (PFAS) contamination.

# Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination



## PFAS Information sharing, Communication and Engagement Guidelines

NATIONAL FRAMEWORK FOR RESPONDING TO PFAS CONTAMINATION

# Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination



## Health Based Guidance Values for PFAS FOR USE IN SITE INVESTIGATIONS IN AUSTRALIA

In June 2016, the Department of Health commissioned Food Standards Australia New Zealand (FSANZ) to develop final health based guidance values for perfluorooctane sulfonate (PFOS), perfluorohexane sulfonate (PFHxS), and perfluorooctanoic acid (PFOA) and perfluorobutane sulfonate (PFBS) which belong to a group of chemicals known as per- and poly-fluoroalkyl substances (PFAS).

The Department of Health has received FSANZ's Hazard Assessment Report—PFOS, PFOA and PFHxS with its recommendations for Australia's final health based guidance values.

The final health based guidance values will be used consistently in undertaking human health risk assessments across Australia. The recommended health based guidance values have replaced the Environmental Health Standing Committee's (ehHealth) interim human health reference values.

The final health based guidance values are protective of human health; are a precautionary measure for use when conducting site investigations; and are to assist in providing advice to affected communities on how to minimise exposure to PFAS.

### What is a health based guidance value?

Health based guidance values indicate the amount of a chemical in food or drinking water that a person can consume on a regular basis over a lifetime without any significant risk to their health. Health based guidance values can be expressed as a tolerable monthly intake (TMI), a tolerable weekly intake (TWI) or a tolerable daily intake (TDI). The choice of whether a TMI, TWI or TDI is set depends on the nature of the chemical.

Health based guidance values are used by organisations and government agencies to investigate and assess potential human health risks.

### Final health based guidance values for use in site investigations in Australia

FSANZ has recommended final health based guidance values for PFOS and PFOA in the form of a tolerable daily intake. A tolerable daily intake is a level of exposure over a lifetime that is considered to be of no significant health risk for humans.

Based on FSANZ's recommended tolerable daily intake, the Department of Health has calculated revised health based guidance values for use in site investigations in Australia.

To determine the drinking and recreational water quality values for site investigations across Australia, the Department of Health used the final health based guidance values for PFOS and PFOA and the methodology described in Chapter 6.3.3 of the National Health and Medical Research Council's Australian Drinking Water Guidelines. This approach is consistent with the methodology used in developing the interim human health reference values.

The health based guidance values for PFOS/PFHxS are:

Toxicity reference value	PFOS/PFHxS	
	ng	µg
Tolerable daily intake (ng or µg / kg bw/day)	20	0.02
Drinking water quality value (ng or µg / L)	70	0.07
Recreational water quality value (ng or µg / L)	700	0.7

Note: bw = body weight, ng = nanogram

Updated September 2017



## ehHealth Guidance Statements on per- and poly-fluoroalkyl substances

### Background and context:

Per- and poly-fluoroalkyl substances, or "PFAS", are a class of manufactured chemicals that have been used since the 1950s to make products that resist heat, stains, grease and water. Until recently, this group of chemicals was known as "perfluorinated chemicals", or "PFCs". The name change has come about to avoid confusion with another group of chemicals that are relevant to climate change, which are known as "PFCs".

Products that may contain PFAS are used for firefighting, fast drying and cleaning products. PFAS and the PFAS are found in many products.

PFAS are of concern in the environment and so can many types of PFAS are found in the environment.

The PFAS of most concern are perfluorooctane sulfonate (PFOS) and perfluorohexane sulfonate (PFHxS). PFOS and PFHxS are found in many types of PFAS are found in the environment.

Because of their widespread use, PFAS are found in many products. PFAS and the PFAS are found in many products.

The Australian Government has issued a trend towards lower levels of PFAS in the environment.

Outside of the occupational and various consumer products, PFAS are found in many products.

For some communities, PFAS are found in the environment.

In chronic exposure to PFAS, the health effects are not yet clear.

### Food Regulation Standing Committee Statement Per- and poly-fluoroalkyl substances (PFAS) and the general food supply

*In Australia, exposure of the general population to perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) is low and declining, and there is no consistent evidence that this exposure has been harmful to human health.*

PFAS have been used since the 1950s in a range of industrial processes, common household products, and some fire-fighting foams. Due to their persistence and widespread presence in the environment, PFAS are found in the blood of people and animals all over the world and are sometimes present at low levels in a variety of food products and in the environment.

Food Standards Australia New Zealand (FSANZ) conducted a hazard assessment of PFOS, PFOA and Perfluorohexane sulfonate (PFHxS) and concluded that there is currently no consistent evidence that these chemicals cause any adverse health effects in humans, including people highly exposed occupationally (1). This conclusion is consistent with other international evaluations.

A dietary exposure assessment, literature review and the 24<sup>th</sup> Australian Total Diet Study conducted by FSANZ (in which two PFAS compounds were screened i.e. PFOS and PFOA) indicated that the risk posed by these chemicals to consumers in the general population is likely to be very low (2, 3). This finding is also supported by blood studies involving human serum that provide strong evidence of decreasing serum PFOS and PFOA concentrations in the Australian population from 2002. This likely reflects the decline in use of these chemicals in Australia since around 2002 (4, 5).

These studies combined indicate that in Australia the general population's exposure to PFOS and PFOA is declining. PFAS testing will be considered for inclusion in future food studies to provide appropriate on-going monitoring of the general population's exposure.

Updated June 2016

## Australian Health Protection Principal Committee Per- and poly-fluoroalkyl substances (PFAS) FactSheet

### What are per- and poly-fluoroalkyl substances?

Per- and poly-fluoroalkyl substances, also known as "PFASs", are a group of manufactured chemicals that have been used since the 1950s in a range of common household products and specialty applications, including in the manufacture of cookware; fabric, furniture and carpet stain protection applications; food packaging; some industrial processes; and in some types of fire-fighting foam.

Recently, this group of chemicals was known as "perfluorinated chemicals", or "PFCs". The name change has come about to avoid confusion with another group of chemicals that are relevant to climate change, which are also known as "PFCs".

Many types of PFASs. The best known examples are: perfluorooctane sulfonate, also known as "PFOS"; and perfluorooctanoic acid, also known as "PFOA".

Another chemical of the PFAS group and is known as "PFBS".

PFAS are used in Australia?

PFAS and Assessment Scheme (NICNAS) Australia through four national surveys, manufactured in Australia.

PFAS are imported into Australia, mainly for use in hydraulic fluid in the aviation industry.

PFAS are imported into Australia and used in the manufacture of fire-fighting foams. PFAS chemicals are not present in the environment.

PFAS are used in many types of fire-fighting foam to be stockpiles of PFAS.

PFAS are used in many consumer products, including PFAS, PFAS are being phased out the use of PFAS, PFAS accumulation and PFAS.



# PFAS NEMP complements advice by the AG Department of Health

## – *Expert Health Panel update 7 May 2018*

---

*The Panel concluded there is mostly **limited or no evidence** for any link with human disease from these observed differences. Importantly, there is no current evidence that supports a large impact on a person's health as a result of high levels of PFAS exposure. However, the Panel noted that even though the evidence for PFAS exposure and links to health effects is **very weak and inconsistent**, important health effects for individuals exposed to PFAS cannot be ruled out based on the current evidence.*

---



# PFAS NEMP overview

- What is it?
- What's in it?
- Where to next?



# Contents

<b>Abbreviations</b> .....	2	<b>14</b> Landfill disposal.....	28
<b>1</b> Scope .....	3	14.1 Landfill siting and design .....	28
An introduction to PFAS .....	3	14.2 Landfill operation .....	28
<b>2</b> Australia's international obligations.....	4	14.3 Leachate management practices .....	28
<b>3</b> Guiding principles.....	4	14.4 Monitoring at landfills.....	28
General environmental obligations		14.5 Closure considerations.....	28
concerning PFAS.....	5	14.6 Landfill acceptance criteria .....	29
<b>4</b> Communication and engagement.....	6	<b>15</b> Trade waste discharge .....	31
<b>5</b> PFAS monitoring .....	7	<b>16</b> Data sharing .....	31
<b>6</b> PFAS inventory.....	9	<b>17</b> Notification.....	31
<b>7</b> Site prioritisation.....	11	<b>18</b> PFAS sampling.....	32
<b>8</b> Environmental guideline values .....	13	18.1 Sampling and analysis quality plans .....	32
<b>9</b> Contaminated site assessment.....	17	18.2 Who should take the sample? .....	32
<b>10</b> On-site storage and containment.....	21	<b>19</b> PFAS analysis .....	35
<b>11</b> Transport of PFAS-contaminated material.....	23	19.1 Interpreting results .....	37
<b>12</b> Reuse of PFAS-contaminated materials.....	24	19.2 Laboratory requirements.....	39
12.1 Reuse of PFAS-contaminated water .....	25	19.3 Limit of reporting.....	39
<b>13</b> Treatment and remediation .....	26	<b>20</b> Future work.....	40
13.1 Management strategy .....	26	<b>21</b> Review .....	41
		<b>References</b> .....	42
		<b>Appendices</b> .....	43

# Content

Intended to integrate with existing national frameworks and guidelines:-

- Assessment of Site Contamination NEPM,
- Movement of Controlled Waste NEPM,
- National Water Quality Management Strategy including the Freshwater and Marine Water Quality Guidelines



# Contaminated site assessment

Complements the ASC NEPM – provides guidance on issues for particular consideration such as -

- potential for multiple pathways of exposure
- presence of primary sources (fire training grounds, landfills) and secondary sources (sediment in surface water bodies)
- early investigation of risks to sensitive off-site receptors



# Guideline Values

## Health-based guidelines

- FSANZ 2017
- Australian Government Department of Health
- Soil (20% of FSANZ TDI, to allow for multiple routes of exposure)
- early community engagement to identify actual pathways of exposure



# Guideline Values

## **Ecological guidelines**

- Interim soil (direct and indirect exposure)
- Interim biota
- Draft aquatic ecosystems



# PFAS NEMP overview

- What is it?
- What's in it?
- Where to next?



# PFAS NEMP – 20 Future Work

**Table 8: Future work for completion to inform the mid-2018 Plan update**

Future work	Description	Expected completion
Ecological guideline values	<ol style="list-style-type: none"> <li>1. Review the indirect exposure guideline values from Canada and their relevance in the Australian context and make recommendations to HEPA (e.g. adopt/modify/revoke).</li> <li>2. Review available direct exposure guideline values to determine suitability for inclusion in the Plan.</li> </ol>	June 2018
Criteria for soil and waste reuse criteria	Establish soil and waste reuse criteria, with consideration of both total and leachable values.	June 2018
Criteria for water authorities and utilities	Work with water authorities/utilities to develop criteria or approaches for the derivation of criteria, including trade waste acceptance criteria, wastewater treatment effluent and biosolids criteria.	June 2018
Guidance note – Treatment and remediation trials	Develop a Guidance note on requirements for undertaking preliminary treatment and remediation trials.	June 2018
Guidance note – Response to uncertainty	Develop a Guidance note responding to uncertainty arising from the analysis of other PFAS, considering various national and international resources.	June 2018
Revision of the Guidance note on Monitoring	Development of protocols / guidance for sampling the less common materials especially if we are to identify low level PFAS contamination for example in concrete timber etc.	June 2018
Guidance Note – Site prioritisation	Develop a Guidance note to provide the process for site prioritisation.	June 2018
Revision of the Guidance note on Containment	Develop further guidance / protocols for on-site containment of PFAS-contaminated materials, including considerations for design criteria.	June 2018
Guidance note – application of environmental guidelines and criteria	Develop a Guidance note on the application of environmental criteria including extrapolating from investigation to intervention to remediation.	June 2018
Revision of the Guidance note on Sampling	To provide further guidance on options for cost-effective analyses.	June 2018
Protocol for data sharing	Develop a protocol for data sharing to establish a structured way of sharing data and information.	June 2018

# PFAS NEMP – 20 Future Work

## RESEARCH ACTIVITIES

Future work	Description	Expected completion
PFAS sources entering and emitted from wastewater treatment plants	Develop a research proposal to characterise PFAS in trade waste/sewer systems entering wastewater treatment plants to help identify the relative contributions of industrial sources discharging to trade waste, including landfills, in the total PFAS load.	Out of sessions March 2018, to consider funding options
Ambient concentrations	Develop a research proposal to investigate, through monitoring, ambient concentrations of PFAS across Australia to inform decisions relating to site assessment, management options and the practicality of adopted guideline values and other criteria.	Out of sessions March 2018, to consider funding options
Analytical method validation	Develop a project proposal with a suitable partner for analytical method validation, including inter-laboratory and/or proficiency trials	Out of sessions March 2018, to consider funding options
Toxicity equivalence factors for short and long chain PFAS	Development of toxicity equivalence factors for short and long chain PFSA and PFCA to allow for risk assessment of a broader suite of PFAS	Out of sessions March 2018, to consider funding options
Bioaccumulation in the Australian context	Understanding bioaccumulation in the Australian context, to assist development of Australian guideline values for wildlife food and water quality	Longer term
Development of ecotoxicological guideline values	Further development of ecotoxicological guideline values, that consider multigenerational effects	Longer term
PFAS sediment concentration impact on ecotoxicity and bioaccumulation	Understanding the importance of PFAS sediment concentrations on ecotoxicity and bioaccumulation in aquatic biota	Longer term
PFAS behaviour	Understanding the behaviour (sorption/desorption; transport; transformation) of PFAS of concern (targeting factors such as water characteristics; organic matter characteristics; salinity; pH; microbial composition)	Longer term
PFAS precursors	Fate, behaviour, transport of precursors and the kinetics of their degradation to form PFAS end products	Longer term

# PFAS NEMP version 2

- Update late 2018 - not mid 2018
- High priority sub-projects
  - Criteria for water authorities & utilities
  - Soil and waste reuse criteria
  - ‘Finalise’ guideline values
- Public consultation early 2019



# Implementation of PFAS NEMP

- Scope and Content
- Treatment and Remediation
- Management
- Future Proofing
- Key Considerations



# Scope and content of the PFAS NEMP

- Provides consistent approach to assessment, management and remediation of PFAS across Australian jurisdictions
- Contains overarching guidance and specific guidance notes
- Recognises that PFOS, PFOA and PFHxS are usually indicators of a much broader range of PFAS
- Recognises that scientific and practical knowledge around PFAS issues is evolving rapidly.





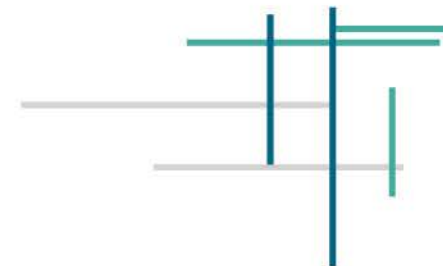
# Section 13 – Treatment and remediation

Hierarchy of treatment and remediation options  
(as per Principle 16 of the ASC NEPM)

1. Separation, treatment and destruction
2. On site encapsulation and/or immobilisation
3. Removal and off site disposal (landfill)



(photo:Wikipedia.org)





## 13.1 Management strategy

- Recognises that PFAS remediation is challenging
- Recognises that remedial targets may need to focus on risk reduction rather than complete removal.
- Recognises that removal of pathways may be a priority with regard to timely reduction of risk.



(ABC News: Xavier LaCanna)



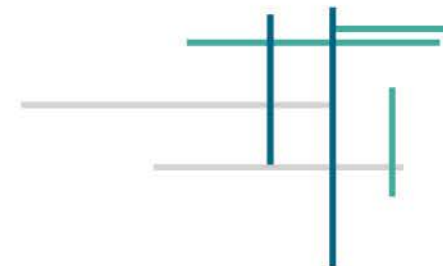


# The challenge of future-proofing

- Changing land uses
- Climate change:
  - changing rainfall/  
run-off
  - changing  
groundwater/surface  
water levels
- Evolving knowledge of  
PFAS risks and behaviour.



([www.oneperth.com.au](http://www.oneperth.com.au))







# Key considerations

## Long-term stability (of binding agents)

- Binding/Immobilisation – limited information on the long-term stability of treated soils.
- Regulators likely to require post-remediation validation monitoring.

## Long-term stability (of containment/liners)

- PFAS may out-last the structures engineered to contain it.





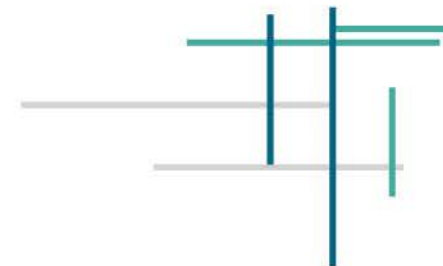
# Key considerations

## Fate of 'total' PFAS

- Does remedial strategy account for the full PFAS load?
- Indicative targets for PFOS, PFOA, PFHxS – but use of TOPA and/or TOFA likely to be required in validation testing.



(photo:Wikipedia.org)





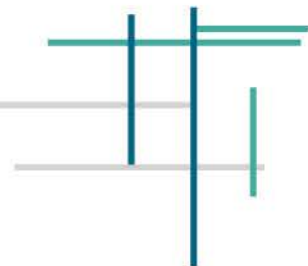
# Key considerations

## Co-contaminants

- Co-occurrence of PFAS with other organics (especially hydrocarbons) may reduce effectiveness of binding agents.



(Guardian.org; photo: Jack Guez, AFP)





# Key Considerations

- Community Acceptance
  - How well does the public understand 'risk reduction'?
  - Potential impacts on value of land (real or perceived)



(Image : Vic EPA)





# Thank you

The PFAS NEMP is available through the Victorian EPA website:

**[www.epa.vic.gov.au/your-environment/land-and-groundwater/pfas-in-victoria/pfas-national-environmental-management-plan](http://www.epa.vic.gov.au/your-environment/land-and-groundwater/pfas-in-victoria/pfas-national-environmental-management-plan)**

