The Senate

Select Committee on PFAS (per and polyfluoroalkyl substances)

Inquiry into the extent, regulation and management of PFAS

Final report

November 2025

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Terms of reference

Reappointment
That

(a) a. the Select Committee on PFAS (per and polyfluoroalkyl substances), appointed by resolution of the Senate on 22 August 2024, be reappointed with the same powers and provisions for membership, except as otherwise provided by this resolution;

(b)

(c) b. the committee and any subcommittee have power to consider and use the evidence and records of the select committee appointed on 22 August 2024; and

(d)

(e) c. the committee present its final report on or before 19 November 2025.

Appointment
(1) That a select committee, to be known as the Select Committee on PFAS (per and polyfluoroalkyl substances), be established to inquire into the extent, regulation and management of PFAS, with particular reference to:

(a) the extent of data collection on PFAS contamination of water, soil and other natural resources;

(b) sources of exposure to PFAS, including through environmental contamination, food systems and consumer goods;

(c) the health, environmental, social, cultural and economic impacts of PFAS;

(d) challenges around conducting and coordinating health and exposure research into PFAS, including the adequacy of funding arrangements and the influence of the chemicals industry over the evolving body of scientific evidence on the health effects of PFAS, including in respect to First Nations communities;

(e) the effectiveness of current and proposed federal and state and territory regulatory frameworks, including the adequacy of health based guidance values, public sector resourcing and coordination amongst relevant agencies in preventing, controlling and managing the risks of PFAS to human health and the environment;

(f) the role, liability and responsibility of government agencies and industry in the production, distribution, contamination and remediation of PFAS,

including obligations under the Stockholm Convention on Persistent Organic Pollutants and other relevant principles and international conventions;

(g) international best practices for the environmentally sound management and safe disposal of PFAS;

(h) the adequacy and effectiveness of government engagement with and support for communities disproportionately affected by PFAS contamination, including fair and appropriate compensation schemes;

(i) the effectiveness of remediation works on specific sites and international best practices for remediation and management of contaminated sites;

(j) international best practices for environmental and health risk assessments, reduction and management of PFAS contamination and exposure;

(k) areas for reform, including legislative, regulatory, public health and other policy measures to prevent, control and manage the risks of PFAS to human health and the environment, including the phasing out of these harmful substances; and

(l) any other related matters.

Abbreviations and acronyms

6:2 FTS	6:2-fluorotelomersulfonic acid
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ADWG	Australian Drinking Water Guidelines
AFFF	aqueous film forming foam
AICIS	Australian Industrial Chemicals Introduction Scheme
AMCS	Australian Marine Conservation Society
AMSANT	Aboriginal Medical Services Alliance NT
ANU	Australian National University
APCO	Australian Packaging Covenant Organisation
APVMA	Australian Pesticides and Veterinary Medicines Authority
ARFFS	Aviation Rescue Fire Fighting Service (Airservices Australia)
ASC NEPM	*National Environment Protection (Assessment of Site Contamination) Measure 1999*
ATSDR	Agency for Toxic Substances and Disease Registry
BEST	Biomedical and Environmental Sensor Technology
CPSU	Community and Public Sector Union
crcCARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DDT	dichlorodiphenyltrichloroethane
Defence	Department of Defence
Department of Environment	Department of Climate Change, Energy, the Environment and Water
Department of Health	Initially Department of health and Aged Care, then Department of Health, Disability and Ageing
Department of Infrastructure	Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts
EDO	Environmental Defenders Office
EFSA	European Food Safety Authority

enHealth	Environmental Health Standing Committee (Department of Health and Aged Care)
EPA Tasmania	Environment Protection Authority Tasmania
EPA Victoria	Environmental Protection Authority Victoria
EVTs	emergency vehicle technicians
FOGO	food organics and garden organics
FSANZ	Food Standards Australia and New Zealand
HEPA	Heads of Environmental Protection Agencies
HBM	human biomonitoring
HBGVs	Health Based Guidance Values
IARC	International Agency for Research on Cancer
IChEMS	Industrial Chemicals Environmental Management Standard
JSCFADT	Joint Standing Committee on Foreign Affairs, Defence and Trade
NACCHO	National Aboriginal Community Controlled Health Organisation
NATA	National Association of Testing Authorities
NEMP	National Environment Management Plan
NEPC Act	*National Environmental Protection Council Act 1994* (Cth)
NEPM	*National Environment Protection (Assessment of Site Contamination) Measure 1999*
ng/L	nanograms per litre
NHMRC	National Health and Medical Research Council
NHMS	National Health Measures Survey
NIRC	Norfolk Island Regional Council
NT DLPE	Northern Territory Department of Lands, Planning and Environment
NWI	National Water Initiative
NWQMS	National Water Quality Management Strategy
PFAS	per and polyfluoroalkyl substances
PFAS NEMP	PFAS National Environmental Management Plan 3.0
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexane sulfonate

PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
POPs	persistent organic pollutants
qldwater	Queensland Water Directorate
TCR	Targeted Call for Research (NHMRC)
TDI	tolerable daily intake
TGA	Therapeutic Goods Administration
TWI	tolerable weekly intake
the Guidelines	Australian Drinking Water Guidelines
UCSF	University of California, San Francisco
UCSF EtD	Navigation Guide Evidence-to-Decision Framework for Environmental Health
UFUA	United Firefighters Union of Australia
US	United States
US ATSDR	United States Agency for Toxic Substances and Disease Registry
US EPA	United States Environmental Protection Agency
Water Guidelines	Australian Drinking Water Guidelines
WBACC	Wreck Bay Aboriginal Community Council
WHO	World Health Organization
Worksafe	Worksafe Victoria
WSAA	Water Services Association of Australia
WWF—Australia	World Wide Fund for Nature—Australia

List of recommendations

Recommendation 1

11.37 The committee recommends that Food Standards Australia and New Zealand (FSANZ) reviews the Tolerable Daily Intakes for PFAS against the latest international research and regulatory settings and updated Australian Drinking Water Guidelines, and presents a report to the Australian Parliament—no later than October 2026—which outlines the findings of the review.

11.38 As part of this review, FSANZ should reconsider the need to establish regulatory limits on PFAS in food, taking into account a holistic quantification of population PFAS exposure.

Recommendation 2

11.59 The committee recommends that, as part of the current review of the enHealth guidance statement—Per- and polyfluoroalkyl Substances (PFAS), the Australian Government considers the appropriateness of the statement that health effects associated with PFAS exposure 'have generally been small and are unlikely to be important to health outcomes' in the context of leading international research and health advice.

Recommendation 3

11.78 The committee recommends that the Australian Government considers providing subsidised PFAS blood testing, enhanced health and cancer screening, and targeted mental health support for those people with the highest levels of PFAS exposure, including some firefighters, people exposed at work, and residents of heavily contaminated areas (especially those with exposure to home-grown produce, contaminated seafood, plants and animals, river and creek waters, and/or bore water).

Recommendation 4

11.82 The committee recommends that the Australian Government consults with the Australian Academy of Health and Medical Sciences and other relevant stakeholders on designs for a national, longitudinal chemicals biomonitoring program (similar to existing programs in the United States, South Korea, Japan, and several European countries) and associated longitudinal PFAS health research projects.

11.83 A national biomonitoring program should incorporate a focus on monitoring exposure levels of children and pregnant women and identifying any associated health effects or trends.

11.84 In designing the program, the government should consider using leftover blood held by pathology laboratories.

Recommendation 5

11.92 The committee recommends that the review of the enHealth PFAS guidance statement consider whether the risks to human health from exposure to PFAS are dose dependent. Should the review determine that to be the case, the guidance should acknowledge that the risks are likely increased for those who have been heavily exposed and are lower for those with low levels of exposure to PFAS.

Recommendation 6

11.107 The committee recommends that the Australian Government considers providing PFAS blood testing, cancer screening and general health monitoring for all impacted residents of Wreck Bay who wish to take part, with a particular focus on children and pregnant women.

11.108 These services must be provided in a culturally appropriate and easily accessible manner, in collaboration with the Wreck Bay Aboriginal Community Council and relevant Aboriginal Community Controlled Health Organisations.

Recommendation 7

11.109 The committee recommends that the Australian Government considers commissioning longitudinal research into the health impacts of exposure to PFAS contamination on the community at Wreck Bay.

11.110 This research should utilise existing data from available sources as well as collecting new data through the testing and health monitoring outlined in Recommendation 6.

Recommendation 8

11.117 The committee recommends the Australian Government:

- **works with the states and territories to ensure that workers are protected from unnecessary PFAS exposure in all states and territories;**
- **reviews relevant Commonwealth work health and safety legislation, regulations, and official advice with the aim of ensuring a consistent approach to occupational PFAS exposure—and actively encourages states and territories to do the same;**
- **amends the Australian Code for the Transport of Dangerous Goods by Road & Rail to classify PFAS as a 'dangerous good'; and**
- **develops a publicly available online resource to provide state regulators, employers, and employees with information about PFAS as a workplace**

hazard, including how to initiate and progress remediation of contamination.

11.118 Where necessary, work health and safety regulations should also be amended to extend provisions to employees of private companies working on PFAS remediation, such as for Defence.

Recommendation 9

11.119 The committee recommends the Australian Government:

- **works with relevant state and territory regulators to ensure that all veterans and firefighters exposed to PFAS—including members of the Australian Army Fire Service and Retired Firefighters' Group—are considered and eligible as part of any remediation, research, testing, and support programs; and**
- **includes Airservices Australia Emergency Vehicle Technicians in its workers compensation scheme for firefighters, by amending the Safety, Rehabilitation and Compensation Act 1988 (Cth).**

Recommendation 10

11.120 The committee recommends the Australian Government works with state and territory work health and safety regulators to develop a national regulatory framework which enables state and territory WorkSafe agencies to issue notices and progress regulatory responses to PFAS exposure in Australian workplaces.

Recommendation 11

12.23 The committee recommends the Australian Government:

- **fast-tracks the deployment of PFAS-free firefighting foams to replace all legacy PFAS-containing foams;**
- **moves to quickly replace all legacy firefighting equipment that still utilises or stores PFAS-containing foams, and ensures the safe disposal of existing stocks;**
- **bans or severely restricts the use of firefighting foams containing PFAS by Commonwealth entities; and**
- **works through cross jurisdictional bodies to achieve an urgent national ban on the use of PFAS-containing firefighting foams, including by private sector entities, major hazard facilities and B Class foam extinguishers in Australia.**

Recommendation 12

12.26 The committee recommends that the Australian Government provides funding for toxicological studies of fluorine-free foams so as to ensure that legacy PFAS-containing foams are not replaced by the next harmful products.

Recommendation 13

12.30 The committee recommends that the Australian Government works with states and territories to establish a fund and taskforce to support the remediation of severely PFAS-contaminated sites, including current and former fire stations (and surrounds), firefighting training facilities, and nearby water catchments that have been impacted, and ensures the availability of uncontaminated drinking water at all fire stations.

12.31 To complement this initiative, the Australian Government should establish an expert tripartite panel comprised of government, private sector and unions, to:

- **advise on reducing PFAS exposure risk to workers;**
- **advise on effective remediation of PFAS-contaminated sites;**
- **advise on new and established techniques and technologies; and**
- **encourage further innovation through supporting site remediation research and development.**

Recommendation 14

12.33 The committee recommends the Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts assumes full responsibility for remediation and management of PFAS contamination on and around Norfolk Island airport.

Recommendation 15

12.41 The committee recommends that the Australian Government funds and coordinates a strategic national PFAS environmental monitoring program to track contamination levels and trends in the Australian environment, including key waterways and native wildlife species, and publish emerging data.

Recommendation 16

12.42 The committee recommends that the Australian Government works with state and territory and local governments to improve data-sharing on PFAS contamination and remediation activity, and develop a publicly available, interactive online PFAS map which identifies PFAS contamination locations and remediation activity.

Recommendation 17

12.49 The committee recommends that the Australian Government works with state and territory government entities to establish a mechanism to fund and support conservation and remediation of PFAS-contaminated environments that have significant social, cultural, recreational, heritage and/or environmental value.

12.50 This initiative should include the development and provision of information to assist organisations to undertake remediation activities safely, and safety information for school groups and other recreational users.

Recommendation 18

12.71 The committee recommends that the Australian Government commences negotiation with the aim of formalising its partnership with the Wreck Bay Aboriginal community for ongoing remediation and restoration of PFAS-affected lands and waters at Wreck Bay. The agreement should be designed to provide self-determination for Wreck Bay people in managing and remediating PFAS contamination on their land.

Recommendation 19

12.78 The committee recommends that the Australian Government provides immediate access to clean drinking water for the community at Wreck Bay as a temporary measure until the pipeline connecting Wreck Bay to the Shoalhaven City Council water supply is completed and operational.

Recommendation 20

12.89 The committee recommends that Australian Government agencies involved in remediation efforts, including the Department of Defence, work together with local First Nations community and language groups, and Aboriginal Community Controlled Organisations, to review PFAS management plans and update them to incorporate actions to safeguard the cultural, social, nutritional, and economic wellbeing of First Nations people and communities that are significantly impacted by PFAS contamination.

12.90 PFAS management plans for sites with significant Aboriginal and Torres Strait Islander communities should be aligned with the priority reform areas in the National Agreement on Closing the Gap and the United Nations Declaration on the Rights of Indigenous Peoples.

Recommendation 21

12.91 The committee recommends that the Australian Government urgently considers options to improve and maintain ongoing access to healthy and traditional food sources for Aboriginal communities around Katherine. This

may include facilitating safer fishing, subsidising, and/or improving the supply of affordable uncontaminated seafood.

Recommendation 22

12.101 The committee recommends that the new PFAS National Coordinating Body prioritises establishing community-based working groups, and/or other collaboration mechanisms, to facilitate the involvement of affected communities in decision-making processes relating to remediation efforts.

Recommendation 23

12.102 The committee recommends that the Australian Government, through the Department of Defence, reaches out to local health services, such as Wurli Wurjlinjang in Katherine, to codesign culturally appropriate and effective signage and educational material for Aboriginal communities impacted by the PFAS contamination of the Katherine River.

Recommendation 24

12.105 The committee recommends that the Australian Government investigates the proposal made by La Trobe University to develop Indigenous-led field-deployable PFAS detection technologies.

Recommendation 25

12.119 The committee recommends that Airservices devotes additional resources to its National PFAS Management Program to expedite the remediation phase of the program.

Recommendation 26

12.125 The committee recommends that the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts works with the Australian Airports Association, Airservices, and the Department of Defence to identify airports that may have been exposed to significant PFAS contamination which fall outside the scope of the three Commonwealth PFAS investigation and remediation programs.

12.126 Options for remediating these airports should then be considered by the Australian Government, in collaboration with the relevant state, territory, and local government authorities.

Recommendation 27

12.135 The committee recommends that the Australian Government works through the new PFAS National Coordinating Body, the Heads of Environmental

Protection Authorities Australia and New Zealand, and other relevant bodies to:

- **conduct a national audit of PFAS contamination sites and remediation activity;**
- **develop a strategic, risk-based national remediation plan;**
- **develop a common national framework for remediation; and**
- **develop national standards for reporting on remediation activity and outcomes.**

Recommendation 28

12.139 The committee recommends that the Australian Government produces a detailed cost estimate for the remediation of Australia's airports impacted by PFAS contamination and works with stakeholders to develop a cost-sharing model.

Recommendation 29

12.149 The committee recommends that the Australian Government establishes an interdisciplinary joint council, comprising regulators, industry experts, and researchers, to evaluate PFAS treatment and remediation technologies.

Recommendation 30

12.150 The committee recommends that the Australian Government continues to invest in a variety of PFAS remediation, removal and destruction technologies and techniques as part of its remediation programs. Where possible, Australian Government PFAS remediation programs should seek to support locally developed solutions and invest in environmentally responsible remediation technologies.

Recommendation 31

12.165 The committee recommends that the Australian Government amends the National Water Quality Management Strategy to incorporate a coordinated approach to pollutants and contaminants, including PFAS. As part of this initiative, governments should create a taskforce, comprising regulatory agencies and industry bodies, to:

- **plan and coordinate the management of PFAS in water supplies around Australia;**
- **develop standardised PFAS monitoring protocols and a national register of results; and**
- **progress the implementation of the revised Australian Drinking Water Guidelines.**

Recommendation 32

12.171 The committee recommends that the Australian Government works with state and territory governments and the Water Services Association of Australia to develop funding mechanisms that will support water service providers to meet upgraded PFAS testing and removal.

Recommendation 33

12.175 The committee recommends that the Australian Government actively pursues legal action against 3M and any other manufacturer of PFAS-containing firefighting foams used in Australia, with any settlement used to help fund remediation of contaminated sites.

Recommendation 34

12.184 The committee recommends that the Australian Government works with stakeholders from the textiles, clothing, floor coverings, and furniture sectors, and other relevant stakeholders, to:

- **measure the scale and distribution of PFAS in clothing, textiles, floor coverings, and furniture across Australia;**
- **identify key sources of PFAS-contaminated clothing, textiles, carpets and furniture, including import pathways;**
- **develop strategies for reducing the import of PFAS-contaminated clothing, textiles, floor coverings, and furniture; and**
- **develop mechanisms for more safely disposing of legacy PFAS-contaminated textiles waste.**

Recommendation 35

12.188 The committee recommends that the Australian Government fast-tracks regulatory reforms to remove PFAS from all food contact packaging imported into and/or used in Australia and considers encouraging the establishment of a domestic, toxic-free packaging industry.

Recommendation 36

12.204 The committee recommends that the Australian Government works with state and territory governments, local councils, and the waste management sector to develop a plan for dealing with legacy PFAS contamination in Australian waste streams, including consideration of funding, options to reduce disposal of PFAS contamination in landfill facilities, and cost-sharing mechanisms.

Recommendation 37

12.210 The committee recommends that the Australian Government fast-tracks the development and publication of new Health Investigation Levels to inform risk assessments for the suitability of PFAS contaminated land for agricultural purposes, and publishes advice on the threshold over which produce containing PFAS should not be sold.

Recommendation 38

12.211 The committee recommends that, in line with Recommendation 16, the Australian Government provides publicly available information identifying the presence of PFAS contamination on farming land, and proactively informs landholders.

Recommendation 39

12.228 The committee recommends that the Australian Government provides additional resources to the Australian Industrial Chemical Introduction Scheme to fast-track chemical assessment, including for PFAS and other persistent organic pollutants (POPs) to ensure toxic chemicals are not allowed on the market.

Recommendation 40

12.235 The committee recommends that the Australian Government prioritises work to develop legislative and policy mechanisms to enable the Schedule 7 listing of PFOA, PFOS and PFHxS (and related chemicals) to be effectively monitored and enforced, especially in relation to imported products.

12.236 Detection, disclosure and monitoring mechanisms should include internal assessments and self-reporting by businesses along with independent product testing where appropriate.

12.237 Enforcement mechanisms should be risk-based, focussing on industries and sectors where businesses may be unintentionally or unwittingly importing products containing restricted PFAS.

Recommendation 41

12.238 The committee recommends that, as a priority, the Australian Government works to enforce the PFAS ban in relation to cosmetics and personal care products, including period products.

Recommendation 42

12.239 The committee recommends that the Department of Climate Change, Energy, the Environment and Water works with the Department of Health, Disability and Ageing and the Australian Competition and Consumer Commission to

develop a mandatory product labelling regime aimed at retailers, wholesalers, distributors, importers and manufacturers who import consumer products containing PFAS chemicals.

Recommendation 43

12.244 The committee recommends that, as a priority, the Australian Government:

- **provides adequate resourcing for the development of legislation and associated regulations to give effect to the ban on PFAS;**
- **works with states and territories to encourage and support adoption of the Industrial Chemicals Environmental Management Standard (IChEMS) into state and territory chemical regulations;**
- **urgently progresses the treaty making process to enable the ratification of the Stockholm Convention listings of PFOS, PFOA and PFHxS; and**
- **works across government to develop a clear and simplified framework to enable faster ratification of future amendments to the Stockholm Convention and domestic implementation of toxic chemical bans.**

Recommendation 44

12.245 The committee recommends that the Australian Government develops a standardised approach to domestic chemical classification and regulatory changes for new hazard classifications made by the International Agency for Research on Cancer.

Recommendation 45

12.254 The committee recommends that the Australian Government works through intergovernmental decision-making forums, such as National Cabinet and the Heads of Environmental Protection Authorities Australia and New Zealand, to encourage and support jurisdictions to incorporate the standards, practices and regulatory limits outlined in the PFAS National Environmental Management Plan (NEMP) into their own regulatory regimes, including new limits for biosolids.

12.255 The Australian Government should consider providing additional resourcing and support as jurisdictions implement NEMP 3.0, including by funding the Department of Climate Change, Energy, the Environment and Water to provide departmental staff to oversee and support the implementation.

Recommendation 46

12.262 The committee recommends that the Australian Government works with: research organisations including the CSIRO, Australian Academy of Science and Australian Academy of Health and Medical Sciences; industry bodies;

and independent research centres like crcCARE, to develop a strategic PFAS research strategy and roadmap.

12.263 A national PFAS research strategy should focus investments towards developing novel remediation technologies, supporting longitudinal research—particularly in relation to health and environmental impacts—and streamlining ethics approval for research involving multiple jurisdictions.

Recommendation 47

12.267 The committee recommends that the Australian Government provides user–friendly, up-to-date public information on PFAS which incorporates:

- **a 'single source of truth' on PFAS, updated regularly according to the most recent evidence, with publication dates included on all pages;**
- **a single point of contact for members of the public to ask questions about PFAS; and**
- **in due course, a map showing PFAS contamination 'hotspots' and remediation activity (see Recommendation 16).**

12.268 This information could be provided on a new website or the existing website hosted by the Department of Climate Change, Energy, the Environment and Water (pfas.gov.au).

Chapter 1
Introduction

Appointment of the committee and conduct of the inquiry

1.1 On 22 August 2024, the Senate of the 47th Parliament of Australia appointed the Select Committee on per and polyfluoroalkyl substances (PFAS) to inquire into the extent, regulation and management of PFAS in Australia. The committee was required to present a final report by 5 August 2025.[1]

1.2 After receiving 127 submissions, conducting four public hearings, a site visit to Launceston Airport, and a community visit to Wreck Bay in the Jervis Bay Territory on Australia's south-east coast, the committee tabled an interim report on 14 March 2025, which included a summary of the committee's visit to Wreck Bay.

1.3 The committee's interim report aimed to provide an initial overview of PFAS in Australia and present some of the evidence the committee had received at that time. The report included a focus on the impacts of PFAS contamination in the Aboriginal community of Wreck Bay and made two recommendations aimed at improving the government's remediation response at Wreck Bay. Before making any further recommendations, or drawing further conclusions, it was the committee's intention to seek more evidence and continue to deliberate on these complex matters.

1.4 The committee's first four public hearings were held in Canberra on 13 November 2024; in Nowra, New South Wales (NSW) on 21 January 2025; in Penrith, NSW on 22 January 2025; and in Launceston, Tasmania on 12 March 2025. Information about those hearings, including a list of witnesses, is provided in Appendix 4.

1.5 The committee held three more hearings during the 47th Parliament—one in Melbourne on 4 June 2025, and two hearings in Canberra, on 10 and 11 June 2025.

1.6 The committee also conducted additional two site visits. The first at Launceston Airport on 11 March 2025 involved an inspection of the remediation site at the former Fire Training Ground. The second was to the SOLVE hazardous waste facility in Altona, Victoria on 3 June 2025.

1.7 Summaries of the committee's site visits to Launceston Airport and the SOLVE hazardous waste facility in Altona are provided in Appendices 1 and 2 respectively.

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1 *Senate Journals*, No. 127, 22 August 2024, pp. 3840–3841.

1.8 The committee continued to receive and publish submissions, responses to questions on notice, and additional information right up until the eve of the 47th Parliament. At that time, the committee had received 148 submissions.

1.9 In its interim report, the committee recommended that it be reappointed to continue its work in the 48th Parliament. On 28 July 2025, the Senate reappointed the committee, granting access to the documents and records from the committee of the 47th Parliament, and extending the reporting date to 19 November 2025.[2]

1.10 Following the appointment, the new committee set up a new website for the 48th Parliament. The committee conducted one more hearing, in Canberra on 5 September 2025, and continued to receive evidence. Evidence received in the 48th Parliament is published on the committee's website for the 48th Parliament.[3]

1.11 A total of 170 submissions were received during 47th and 48th Parliaments, along with a substantial number of additional documents, including answers to questions on notice. These are available on the committee's websites for the 47th and 48th Parliaments respectively.

1.12 The committee also received a petition from Ms Sophie Barrett, regarding the impact of chemicals on childhood cancer. The petition had 63 signatories and has been published as additional information to the inquiry.

1.13 All submissions, additional information, and answers to questions on notice received across both Parliaments are listed in Appendix 3. Information about hearings across the 47th and 48th Parliaments, including a list of witnesses, is provided in Appendix 4.

1.14 At the time of writing this report a government response had not yet been received to the committee's interim report.

Acknowledgments

1.15 The committee thanks all the individuals, organisations, government departments and agencies who appeared as witnesses or made submissions to the inquiry, including international witnesses.

1.16 The committee especially values the courage and generosity of witnesses who have been personally impacted by PFAS, including through occupational or environmental exposure, and appreciates their testimony.

Notes on terminology and references

1.17 Throughout this report, the term 'PFAS' is used as a shorthand for the group or class of chemicals that can also be known as 'perfluorinated chemicals',

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2 *Senate Journals*, No. 4, 28 July 2025, p. 150.

3 Select Committee on PFAS (per and polyfluoroalkyl substances), *About this inquiry* (accessed 10 November 2025).

'perfluorochemicals', or 'perfluoroalkyls'. PFAS are also commonly referred to as 'forever chemicals', due to their persistence in the environment and in living organisms. A detailed explanation of PFAS was included in Chapter 2 of the committee's interim report.

1.18 The terms 'Indigenous', 'First Nations' and 'Aboriginal' and/or 'Torres Strait Islander' may all be used at various points in this report.

1.19 To differentiate between the primary Commonwealth departments involved in Australia's PFAS response (the Department of Defence, the Department of Health, Disability and Ageing, the Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts, and the Department of Climate Change, Energy, the Environment and Water) the committee uses the shorthand terms, 'Defence', 'Department of Health', 'Department of Infrastructure', and 'Department of Environment', throughout this report.

1.20 The committee also notes the 'Department of health and Aged Care' became the 'Department of Health, Disability and Ageing' part way through this inquiry.

1.21 References to 'Committee Hansard' are to *Proof* Committee Hansards, which were available at the time of drafting. There may be minor differences between Proof and Official Hansards, including page numbers.

AICIS clarification

1.22 Following the release of the committee's interim report, the Australian Industrial Chemicals Introduction Scheme (AICIS) wrote to the committee with a request that it clarify two statements that were made in the interim report which were not an accurate representation of AICIS obligations.[4]

1.23 Paragraph 2.26 of the committee's interim report stated:

> *All importers and manufacturers of industrial chemicals listed under this Act are required to register their business and the categories of their chemical importations or manufacture with AICIS before they introduce industrial chemicals into Australia.*

1.24 AICIS suggested that the following would be a more accurate representation:

> All importers and manufacturers (introducers) of industrial chemicals are required to register their business before they introduce industrial chemicals into Australia. They must also categorise their chemical introductions before introducing the chemical into Australia for the first time, and meet the obligations associated with the relevant category.

[4] Australian Industrial Chemicals Introduction Scheme (AICIS), clarification of AICIS' obligations (received 30 June 2025).

1.25 Paragraph 2.27 of the committee's interim report stated:

> *AICIS enforces import and export controls on PFOS and specified PFOS precursors listed under an international agreement called the Rotterdam Convention. Importers and manufacturers of PFAS must comply with legal obligations under the Act and are prohibited from importing or exporting PFAS without approval from AICIS.*

1.26 AICIS suggested that the following would be a more accurate representation:

> AICIS enforces import and export controls on chemicals that are listed under an international agreement called the Rotterdam Convention, which includes high concern PFAS chemicals such as PFOS, PFOA and related chemicals. Importers and manufacturers of chemicals that are listed on the Rotterdam Convention must comply with legal obligations under the Act and are prohibited from importing or exporting such chemicals without approval from AICIS.

1.27 The committee thanks AICIS for these clarifications.

Structure of the report

1.28 The committee's final report is divided into two parts—evidence received, and committee views and recommendations. Part 1 presents the evidence received throughout the course of the inquiry and has 10 chapters:

- Chapter 1 provides an introduction to the report.
- Chapter 2 presents further evidence on PFAS and human health, including:
  - Australian research on health impacts;
  - international research on health impacts, including recent international findings;
  - Australian Government guidance and plans for review;
  - views of inquiry participants on the health science; and
  - discussion on biomonitoring and health screening for exposed cohorts.
- Chapter 3 presents evidence relating to firefighters and other groups exposed to PFAS at work, including a discussion of exposure management strategies.
- Chapter 4 discusses social and ecological impacts of PFAS, including impacts on lifestyle and recreation, and impacts on Australian wildlife and habitats.
- Chapter 5 presents evidence on the unique and disproportionate impacts of PFAS contamination on First Nations communities, including Wreck Bay and Katherine in the Northern Territory.
- Chapter 6 discusses PFAS remediation technologies and projects and provides a case study on Launceston Airport. It also provides an update on PFAS remediation programs, including:
  - Defence's PFAS Investigation and Management Program;
  - Airservices' National PFAS Management Program; and

  - the Australian Government PFAS Airports Investigation Program.
- Chapter 7 provides an update on PFAS in water supplies, including drinking water and other water systems. The chapter incudes a case study update on water supplies in the NSW Blue Mountains.
- Chapter 8 discusses PFAS in consumer goods and products, including:
  - Prevalence of PFAS in consumer goods, including imported goods;
  - methods of human exposure; and
  - views of inquiry participants on regulation, labelling, food packaging and research.
- Chapter 9 presents evidence about PFAS in waste streams and agricultural impacts of PFAS. It covers:
  - PFAS in waste streams such as biosolids, food organics and garden organics (FOGO) and landfill;
  - PFAS in agriculture, including application of biosolids on agricultural land, PFAS in stock water and PFAS in pesticides, and their impact on the food chain; and
  - approaches to managing PFAS in waste streams and agriculture, including suggestions from these sectors.
- Chapter 10 outlines PFAS policy, regulation and coordination in Australia. This chapter incorporates discussion of:
  - chemical assessment and regulation;
  - national PFAS policy and coordination, including the PFAS National Environmental Management Plan;
  - views of state, territory and local governments, and other inquiry participants;
  - lessons from international jurisdictions; and
  - potential options for phasing out PFAS in Australia.

1.29 Part 2 comprises Chapters 11 and 12 and presents the committee's views and recommendations.

Part 1
Evidence received

Chapter 2
PFAS and human health

Introduction

2.1 Over the last 25 years, a growing body of research has raised concerns about the potential impacts of some per- and polyfluoroalkyl substances (PFAS) on human health.[1] However, the significance of these impacts remains a contested subject.

2.2 In its interim report, the committee outlined current Australian Government health advice regarding PFAS and discussed PFAS exposure in Wreck Bay, Richmond, and the Blue Mountains in New South Wales. The interim report also summarised evidence regarding the mental health impacts of living in an area that is known to be contaminated with high levels of PFAS.

2.3 In this final report, the committee presents the remaining evidence on PFAS and human health that was received throughout the course of the inquiry. This chapter begins by outlining major Australian PFAS research, considers the impact of historical delays in commencing independent research on the health effects of PFAS, and then looks at recent international research and findings. This is followed by the Australian Government health guidance and current reviews of that guidance, and witness views on the adequacy of this advice.

2.4 Next, the chapter presents the testimony of submitters and witnesses on the science around PFAS and human health, including bioaccumulation in animals and humans, and the strength and quality of the epidemiological evidence. The chapter then presents testimony about the health effects of PFAS and potential safe levels of PFAS exposure, and views on approaches to dealing with uncertainty. The chapter concludes with a consideration of biomonitoring.

Australian research on health impacts

2.5 This section sets out several Australian studies and reviews of evidence, as well as summarising the conclusions of a number of Commonwealth agencies.

Australian Expert Health Panel on PFAS: 2017–18

2.6 In 2017, the Australian Government established the Expert Health Panel on PFAS (the Panel) to advise it on the evidence for potential health impacts associated with PFAS exposure.[2]

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1 See, for example, Professor Denis O'Carroll, *Submission 1* (47th Parliament), p. 1.

2 Australian Government Department of Health, Disability and Ageing, *Expert Health Panel on PFAS*, 7 June 2024 (accessed 8 July 2025).

2.7 The Panel's 400-page report, published in May 2018, was based on 'a comprehensive review of recent literature reviews regarding Australian and international evidence on potential human health effects of PFAS exposure', as well as a public consultation process.[3]

2.8 In its report summary:

> The Panel found that although the scientific evidence on the relationship between PFAS exposure and health effects is limited, current reports, reviews and scientific research provide fairly consistent reports with several health effects.[4]

2.9 These health effects were:

- increased levels of cholesterol in the blood;
- increased levels of uric acid in the blood;
- reduced kidney function;
- alterations in some indicators of immune response;
- altered levels of thyroid hormones and sex hormones;
- later age for starting menstruation (periods) in girls, and earlier menopause; and
- lower birth weight in babies.[5]

2.10 However, the Panel stated that for the health effects listed above, 'the differences reported in the scientific studies between people who have the highest exposure to PFAS and those who have had low exposure, are generally small'.[6]

2.11 Further, the Panel stated that 'the level of health effect reported in people with the highest exposure is generally still within the normal ranges for the whole population'.[7]

2.12 Therefore:

> 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

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3 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS – Report*, pp. 1–2 (accessed 9 July 2025).

4 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, May 2018, p. 1 (accessed 9 July 2025).

5 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, May 2018, p. 1.

6 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, May 2018, p. 1.

7 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, May 2018, p. 1.

> inconsistent, important health effects for individuals exposed to PFAS cannot be ruled out based on the current evidence.[8]

2.13 The Panel also 'concluded many of the biochemical (for example, higher cholesterol and uric acid levels in the blood) and disease links reported in the studies may be able to be explained by reverse causation or confounding':

> Reverse causation is when there is a link between the exposure to PFAS and a health effect, but it is not clear whether the exposure has caused the health effect or whether the health effect causes increased exposure. Confounding is where a third factor (for example, age, smoking, or socio-economic status), could influence the findings of the study.[9]

2.14 In terms of cancer, 'the Panel concluded there is no current evidence that suggests an increase in overall cancer risk':

> The Panel did however note that the most concerning signal reported in the scientific studies for life-threatening human disease is a possible link with an increased risk of two uncommon cancers: testicular and kidney cancer. However, these associations were only found in one cohort, and the Panel believes they were possibly due to chance, as they have yet to be found in other studies. Additionally, the Panel noted that the limited amount of evidence which is available on cancer relates to the [perfluorooctanoic acid (PFOA)] chemical, not [perfluorooctanesulfonic acid (PFOS)] (which is more common in Australia).[10]

2.15 In concluding, the Panel stated:

> After considering all the evidence, the Panel's advice to the Minister on this public health issue is that the evidence does not support any specific health or disease screening or other health interventions for highly exposed groups in Australia, except for research purposes.[11]

ANU PFAS Health Study: 2016–21

2.16 Research on the health impacts of PFAS on the Australian population is limited. One study that investigated the potential health effects of PFAS exposure was the Australian National University's (ANU) PFAS Health Study. The study was commissioned by the Department of Health and conducted by Professor Martyn Kirk and a team of researchers from the National Centre for Epidemiology and Population Health at ANU between 2016 and 2021. The study focussed on three Australian communities with known PFAS contamination: Katherine in the

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8 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, May 2018, p. 2.

9 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, May 2018, p. 2.

10 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, May 2018, p. 2.

11 Australian Government Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, May 2018, p. 2.

Northern Territory, Oakey in Queensland and Williamtown in New South Wales.[12]

2.17 The study started with a systematic review of the available scientific and health literature to identify potential health effects related to exposure to PFAS chemicals. The study was conducted in four parts:

(1) Focus group study—examined the three PFAS management areas communities' social and health related experiences and perceptions.
(2) Blood serum study—examined the blood PFAS levels, biochemical markers of health, and PFAS exposure in the communities of the three PFAS management areas and in people living in three similar communities that had no known environmental PFAS contamination (referred to as 'comparison communities').
(3) Cross-sectional survey—examined the exposure history, physical, and mental health of the communities in the three PFAS management areas and the three comparison communities and compared the prevalence of self-reported physical and mental health outcomes between them.
(4) Data linkage study—comprised three studies that used historical health records to determine if the rates of adverse health outcomes were higher among those living in the three PFAS management areas than among those living in the comparison communities.[13]

2.18 Overall, the PFAS Health Study found:

- elevated blood serum concentrations of PFAS in residents and workers of the exposed communities.
- PFOS, perfluorohexane sulfonic acid (PFHxS) and perfluorooctanoic acid (PFOA) were detected in more than 80 per cent of blood samples in each community.
- Blood PFAS concentrations were higher in residents of the exposed communities than in residents of comparison communities, except for PFOA where concentrations were similar. PFOS and PFHxS were the main active ingredients of the firefighting foams that contaminated the environment of the exposed communities.

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[12] Australian National University, *PFAS Health Study: Overall summary*, December 2021, p. 2, in Professor Martyn Kirk, Dr Kayla Smurthwaite and Ms Susan Trevenar, *Submission 85* (47th Parliament).

[13] Australian National University, *PFAS Health Study: Overall summary*, December 2021, pp. 1–5, in Professor Martyn Kirk, Dr Kayla Smurthwaite and Ms Susan Trevenar, *Submission 85* (47th Parliament).

- Clear evidence of increased psychological distress in the three exposed communities in the PFAS Health Study.[14]

2.19 In their submission, Professor Kirk et al. noted that, apart from the findings on psychological distress, the evidence for other adverse health outcomes was generally limited, and the findings were consistent with international studies:

> An extensive data linkage study provided limited support for adverse health effects from living in an exposed community. While there were higher rates of some adverse outcomes in individual areas, they were rarely present in more than one community. Across different components of the PFAS Health Study, we observed associations between blood concentrations of PFAS and higher cholesterol levels, and between living in an exposed community and increased deaths due to heart disease.[15]

ABS National Health Measures Survey 2022–25

2.20 The Australian Government provided funding to the Australian Bureau of Statistics (ABS) to include PFAS biomarker testing as an indicator in the National Health Measures Survey (NHMS) as part of the Intergenerational Health and Mental Health Study. Collection of samples occurred over 2022–23, and results were released on 27 May 2025.

2.21 Mr James Eynstone-Hinkins, Head of Health Statistics, explained that the data 'will help to create a national baseline for levels of PFAS in the Australian population', will enable future monitoring, and will 'support further research into PFAS and the potential impacts of these chemicals on human health'.[16]

2.22 The ABS tested for 11 types of PFAS in people aged 12 years and over.[17] Three types of PFAS were detected in the blood of over 85 per cent of the Australian population, while six types were detected in less than 10 per cent of people. The remaining two types of PFAS had detection rates between 15 per cent and 45 per cent. In general, older people had higher PFAS levels, and PFAS levels were generally higher for males than for females.[18]

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14 Professor Martyn Kirk, Dr Kayla Smurthwaite and Ms Susan Trevenar, *Submission 85* (47th Parliament), p. 1.

15 Professor Martyn Kirk, Dr Kayla Smurthwaite and Ms Susan Trevenar, *Submission 85* (47th Parliament), pp. 1–2.

16 Australian Bureau of Statistics (ABS), *Media release: New ABS data on PFAS levels*, 27 May 2025 (accessed 9 July 2025).

17 PFAS tested were: Perfluorooctane sulfonic acid (PFOS); Perfluorooctanoic acid (PFOA); Perfluorohexane sulfonic acid (PFHxS); Perfluorononanoic acid (PFNA); Perfluoroheptane sulfonic acid (PFHpS); Perfluorodecanoic acid (PFDA); Perfluoroundecanoic acid (PFUnDA); Perfluoroheptanoic acid (PFHpA); Perfluorobutane sulfonic acid (PFBS); Perfluorohexanoic acid (PFHxA); and 6:2-Fluorotelomer sulfonic acid (6:2-FTS). See: ABS, *Per- and polyfluoroalkyl substances*, 27 May 2025 (accessed 10 November 2025).

18 ABS, *Media release: New ABS data on PFAS levels*, 27 May 2025.

2.23 As shown in Figure 2.1, the ABS found levels of the three most common PFAS (PFOS, PFHxS and PFOA) were 'generally highest in Europe, followed by the US, then Canada, and then Australia'. The ABS noted that these studies 'were undertaken at different times and have different methodologies', so any comparisons should be 'done with caution'.[19]

Figure 2.1 Mean PFAS serum or plasma levels of PFOS, PFOA, and PFHxS (ng/mL) from the NHMS and other international studies—Adults

	Australia 2022–24, 18 years and over	Canada 2018–19(a), 20–79 years	USA 2017–18(b), 20 years and over	Europe 2007–08 and onwards, adults
	Geometric mean and 95% confidence interval (ng/mL)			Mean(c) and range (ng/mL)
Perfluorooctane sulfonic acid (total PFOS)	1.76 (1.71, 1.80)	2.9 (2.7, 3.1)	4.50 (4.15, 4.89)	7.5 (1.7–27.4)
Perfluorohexane sulfonic acid (PFHxS)	0.74 (0.71, 0.77)	0.83 (0.75, 0.93)	1.11 (1.03, 1.21)	4.94 (0.2–152)
Perfluorooctanoic acid (PFOA)	0.84 (0.83, 0.86)	1.2 (1.1, 1.3)	1.45 (1.35, 1.56))	2.1 (0.76–4.9)

Source: ABS, Per- and polyfluoroalkyl substances, Data download: Information on serum levels of per- and polyfluoroalkyl substances (PFAS) for people aged 12 years and over, 27 May 2025.

2.24 According to the ABS, mean total PFOS levels were higher for older age groups, with persons aged 75 years and over recording the highest mean total PFOS level of 3.62 ng/mL. Amongst people aged 18 years and over, males had a higher mean total PFOS level than females in every age group except people aged 75 years and over. The ABS also observed that 'PFAS levels have been reported to be declining in humans in the last two decades in North America and Europe', and the Australian results support this trend.[20]

2.25 As part of its research, the ABS looks for associations between high PFAS levels and chronic disease biomarkers. The ABS was careful to point out that an 'association' to a chronic disease biomarker does not mean a 'direct cause', and that its analysis did not control for all factors known to influence PFAS levels. Nevertheless, the ABS provided the following information regarding PFOS and PFOA levels, and biomarkers of chronic disease:

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[19] ABS, Per- and polyfluoroalkyl substances, *Data download: Information on serum levels of per- and polyfluoroalkyl substances (PFAS) for people aged 12 years and over*, 27 May 2025 (accessed 10 November 2025).

[20] ABS, Per- and polyfluoroalkyl substances, *Data download: Information on serum levels of per- and polyfluoroalkyl substances (PFAS) for people aged 12 years and over*, 27 May 2025.

In 2022–24, the mean total PFOS level for people aged 18 years and over was higher for people with:

- an abnormally high total cholesterol level, compared to those with a normal total cholesterol level (2.03 ng/mL of total PFOS compared to 1.65 ng/mL)
- diabetes compared to those without diabetes (2.40 ng/mL of total PFOS compared to 1.78 ng/mL)
- an abnormally low estimated glomerular filtration rate[21] (eGFR), compared to those with a normal eGFR (3.14 ng/mL of total PFOS compared to 1.70 ng/mL)
- albuminuria[22], compared to those who did not have albuminuria (1.98 ng/mL of total PFOS compared to 1.75 ng/mL).

…

In 2022–24, the mean total PFOA level was higher for people aged 18 years and over with an abnormally high total cholesterol level than those with a normal total cholesterol level (0.94 ng/mL of PFOA compared to 0.81 ng/mL). This was also true for the following age groups:

- people aged 45–54 years (0.89 ng/mL of PFOA compared to 0.77 ng/mL)
- people aged 55–64 years (1.16 ng/mL of PFOA compared to 0.97 ng/mL).[23]

2.26 While some associations may be observed, the ABS analysis could not control for all factors known to influence PFAS levels, nor for all factors known to influence chronic disease. As such, the ABS concluded 'it is not possible to determine from this analysis if higher PFAS levels are related to an increased risk of chronic disease'.[24]

FSANZ guidance values and total diet study

2.27 Food Standards Australia New Zealand (FSANZ) is a statutory authority responsible for developing food standards for Australia and New Zealand. It is

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21 Estimated glomerular filtration rate is a calculation used to estimate how well your kidneys are filtering certain agents produced by your body. National Kidney Foundation, *Estimated Glomerular Filtration Rate (eGFR)*, 13 July 2022 (accessed 15 July 2025).

22 Albuminuria is a symptom of many different types of kidney disease and a significant risk factor for complications. National Kidney Foundation, *Albuminuria (proteinuria)*, 19 July 2023 (accessed 15 July 2025).

23 ABS, Per- and polyfluoroalkyl substances, *Data download: Information on serum levels of per- and polyfluoroalkyl substances (PFAS) for people aged 12 years and over*, 27 May 2025.

24 ABS, Per- and polyfluoroalkyl substances, *Data download: Information on serum levels of per- and polyfluoroalkyl substances (PFAS) for people aged 12 years and over*, 27 May 2025.

a standards-setting body, rather than a regulator and has no jurisdiction over food harvested or grown for personal consumption.[25]

2.28 FSANZ undertakes risk analysis based on hazard (the potential of a substance to cause harm or toxicity) and exposure (the levels of the substance in food and how much food containing the substance is consumed in the diet). FSANZ is responsible for developing PFAS guidelines for food intake.[26]

2.29 In June 2016, the Department of Health commissioned FSANZ to develop Health Based Guidance Values for PFOS, PFOA and PFHxS. The Australian Health Based Guidance Values, 'expressed as tolerable daily intakes [TDIs], indicate the amount of a chemical in food or drinking water that a person can consume regularly over a lifetime without any significant risk to health'.[27]

2.30 The TDIs for PFAS were derived from the results of toxicity studies in laboratory animals.[28]

2.31 FSANZ established the following tolerable daily intakes for PFAS chemicals measured as nanograms (one billionth of a gram) per kilogram of body weight per day, or ng/kg bw/day:

- PFOS: 20 ng/kg bw/day;
- PFOA: 160 ng/kg bw/day;
- PFHxS: FZANZ noted that while there was insufficient toxicological information to establish a TDI for PFHxS, the tolerable daily intake established for PFOS would be sufficiently protective for PFHxS and therefore can be applied to the sum of PFOS and PFHxS.[29]

2.32 For comparison, in 2020, the European Food Safety Authority's (EFSA) published their Tolerable Weekly Intake (TWI) at 4.4 nanograms per kilogram of body weight per day for the combined sum of 4 PFAS compounds (PFOS, PFOA, PFHxS and PFNA). This converts to 0.63 nanograms per kilogram of

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25 Food Standards Australia New Zealand, *Submission 70* (47th Parliament), p. 2; Food Standards Australia and New Zealand, response to written questions from Senator Thorpe (received 11 July 2025).

26 Food Standards Australia New Zealand, *Submission 70* (47th Parliament), p. 2; see also CSIRO, *Submission 22* (47th Parliament), p. 8.

27 Australian Government Department of Health and Aged Care, *Submission 100* (47th Parliament), p. 3.

28 Australian Government, Department of Health, *Health Based Guidance Values for PFAS,* July 2022, p. 2 (accessed 2 October 2025).

29 Food Standards Australia New Zealand, *Submission 70* (47th Parliament), p. 3.

body weight per day for the combined consumption of all four compounds (PFOA, PFNA, PFHxS, and PFOS) in food.[30]

2.33 As demonstrated in Table 2.1, the equivalent tolerable daily intakes established by the EFSA are much lower than the amounts established by FSANZ. While FSANZ did not comment directly on these differences, it did note that it 'does not routinely consider non-dietary exposure pathways because food standards are established specifically for food', suggesting that Australia's tolerable daily intakes for PFAS do not take into account potential accumulation of PFAS exposure from a variety of sources.[31]

Table 2.1 Table comparing TDIs established by FSANZ and EFSA

	TDIs established by FSANZ (nanograms per kilogram of body weight per day)	**TDIs established by EFSA (nanograms per kilogram of body weight per day)**
PFOS	20 ng/kg bw/day	0.63 ng/kg bw/day for the sum of PFOA, PFNA, PFHxS and PFOS
PFOA	160 ng/kg bw/day	
PFHxS	**FSANZ does not currently provide a TDI for PFHxS*	
PFNA	**FSANZ does not currently provide a TDI for PFNA*	

Source: FSANZ, Submission 70, p.3; European Food Safety Authority, Risk to human health related to the presence of perfluoroalkyl substances in food, 2020, p. 157.

2.34 The trigger points established by FSANZ could be used to assist 'relevant authorities in undertaking site assessments and providing advice to communities impacted by localised PFAS contamination'.[32]

2.35 Noting that Australia's tolerable daily intakes for PFAS are set significantly higher than those of the European Union, FSANZ analysed levels of PFAS in the Australian food supply. FSANZ submitted that its 27th Australian Total Diet Study released in December 2021 'showed PFAS levels in the Australian food

30 European Food Safety Authority, *Risk to human health related to the presence of perfluoroalkyl substances in food*, 2020, p. 157 (accessed 10 July 2025).

31 Food Standards Australia and New Zealand, response to written questions from Senator Thorpe (received 11 July 2025), [p. 1].

32 Food Standards Australia New Zealand, *Submission 70* (47th Parliament), p. 3.

supply are very low and there are no public health and safety concerns for the general population.[33]

2.36 FSANZ also submitted that 'based on the scientific evidence gathered to date, there is no need to establish regulatory limits for PFAS in any foods'.[34] However, some submitters noted that this research was not focused on food products emerging from PFAS contamination hotspots, where food production may still be occurring, and where locals may be exposed to a higher volume of contaminated produce.[35]

2.37 To support the 27th Australian Total Diet Study, FSANZ also reviewed studies of the potential for PFAS to affect the human immune system (the PFAS and immunomodulation review). FSANZ 'evaluated the relationship between PFAS and immune response to vaccinations, susceptibility to infections, and hypersensitivity responses, including allergy'. FSANZ published its findings in December 2021. It concluded that, despite some statistical associations, there was 'a lack of consistent evidence that PFAS at levels of environmental exposure were harmful to the human immune system'.[36] A number of inquiry participants, including toxicologists, disputed this assertion. Their evidence is discussed further on in this chapter.

2.38 Some submitters argued that FSANZ's tolerable daily intakes were outdated and did not align with stricter international standards set out by bodies such as the European Union or the United States Environmental Protection Agency (US EPA). For example, the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (crcCARE) submitted that the tolerable daily intakes established by FSANZ are, 'almost three hundred (300) times higher' than the limits established in 2020 by the EFSA.[37] (See also the comparison in Table 2.1 above).

2.39 Environmental campaigner, Ms Tracey Anton claimed that 'the biggest threat to victims of contamination in food growing areas is FSANZ's declaration that PFAS is safe at a ridiculously higher level than global levels'.[38]

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33 Food Standards Australia New Zealand, *Submission 70* (47th Parliament), p. 3; see also Australian Government Department of Health and Aged Care, *Submission 100* (47th Parliament), p. 4.

34 Food Standards Australia New Zealand, *Submission 70* (47th Parliament), p. 3; see also Australian Government Department of Health and Aged Care, *Submission 100* (47th Parliament), p. 4.

35 See, for instance: Tracey Anton, *Submission 128* (47th Parliament), p. 8.

36 Food Standards Australia New Zealand, *Perfluorinated compounds*, 3 June 2025 (accessed 10 November 2025); see also Food Standards Australia New Zealand, *PFAS and Immunomodulation: Review and Update*, December 2021 (accessed 10 November 2025).

37 crcCARE, *Submission 36* (47th Parliament), p. 19.

38 Tracey Anton, *Submission 128* (47th Parliament), p. 11.

2.40 FSANZ responded to Ms Anton's criticism of its Health Based Guidance Values (HBGVs) by noting:

> HGBVs are not standards but guidance values used specifically to characterise food-related health risks. FSANZ continues to undertake regular reviews of new scientific evidence to ensure the HBGVs for PFOA, PFOS and PFHxS remain health protective for consumers.[39]

2.41 In June 2025, the committee asked FSANZ if it intended to conduct an updated review of acceptable levels of human PFAS consumption through food (the last review being in 2021). FSANZ responded:

> FSANZ is confident the TDIs for PFAS chemicals in food remain health protective and notes that the outcomes of the 27th Australian Total Diet Study demonstrated Australian consumers' exposure to PFAS through food is very low and poses no food safety concerns.[40]

2.42 Nevertheless, FSANZ reiterated its commitment to continually reviewing scientific evidence as it is made available, affirming that it would consider establishing regulatory limits on PFAS in food if the evidence supported such an action.[41]

2.43 FSANZ also outlined its intention to contribute to the 'future independent, international review of PFAS by the Joint Food and Agricultural Organisation of the United Nations (FAO)/World Health'. The review will examine if there is a need to provide international HBGVs for PFAS.[42]

2.44 Finally, FSANZ noted that the values it derives for acceptable PFAS consumption solely consider dietary exposure pathways. In other words, FSANZ has not considered non-dietary exposure pathways of PFAS (such as through dermal absorption or inhalation) as 'ingestion via food and water' is considered the primary exposure route for PFAS. While other exposure routes are deemed less significant, FSANZ stated that if the data is available, it is willing to consider other sources of exposure to aid in a holistic quantification of PFAS exposure.[43]

Minderoo Foundation research

2.45 Some inquiry participants spoke about research and reviews their organisations have conducted. For example, Emeritus Professor Sarah Dunlop, Head of

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39 Food Standards Australia and New Zealand, Response to Submission 128 (47th Parliament), [p. 2].

40 Food Standards Australia and New Zealand, response to written questions from Senator Thorpe (received 11 July 2025), [p. 1].

41 Food Standards Australia and New Zealand, Response to Submission 128 (47th Parliament), [p. 2].

42 Food Standards Australia and New Zealand, response to written questions from Senator Thorpe (received 11 July 2025), [p. 1].

43 Food Standards Australia and New Zealand, response to written questions from Senator Thorpe (received 11 July 2025), [p. 1].

Plastics and Human Health at the Minderoo Foundation, described the process of conducting an 'umbrella review':

> By looking at systematic reviews, which statistically combine all the data, and then doing an umbrella review, which systematically reviews the systematic reviews, we finally got there after four years work … What that does is look at the level of the literature of the systematic reviews—someone else has already synthesised them—and then it looks at the balance sheet of those systematic reviews. It's essentially a sort of vote-counting method where you say, 'Yes, there is an impact,' and, 'No, there isn't.' … The other really important thing about this methodology is to make sure that you take all the evidence into account for harm, no harm or even being protective of health. … That's how, after about four years, we got to publishing the umbrella review.[44]

2.46 The Minderoo Foundation umbrella review found:

> … consistent and statistically significant evidence of harm to health from PFAS: reduced birth weight and length—these are adverse outcomes which, in turn, lead to poor outcomes later in life—poor cognitive development; chronic diseases such as respiratory disease, heart disease and diabetes; lower lifetime earnings; an increased risk of ADHD in girls and of hay fever and obesity in children; and altered thyroid function in adults. There's other research which has identified risks to kidney and testicular cancer and has also identified, concerningly, reduced response to vaccines.[45]

International research

2.47 This section briefly charts the history surrounding research into the health effects of PFAS, including the role of industry research. It then presents some of the international research on PFAS exposure and health effects. Several inquiry participants noted that a range of international bodies using several lines of evidence have now classified certain PFAS as carcinogenic.

Delayed start to independent research on the health effects of PFAS

2.48 The committee received evidence that industry reluctance to fully investigate and publish potentially adverse findings with respect to the health effects of PFAS was an important factor in the decades-long delay before independent scientific studies began.

2.49 Senior Research Fellow at the School of Pharmacy at the University of Sydney, Dr Nicholas Chartres told the committee that empirical studies have 'shown that the main manufacturers and sellers of PFOA and PFOS in the United States

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[44] Emeritus Professor Sarah Dunlop, Head, Plastics and Human Health, Minderoo Foundation, *Committee Hansard*, 12 March 2025, p. 21.

[45] Emeritus Professor Sarah Dunlop, Head, Plastics and Human Health, Minderoo Foundation, *Committee Hansard*, 12 March 2025, p. 21.

(US)—3M and DuPont—suppressed the science from regulatory agencies for decades'.[46]

2.50 Professor Philippe Grandjean from the University of Southern Denmark and the University of Rhode Island submitted that it was remarkable how late industry knowledge on PFAS toxicity and environmental dissemination was disclosed to the public and how few in-depth studies the industry had undertaken to reveal and understand any risks associated with PFAS products and hazardous exposures:[47]

> Manufacturers of PFAS and PFAS-containing products knew already decades ago about the highly toxic qualities of PFASs, their environmental and biological persistence, and their capacity to inflict harm on human beings at low levels of exposure. Because internal information was eventually released only two decades ago, public knowledge on dissemination and adverse effects happened at a substantial delay.[48]

2.51 For example, in 1956 researchers at Stanford University detected PFOA bound to human serum proteins. In 1968, the first report suggesting 'the general population was exposed to fluorine-substituted organic compounds' was published in *Nature*.[49]

2.52 Although 'a few major producers of PFAS undertook or sponsored some exploration of PFAS properties in the 1970s and 1980s', Professor Grandjean submitted that certain findings remained unpublished and follow-up studies were not commissioned.[50]

2.53 Apparently, 3M, a major producer of PFAS first discovered that PFAS was transferred in milk in a study on lactating goats in 1993. However, it appears that 3M decided not to publish the results and 'did not follow up with analyses of human milk to establish the potential implications of this discovery'.[51] Further, when company-based articles began appearing in the late 1990s and after 2000, 'they tended to reach optimistic conclusions that appear not to be justified by the data underlying the study'.[52]

2.54 The committee received submissions from US-based multinational, 3M Company, and 3M Australia. While praising the beneficial qualities of PFAS

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46 Dr Nicholas Chartres, Senior Research Fellow, School of Pharmacy, Faculty of Medicine and Health, University of Sydney, *Committee Hansard*, 22 January 2025, p. 1.

47 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 4.

48 Professor Philippe Grandjean, *Submission 51* (47th Parliament), pp. 1–2.

49 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 4.

50 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 4.

51 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 5.

52 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 4.

in its submission, 3M Company acknowledged the reality of 'changing stakeholder expectations' and 'regulatory trends' against the continued use of PFAS. 3M Company submitted that it is completely phasing out the manufacture of PFAS—expecting to achieve this by the end of 2025—and has since invested in research on remediating and treating PFAS.[53]

2.55 Similarly, 3M Australia argued that PFAS have many uses in society; some of which are essential. 3M Australia noted that PFAS in the environment may come from many sources—not only firefighting foams. Some of these other sources included the fabric and carpet protection products, Scotchgard and Scotchban, which were sold by 3M Australia.[54]

2.56 Neither 3M Company or 3M Australia acknowledged the existence of early company research on the risks of PFAS in their submissions.

2.57 US attorney, Robert Bilott—who has been researching and litigating around the impacts of PFOS since 1998—told the committee he has read 'literarily millions' of pages of internal documents from the makers of PFAS chemicals 'which make it pretty clear that the dangers and risks of these chemicals were well known decades and decades ago'. Mr Bilott explained that early animal studies, worker studies, and human data 'going back decades' were withheld by the companies that produced PFAS, while the chemicals were 'pumped out into the world into an incredible array of products', such as Teflon, Scotchgard and firefighting foams.[55]

2.58 According to Mr Bilott, manufacturing company DuPont had to be compelled to support a large-scale independent study into the health impacts of PFOA. This was finally done in 2004 as part of the litigation process for a case on behalf of thousands of people exposed to PFOA from a manufacturing plant in West Virginia. Mr Bilott described the process:

> We and DuPont jointly selected three independent world-class scientists who were then tasked with looking at all the existing data—the animal studies, the worker studies and not just what was published and peer reviewed but also these internal studies that had been withheld and covered up—and were tasked with doing new studies of the community that was drinking this in their water out in West Virginia. We ended up being able to do new studies of tens of thousands of people in that community in the United States. Almost 69,000 people participated in those massive human health studies that were created, some of the largest human health studies ever done on any chemical anywhere … After seven years of this study, this panel conclusively confirmed in 2013 that drinking PFOA had probable links with six different diseases, including testicular cancer and kidney cancer. When that data was confirmed we provided it to the top regulatory

53 3M Company, *Submission 71*, pp. 1–3.

54 3M Australia, *Submission 87*, pp. 2–3.

55 Mr Robert Bilott, Private capacity, *Committee Hansard*, 11 June 2025, p. 1.

> authorities in the United States, and, at that point, we finally started the process of regulating these chemicals in the US—but that took another 10 years.[56]

2.59 Consequently, even though PFAS production began more than 70 years ago, independent publication on PFAS toxicity only started in earnest about 20 years ago.[57] According to Professor Grandjean, the public health implications of a failure to conduct and publish early studies only became apparent many years later when independent research was published.[58]

Recent international findings

2.60 The International Agency for Research on Cancer (IARC) at the World Health Organization uses a hazard classification to indicate the level of certainty that a substance can cause cancer. For example, the Group 1 category indicates an agent is carcinogenic to humans: there is sufficient evidence for cancer in humans. The Group 2B category indicates an agent is possibly carcinogenic to humans: there is limited evidence in humans and less than sufficient evidence in experimental animals.[59]

2.61 Amongst others, the Department of Health noted that, in November 2023, the IARC classified PFOA as Group 1—carcinogenic to humans, and PFOS as Group 2B—possibly carcinogenic to humans.[60]

2.62 In its submission to the inquiry—provided in December 2024—the Department of Health and Aged Care Interim Australian Centre for Disease Control maintained that 'the detailed information needed to interpret the International Agency for Research on Cancer's findings' has not been made available, but the department 'will consider the updated classification once the full article is available as part of its existing work on updating Australian advice in line with the new scientific evidence'.[61] The IARC published this detailed research in

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56 Mr Robert Bilott, Private capacity, *Committee Hansard*, 11 June 2025, pp. 1–2.

57 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 4.

58 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 5.

59 International Agency for Research on Cancer, World Health Organization, *IARC Monographs Hazard Classification*, 16 June 2023 (accessed 11 November 2025).

60 See: Australian Government Department of Health and Aged Care, *Submission 100* (47th Parliament), p. 5; Professor Denis O'Carroll, *Submission 1* (47th Parliament), p. 1; Queensland Alliance of Environmental Health Sciences, University of Queensland, *Submission 112* (47th Parliament), p. 1; Dr Nicholas Chartres, Senior Research Fellow, School of Pharmacy, Faculty of Medicine and Health, University of Sydney, *Committee Hansard*, 22 January 2025, p. 1; Cancer Council, *Submission 62* (47th Parliament), p. 3.

61 Department of Health and Aged Care Interim Australian Centre for Disease Control, *Submission 100* (47th Parliament), pp. 5–6.

February 2025. The committee is unaware whether the Department of Health has since considered it.[62]

2.63 Dr Chartres told the committee about the growing global scientific consensus on the human health effects of PFAS exposure and the multiple streams of evidence used to support the conclusions:

> In the last four years, three world-leading authoritative bodies—the International Agency for Research on Cancer, the National Academies of Sciences, Engineering and Medicine and the US Environmental Protection Agency—have all established that PFOA and PFOS are carcinogens and are associated with multiple health effects, including heart disease, neurological effects and developmental effects. Many of these reviews relied on state-of-the-art systematic review methods to evaluate the evidence that had been widely used in clinical sciences throughout the world to inform billions of dollars of healthcare spending. Importantly, these agencies use multiple streams of evidence—human, animal and in vitro studies—to come up with these conclusions.[63]

2.64 Professor Denis O'Carroll also pointed to negative health findings by the Agency for Toxic Substances and Disease Registry (ATSDR), a US government, non-regulatory, environmental public health agency overseen by the US Department of Health and Human Services.[64]

2.65 While the US ATSDR noted that research is ongoing to understand the mechanisms of PFAS toxicity, the epidemiological evidence suggests associations between increases in exposure to (specific) PFAS and certain health effects. However, the risk of health effects associated with PFAS depend on:

- Exposure factors (for example, dose, frequency, route, and duration).
- Individual factors (for example, sensitivity and disease burden).
- Other determinants of health (for example, access to safe water and quality healthcare).[65]

2.66 The US ATSDR also notes that studies on laboratory animals may help scientists understand whether PFAS will harm people. Studies have found PFAS can cause damage to the liver and immune system, as well as low birth weight, birth defects, delayed development, and newborn deaths in laboratory animals.

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62 International Agency for Research on Cancer, *IARC Monographs Volume 135: Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS)*, 14 February 2025 (accessed 22 October 2025). The research is available here: https://publications.iarc.who.int/636.

63 Dr Nicholas Chartres, Senior Research Fellow, School of Pharmacy, Faculty of Medicine and Health, University of Sydney, *Committee Hansard*, 22 January 2025, p. 1.

64 Professor Denis O'Carroll, *Submission 1* (47th Parliament), p. 1; see United States Government, Agency for Toxic Substances and Disease Registry, *PFAS and your health*, 12 November 2024 (accessed 11 November 2025).

65 United States Government, Agency for Toxic Substances and Disease Registry, *PFAS and your health*, 12 November 2024.

However, there are caveats to these studies. First, the dosage levels in most laboratory animal studies are higher than human environmental exposure. Second, humans and animals react differently to PFAS, and not all effects observed in animals may occur in humans.[66]

2.67 Mr Bilott said it is 'frustrating' for him to have spent decades working with US regulators, 'and have finally gotten to this point where the science is pretty clear'. And yet other countries, including Australia, continue to say:

> 'We just don't know enough yet. There needs to be more science. It's not clear whether there are really any links with disease.' That's simply not accurate. It's simply inconsistent with what the science has actually shown and what's gone on in the last 20 years.[67]

2.68 Mr Bilott observed that, while the US and Australia are dealing with the exact same chemicals, Australian regulators continue to insist that Australian data is required. He added that PFOS and PFOA are:

> … in the water in Australia. The science is the same. I see these submissions from people who are saying, 'Well, we actually need to collect more data from people in Australia to see if we're seeing this here.' You've already got studies of tens of thousands of people from the United States that show this.[68]

2.69 Ms Anton, made a similar observation, saying:

> Australia does not need to conduct our own scientific studies to prove adverse health impacts are consistently associated with high PFAS exposures because the independent international science fraternity has already established that and only Australia appears to be disputing it. Both cannot be correct so don't waste any more time and resources on research that has already been done.[69]

2.70 Asked to comment on recent international findings around PFAS and human health, Assistant Secretary, Department of Health, Disability and Ageing, Mr Stephen Bouwhuis said the department is 'looking at the international evidence' including the IARC report, 'looking at what other countries are doing', and feeding this information into Australia's formal PFAS guidance.[70]

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66 United States Government, Agency for Toxic Substances and Disease Registry, *PFAS and your health*, 12 November 2024.

67 Mr Robert Bilott, Private capacity, *Committee Hansard*, 11 June 2025, p. 2.

68 Mr Robert Bilott, Private capacity, *Committee Hansard*, 11 June 2025, p. 2.

69 Tracey Anton, response to written questions from Senator Thorpe (received 23 June 2025), [p. 4].

70 Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 10 June 2025, p. 39.

Australian Government guidance and plans for review

2.71 The Australian Government Department of Health, Disability and Ageing (formerly the Department of Health and Aged Care) provides high level national health guidance on PFAS.[71]

2.72 Several health portfolio agencies contribute to the development of national PFAS health advice and policy, including:

- the National Health and Medical Research Council (NHMRC);
- Food Standards Australia New Zealand (FSANZ);
- the Australian Industrial Chemicals Introduction Scheme (AICIS); and
- the Therapeutic Goods Administration (TGA).[72]

2.73 In its submission, the National Health and Medical Research Council (NHMRC) summarised the current Commonwealth consensus on evidence relating to the health effects of PFAS:

> To date the evidence on health effects of PFAS has been uncertain, draws on a mix of animal and human studies, and can be interpreted in different ways depending on the choice of health outcome (endpoints) used, methodologies, assumptions and other factors. PFAS exposure in humans has been associated with health effects such as mildly elevated levels of cholesterol (confirmed by the 2021 Australian National University (ANU) PFAS Study), effects on kidney function and on the levels of some hormones. However, these effects are small and largely within ranges seen in the general population. The ANU PFAS study confirmed the findings of the Australian Government Expert Health Panel which determined that a range of public health impacts had been identified in international studies, but the impacts were generally small.[73]

2.74 In its interim report, the committee outlined the Environmental Health Standing Committee (enHealth) PFAS Guidance Statement which was provided as part of the submission by the then Department of Health and Aged Care. The enHealth Guidance Statement represents Australia's 'official position' on the health impacts of PFAS; it states:

> PFAS exposure has been associated with the following effects:
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> - increased levels of cholesterol in the blood
> - increased levels of uric acid in the blood
> - reduced kidney function
> - alterations in some indicators of immune function
> - altered levels of thyroid hormones and sex hormones

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71 Australian Government Department of Health and Aged Care, *Submission 100* (47th Parliament), p. 3.

72 Australian Government Department of Health and Aged Care, *Submission 100* (47th Parliament), p. 3.

73 National Health and Medical Research Council, *Submission 57* (47th Parliament), p. 3.

> - later age for starting menstruation (periods) in girls, and earlier menopause
> - lower birth weight in babies.
>
> However, these differences have generally been small and are unlikely to be important to health outcomes.
>
> …
>
> An association means that there is a relationship between PFAS exposure and the above health effects. This does not mean that the PFAS exposure caused the health effect. A causative relationship between the above health effects and PFAS exposure has not been established to date.
>
> …
>
> Whilst PFAS has not definitely been shown to be a cause of disease in humans, enHealth notes that the science and our understanding of these issues will continue to evolve.[74]

2.75 In contrast, the US and many European countries have a different interpretation of the scientific evidence on PFAS and human health than the Australian Government. For example, the US Environmental Protection Agency (US EPA) lists the following as 'what we know about health effects':

> Current peer-reviewed scientific studies have shown that exposure to certain levels of PFAS may lead to:
>
> - Reproductive effects such as decreased fertility or increased high blood pressure in pregnant women.
> - Developmental effects or delays in children, including low birth weight, accelerated puberty, bone variations, or behavioral changes.
> - Increased risk of some cancers, including prostate, kidney, and testicular cancers.
> - Reduced ability of the body's immune system to fight infections, including reduced vaccine response.
> - Interference with the body's natural hormones.
> - Increased cholesterol levels and/or risk of obesity.[75]

2.76 Mr Bouwhuis told the committee that state-based regulators have reported that they rely upon the enHealth Guidance Statement on PFAS (updated in February 2024), which consolidated the Australian Government's PFAS health guidance and included updates from the ANU PFAS Health Study and the FSANZ 27th Australian Total Diet Study.[76]

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[74] Environmental Health Standing Committee, *enHealth guidance statement—Per- and polyfluoroalkyl Substances (PFAS)*, 2024, p. 4.

[75] US EPA, *Our Current Understanding of the Human Health and Environmental Risks of PFAS*, last updated 26 November 2024 (accessed 11 November 2025).

[76] Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 10 June 2025, p. 36.

2.77 Mr Bouwhuis noted that, despite the current consensus that the potential health impacts of PFAS are likely to be small, the enHealth Guidance Statement on PFAS advises 'a precautionary approach, recommending that exposure is minimised where possible because PFAS persists for a long time in humans and the environment'.[77]

2.78 The enHealth guidance, and the assumptions that underlie it, informs many decisions made by government departments and entities. For instance, when asked why the Commonwealth Health Department does not provide explicit advice to people to avoid consumer products containing PFAS, Mr Bouwhuis said:

> … that ABS study goes to the levels found in people's blood and that was generally below one nanogram per millilitre, off the top of my head, which is not enough to cause any discernible level of risk to people. That's a very low level of PFAS within a blood supply, so it shouldn't cause concern, and that is bioaccumulated over time—so, obviously, that's a person's lifetime exposure to PFAS.[78]

2.79 Evidence received over the course of the inquiry indicated that the government is considering updating its advice on PFAS and human health.

2.80 The NHMRC recently reviewed and updated the 2018 Guideline Recommendations for PFAS concentrations in drinking water. The update incorporates 'a comprehensive review of the latest scientific evidence on PFAS in drinking water for the Australian context, including both national and international scientific reviews'. The new guidelines—published 25 June 2025—stipulate significantly lower allowable concentrations of PFOS, PFOA and PFHxS in Australia's drinking water (see Chapter 7 for discussion).[79]

2.81 Asked to comment on the role of emerging evidence, the Department of Health submitted, 'emerging evidence has not changed enough to state with a degree of confidence that any particular form of PFAS causes any particular disease'.[80]

2.82 Nevertheless, the committee was told that the Department of Health is also conducting a review of PFAS evidence. Mr Bouwhuis said he anticipates that this review will 'feed into a revised enHealth guidance', likely to be finalised later in 2025:

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77 Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 10 June 2025, p. 36.

78 Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 10 June 2025, p. 42.

79 NHMRC, *Updated Australian Drinking Water Guidelines*, 25 June 2025 (accessed 9 July 2025)

80 Department of Health, Disability and Ageing, responses to written questions from Senator Thorpe—science and regulations (received 28 July 2025), [p. 1].

> The enHealth guidance was updated recently in February 2024 but there's a recognition by the enHealth committee of the need to update that further. We are pulling together some analysis of the literature on PFAS and the different studies to inform enHealth ahead of their consideration, should there be a need to update the guidance—which that committee has recognised there is a need to do.[81]

2.83 The Department of Health confirmed this on notice, saying:

- Since the release of the Expert Health Panel's report in 2018, there has been ongoing public interest in PFAS exposure, and recent international developments such as the outcomes of the International Agency for Research on Cancer (IARC) evaluation of PFOA and PFOS highlighted the need to review the latest developments in the health science on PFAS.
- In addition, the 2022 Parliamentary Inquiry into PFAS remediation in and around Defence bases and the 2024 Independent Review of land uses around key Defence bases impacted by PFAS contamination both reference the need for expert advice.
- To address these ongoing concerns, the department engaged Allen + Clarke Pty Ltd to conduct a review of domestic and international PFAS health advice since the release of Expert Health Panel report in 2018, taking into account international health advice on PFAS, the work done by the NHMRC for the review of the Australian Drinking Water Guidelines, and the work produced by the IARC.
- The Environmental Health Standing Committee (enHealth) independently decided to review the enHealth Guidance Statement of PFAS given developments since February 2024, including the revised PFAS values in the Australian Drinking Water Guidelines and the work produced by the IARC. It is anticipated the enHealth review will be completed by the end of 2025.[82]

Views of inquiry participants

2.84 Many inquiry participants argued that Australia's official stance on the science surrounding PFAS and human health is outdated and fails to incorporate recent international findings. Current Australian government guidance on PFAS and human health notes that PFAS exposure has been *associated with* a number of effects (outlined earlier in this chapter), but states that these effects 'are unlikely to be important to health outcomes'. Nevertheless, the enHealth Guidance Statement acknowledges that 'the science and our understanding of these issues will continue to evolve' and recommends PFAS exposure be minimised.[83]

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81 Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 10 June 2025, p. 38.

82 Department of Health, Disability and Ageing, response to written questions from Senator Thorpe—blood testing and enHealth guidance (received 6 August 2025), [p. 1].

83 enHealth, *Per- and Polyfluoroalkyl Substances (PFAS) enHealth Guidance Statement*, updated February 2024, p. 4.

2.85 The committee received a range of views from inquiry participants—many of whom are scientists—on:

- the accumulation of PFAS in human and animal bodies over time;
- epidemiological and other evidence regarding the health effects of PFAS;
- levels of human PFAS exposure currently deemed safe; and
- the need to establish a range of monitoring programs and comprehensive longitudinal studies.

2.86 This section presents submitters' and witnesses' views on bioaccumulation, epidemiological evidence about the health effects of PFAS exposure, human health effects of PFAS exposure, and potential safe levels of PFAS in the environment.

PFAS bioaccumulation in animals and humans

2.87 Several submissions drew attention to the build-up, known as bioaccumulation, of PFAS in human and animal bodies.

2.88 Dr Cameron Shearer, lecturer in chemistry, submitted that because PFAS does not have 'a natural degradation pathway', it has been accumulating in the environment since it was first made so that contamination is now globally pervasive.[84]

2.89 Dr Chartres spoke to the pervasive nature of PFAS exposure, its bioaccumulation, and the unknown cumulative effects on human health:

> It is likely that every single person in this room has PFAS in their blood at this moment in time. Governments around the world cannot tell you what the likely source of that exposure is, how much is in our environment or what the cumulative effects of these chemicals are. PFAS are persistent. They don't leave our environment for several decades, and they bioaccumulate, building up in our bodies over time.[85]

2.90 The Australian Academy of Health and Medical Sciences explained that the durability and persistence of PFAS chemicals in the environment means they can accumulate in human and animal bodies. The resulting bioaccumulation means that PFAS 'concentrations within a person's body can be higher than is measured in their surrounding environment'.[86] Further, 'the effects of individual

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84 Dr Cameron Shearer, *Submission 49* (47th Parliament), p. 1; see also Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 2.

85 Dr Nicholas Chartres, Senior Research Fellow, School of Pharmacy, Faculty of Medicine and Health, University of Sydney, *Committee Hansard*, 22 January 2025, p. 1.

86 Australian Academy of Health and Medical Sciences, *Submission 35* (47th Parliament), p. 2; see also Dr Cameron Shearer, *Submission 49* (47th Parliament), p. 1.

chemicals cumulate even when they occur in low concentrations, often as part of complex chemical mixtures'.[87]

Views on the epidemiological evidence

2.91 The science about the health effects of PFAS is evolving rapidly. The committee heard that, 20 years ago there were one or two papers a year on the subject of the interaction between PFAS and human health; whereas now, more than 100 papers are published annually.[88]

2.92 However, the committee also heard there are substantial obstacles to obtaining causal scientific evidence that could prove PFAS causes adverse health effects, including cancers, but that a precautionary approach is warranted.

2.93 Professor Kirk, whose team conducted the ANU study, told the committee that trying to assess health effects associated with chemical exposure is 'quite difficult', as health effects may occur long after exposure. Further complications arise because many other factors that determine health may also be involved.[89]

2.94 The Australian Academy of Health and Medical Sciences noted that 'confirming and quantifying' the potential risks of PFAS is challenging and complex:

> Identifying the extent of PFAS bioaccumulation across the Australian population and then investigating the connection between PFAS exposure and health outcomes, requires adequate monitoring of the levels of a wide range of chemical contaminants that co-accumulate in the human body.[90]

2.95 Professor Kirk also emphasised the complexity in determining causal relationships between exposure and health effects, including demonstrating a dose response (that is, the more exposure, the greater the risk of disease) and being able to repeat the findings.[91]

2.96 Much of the uncertainty around the health findings arises because the small number of people highly exposed to PFAS precludes the typical large-scale epidemiological studies comprising many tens of thousands of individuals.[92]

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87 Australian Academy of Health and Medical Sciences, *Submission 35* (47th Parliament), p. 3.

88 See Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, p. 32.

89 Professor Martyn Kirk, National Centre for Epidemiology and Population Health, Australian National University, *Committee Hansard*, 13 November 2024, p. 27.

90 Australian Academy of Health and Medical Sciences, *Submission 35* (47th Parliament), pp. 2–3.

91 Professor Martyn Kirk, National Centre for Epidemiology and Population Health, Australian National University, *Committee Hansard*, 13 November 2024, p. 32.

92 Professor Martyn Kirk, National Centre for Epidemiology and Population Health, Australian National University, *Committee Hansard*, 13 November 2024, p. 29; see also Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, p. 36.

2.97 This 'Catch-22' was summarised by Professor Bernard Stewart, Member of the Occupational and Environmental Cancer Committee, Cancer Council Australia, who was asked if the Cancer Council had considered—or would consider—conducting research to try to establish if there is a cancer cluster in Wreck Bay. Professor Stewart said the Wreck Bay population 'may not be enough to do meaningful cancer statistics'. He added:

> I'm not dismissing the sincerely held beliefs of the Wreck Bay population for one moment, and I'm not dismissing the burden of anxiety they have. I sympathise and can readily recognise that burden of anxiety and concern, and I wish I could enunciate a medico-scientific procedure that would bring a degree of reassurance to them in the sense that they have a burden of care and anxiety at the moment.[93]

2.98 In their submission, Professor Kirk and colleagues stated that the ANU PFAS Health Study 'was not designed to investigate whether PFAS exposure was the cause of any health effects. These types of studies require investigation of people over time'.[94]

2.99 Professor Deborah Glass concurred that epidemiological studies require studying large cohorts of people over time. She noted that, generally, PFAS exposure in the community is 'fairly low', while exposures around the PFAS manufacturing plant were probably higher, and higher again for those working in the plant. However, the cohort with high exposure to PFAS was still very small. Professor Glass noted that epidemiology is not useful at finding answers from small cohorts of people, because minor random variations can easily alter the findings and affect the conclusions. She explained that scientists use toxicology studies with laboratory animals because this may provide answers in instances where epidemiological studies cannot.[95]

2.100 Associate Professor Nicholas Osborne noted that conducting PFAS exposure studies on humans is unethical because it risks creating harm. He also explained the limitations of animal studies. While scientists can conduct PFAS exposure experiments on laboratory animals such as mice and rats, a 40-year study with a rat is impossible because they do not live beyond one or two years. In general, however, people are exposed to low doses of PFAS over many decades. To compensate, scientific studies tend to give laboratory animals larger doses in expectation of a larger and quicker effect. Therefore, many animal studies are

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93 Professor Bernard Stewart, Member, Occupational and Environmental Cancer Committee, Cancer Council Australia, *Committee Hansard*, 10 June 2025, p. 29.

94 Professor Martyn Kirk, Dr Kayla Smurthwaite and Ms Susan Trevenar, *Submission 85* (47th Parliament), p. 4.

95 Professor Deborah Glass, private capacity, *Committee Hansard*, 13 November 2024, pp. 32–33.

trying to compare, for example, a higher dose given to an animal over a year with a much lower dose experienced by people over 40 years.[96]

2.101 Similarly, Dr Shearer noted that most current research on animals looks at 'the toxicity of very high levels of PFAS contamination in order to elicit a response' with the result that the findings do not replicate natural processes.[97]

2.102 Consequently, Associate Professor Osborne stated that scientists tend to rely on epidemiological studies that examine large populations and compare people who have been exposed to either high or low doses.[98]

2.103 Associate Professor Osborne noted that because epidemiological studies are observational studies, scientists 'can only really draw associations, not causations, about that relationship between exposure to PFAS and health outcomes'.[99]

2.104 Associate Professor Osborne observed that because an association is a mathematical equation, scientists then need to explain a pathological pathway between PFAS exposure and disease noting that, for example, 'many things are known to cause kidney and testicular cancer'.[100]

2.105 In terms of low-dose chronic-exposure toxins, Associate Professor Osborne, noted the gap in understanding the health effects of PFAS. He observed that while most Australians are exposed to very low doses of PFAS, what is occurring at hotspots next to an air force base is not understood. For example, if a person buys all their food from the supermarket, their drinking water is piped in from another area, and it is not dusty, their exposure to PFAS may not differ significantly from Australians living away from hotspots. By contrast, people consuming poultry, livestock, eggs, and vegetables produced on contaminated land, using contaminated water, harvesting fish, seafood, and plants from contaminated waterways, or swimming in contaminated creeks, may have higher exposure and higher levels of PFAS in their bodies. However, research that may demonstrate such findings has not yet been done.[101]

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96 Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, p. 31.

97 Dr Cameron Shearer, *Submission 49* (47th Parliament), p. 1.

98 Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, p. 31; see also Dr David Goldberg, Private capacity, *Committee Hansard*, 21 January 2025, p. 20; Professor Martyn Kirk, National Centre for Epidemiology and Population Health, Australian National University, *Committee Hansard*, 13 November 2024, p. 29.

99 Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, p. 31.

100 Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, p. 32.

101 Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, pp. 33–34.

2.106 Associate Professor Osborne considered that 'some Australians have lost their lives due to exposure to PFAS' and PFAS 'has increased the risk of a range of diseases' including 'increased cholesterol, kidney dysfunction and kidney and testicular cancers'. That being acknowledged, it is nevertheless difficult to conclusively attribute disease to PFAS because, in general, the exposure levels are 'very low', many of the diseases or symptoms of disease, like increased cholesterol, can be caused by a range of factors such as smoking cigarettes or being overweight, and people have different genetic makeups that may increase or decrease their risk.[102]

2.107 Consequently, epidemiologists aim to study large numbers of people, typically, 50 000, to be able to discern the risk, especially if that risk is relatively low. For example, even though kidney cancer is the seventh most prevalent cancer in Australia, it is still a relatively rare disease. Therefore, a study needs large numbers of people to be able to detect that disease in the population, and more than one or two cases to be able to make calculations and draw robust conclusions around exposure to PFAS and health risk.[103]

2.108 Nevertheless, American toxicologist, Ms Jamie DeWitt, cautioned that the difficulty in establishing a causative link should not lead to complacency when it comes to regulating PFAS chemicals:

> Just because there is not a causative link between PFOA or PFOS or PFHxS exposure and a disease—we still have very strong evidence about those links from epidemiological studies with support from experimental animal studies. That means that the biological plausibility of these effects occurring in people being from PFAS exposure is increased. … it can be very challenging to uncover causative links between diseases and exposure when you're dealing with an environmental contaminant. ... But I think, if you look at different epidemiological studies and include the experimental animal studies, that the evidence overwhelmingly supports that PFAS are hazards and that exposure to PFAS increases the risk of experiencing those hazards.[104]

Views on the human health effects

2.109 The committee received a range of views and conflicting interpretations of the available scientific evidence on the health effects of PFAS exposure.

2.110 Ms DeWitt reported that she has been involved with PFAS research since 2005. Research on PFOA at that time found that it 'suppressed vaccine antibody response in rodents'. This particular study concluded that 'PFOA was the most potent immunosuppressant [one of the authors had] ever observed'. Not long after the findings of this research were published in 2008, human

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102 Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, p. 35.

103 Associate Professor Nicholas Osborne, Private capacity, *Committee Hansard*, 21 January 2025, p. 36.

104 Ms Jamie DeWitt, Private capacity, *Committee Hansard*, 10 June 2025, pp. 6–7.

epidemiological studies were published, indicating that this effect could also be seen in 'children who were exposed to PFAS in the womb'.[105]

2.111 Since then, Ms DeWitt told the committee, many studies in both animals and humans have been completed, and:

> … the overwhelming majority of these studies have reached the conclusion that exposure to PFOA and other PFAS can suppress the vaccine antibody response. You might be thinking: 'That doesn't really seem like much of a change. It seems mild to moderate.' But even mild to moderate immune suppression, such as these studies have demonstrated, can really have profound effects on the health of populations. It can increase the risk of communicable diseases as well as other diseases such as cancer, and the immune system is really a key player in keeping us healthy. When it's impacted, it can lead to lack of health.[106]

2.112 Ms DeWitt also noted that the health effects of PFAS are not limited to the immune system:

> … we call PFAS multisystem toxicants because these agents can impact many different parts of the body. As you probably well know, the list of health effects is growing. Those types of health effects with the strongest body of evidence include kidney and testicular cancer, elevated cholesterol, liver damage, developmental effects such as low birth weight in babies, endocrine disruption such as thyroid disease, and immune suppression.[107]

2.113 Dr Shearer noted that PFAS are detected in the ovarian fluid of women, 'demonstrating that these compounds can directly access the developing eggs in female animals'. Dr Shearer also argued that adverse health effects have already been documented:

> Developmental defects are documented in children of women exposed to high levels of PFAS; however, even low levels of PFAS, currently deemed safe, can exert toxicity.[108]

2.114 The Australian Academy of Health and Medical Sciences noted that PFAS are endocrine disrupting chemicals that can 'impact hormone functioning':

> Preliminary research has proposed potential links between the bioaccumulation of chemical contaminants and health risks such as disruptions to the immune and reproductive systems, inhibited childhood neurodevelopment, and increased risk of some cancers.[109]

2.115 Dr David Goldberg explained that certain chemicals can suppress the immune system which has implications for how susceptible a person becomes to cancer.

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105 Ms Jamie DeWitt, Private capacity, *Committee Hansard*, 10 June 2025, p. 2.

106 Ms Jamie DeWitt, Private capacity, *Committee Hansard*, 10 June 2025, p. 2.

107 Ms Jamie DeWitt, Private capacity, *Committee Hansard*, 10 June 2025, p. 2

108 Dr Cameron Shearer, *Submission 49* (47th Parliament), p. 1.

109 Australian Academy of Health and Medical Sciences, *Submission 35* (47th Parliament), p. 2.

He noted that immune system population data on autopsy suggests that, for every person who dies of a cancer, a person's immune system kills eight cancers. One mechanism of cancer is immunosuppression. This means that something can have a direct carcinogenic effect which is genetic and damages the cell, but it can also cause immunosuppression. For example, if a person has a replication error in a cell, even in the absence of a carcinogen, in the early stages of that cancer the immune system will recognise it as an abnormal cell and kill it. Dr Goldberg's view was that PFAS is 'probably a carcinogen but it's definitely an immunosuppressant'.[110]

2.116 Professor Stewart told the committee that the Cancer Council accepts evidence that PFOA 'is implicated as causing testicular cancer and renal cancer in humans'. Professor Stewart acknowledged that 'the evidence is not definitive' but noted there is evidence that PFOA causes cancer in rodents. PFOS, on the other hand, is 'not known to cause cancer in humans' or in animals. However, Professor Stewart noted that PFOS 'is ranked as possibly carcinogenic on the basis of the mechanistic evidence by IARC'.[111]

2.117 It was Professor Stewart's view that 'the data are not there to establish a causal relationship between PFAS exposure and cancer development as yet, but such findings could emerge'. However, he suggested that, if preventing cancer is the aim, governments should prioritise monitoring and reducing *proven* environmental sources of cancer:

> We're talking about prevention now. In terms of the preventive budget—in terms of cancer prevention specifically—I respectfully submit that the main polluting cause of cancer in Australia is atmospheric pollution, causing lung cancer, and it's mainly from vehicular emissions and industry. If I had to choose between monitoring atmospheric pollutants on the one hand and monitoring PFAS chemicals in water on the other, I would have no difficulty in saying that you monitor definitively established causes of cancer as a first priority and suspected causes of cancer as a second priority, possibly with a view to gaining more evidence.[112]

2.118 Professor Stewart summarised the Cancer Council's view that the risk of cancer in humans from some PFAS chemicals 'is at least partially demonstrated' for occupational exposure (those exposed while working with, or around, PFAS).

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110 Dr David Goldberg, Private capacity, *Committee Hansard*, 21 January 2025, pp. 20–21. Dr Goldberg, a practising medical practitioner, was a visiting medical doctor at Wreck Bay Aboriginal Community between 2000 and 2008. Wreck Bay was exposed to PFAS contamination from the historic use of firefighting foam at two Defence sites above Wreck Bay. Dr Goldberg's evidence is included in the committee's Interim Report.

111 Professor Bernard Stewart, Member, Occupational and Environmental Cancer Committee, Cancer Council Australia, *Committee Hansard*, 10 June 2025, p. 26.

112 Professor Bernard Stewart, Member, Occupational and Environmental Cancer Committee, Cancer Council Australia, *Committee Hansard*, 10 June 2025, pp. 28–29.

However, this risk has not been demonstrated in relation to exposure through 'contaminated water in the wider community'. In contrast with other evidence received by the committee, Professor Stewart argued that the fear around PFAS causing cancer may be 'misplaced':

> Despite that, anxiety has been generated because of reports of people being convinced that they have developed particular cancers because of their exposure to these compounds. That anxiety is, to some extent, misplaced because certain perceptions about cancer causation are wrong. These include the ideas that cancer is sometimes self-evident from a particular carcinogen; that the community can identify, apart from familial cancers, an increased risk of cancer in humans; that any exposure to a known carcinogen causes cancer; that cancer can arise throughout the body in response to a particular carcinogen; that blood levels of a particular carcinogen indicate risk of cancer; and that people have been deliberately withholding the truth. All of those perceptions are, in fact, wrong.[113]

2.119 Professor Stewart also commented on suggestions that the government should support PFAS blood testing, saying that blood levels of PFAS, or any other carcinogen, do not give an indication of the risk of cancer:

> If they did, we could, for example, establish the 16 per cent of lifelong smokers who get lung cancer as identifiable by the tobacco based carcinogens in their blood. They're not. The reason we have to take on board—to the government's credit—a complicated scanning system for lung cancer is that we can't determine which smokers will get lung cancer by looking at their blood levels. So—although it's counterintuitive—in an exposed population, a person with no detectable blood levels of PFAS and a person with the highest recorded blood levels of PFAS have an equal probability of being at risk of cancer. The blood levels do not tell you who's going to get the disease.[114]

2.120 Professor Grandjean submitted that because PFAS compounds are transferred to the foetus through the placenta and are excreted in human milk, 'PFAS exposure reaches the youngest and most vulnerable population' and 'may exert greater and lasting adverse effects if exposure happens in early life, when organ functions develop'.[115]

Views on safe/unsafe levels of PFAS exposure

2.121 Professor Grandjean argued that, even with the current state of scientific evidence, there are reasonable grounds for stating that PFAS cause adverse health effects in the human population:

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[113] Professor Bernard Stewart, Member, Occupational and Environmental Cancer Committee, Cancer Council Australia, *Committee Hansard*, 10 June 2025, p. 26.

[114] Professor Bernard Stewart, Member, Occupational and Environmental Cancer Committee, Cancer Council Australia, *Committee Hansard*, 10 June 2025, p. 28.

[115] Professor Philippe Grandjean, *Submission 51* (47th Parliament), pp. 2 and 5.

> Based on the weight of the epidemiological evidence and supporting laboratory toxicology evidence, and stated with reasonable scientific and medical certainty, exposures to PFASs (including, but not limited to PFOS, PFOA, PFNA, and PFHxS, and their precursors) are causative of important adverse health effects in humans in Australia and globally.[116]

2.122 Consequently, Professor Grandjean maintained that the current evidence is sufficient to deem any additional exposure to PFAS as potentially adverse to human health:

> Given that virtually all people already have measurable quantities of PFASs in their bodies, and that adverse effects have been documented within the range of background exposures, any additional PFAS exposures should be considered potentially adverse, whether from water sources, food or air related to or originating from the specific contamination sources.[117]

2.123 He acknowledged that while comprehensive scientific evidence is still lacking, prudent measures based on probability are necessary to manage preventable adverse health outcomes:

> In principle, it would be desirable to rely on evidence that is as complete as required for decisions on evidence-based medicine. However, in a real world situation, where the goal is to avoid risks from preventable hazards, and where human experimentation is unethical, less comprehensive documentation is generally accepted as the basis for prudent decision-making on environmental risk factors, preferably based on high-quality epidemiological studies and complementary experimental evidence that supports the plausibility of observed associations being causal.[118]

2.124 In this regard, Professor Grandjean drew attention to the most recent assessment by the US EPA which 'regards both PFOS and PFOA as human carcinogens and therefore recommends a maximum human intake of zero as the level that will not result in adverse effects in human beings'. He told the committee that the weight of research is showing PFAS to be 'more toxic than previously thought', leading to the lowering of exposure limits in a number of jurisdictions:

> However, I understand that PFAS are useful; they are financially important. They're fairly cheap to produce but highly expensive to remove after they have been disseminated. I have participated as a medical expert in several court cases in Australia, so I'm quite familiar with exposures in various Australian communities, and it's clear to me that you have in front of you a serious public health problem. I'm therefore very eager to help you in

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116 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 1.

117 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 1.

118 Professor Philippe Grandjean, *Submission 51* (47th Parliament), pp. 5–6.

> finding the best decision, the most ethical and prudent decision, for now and for the future.[119]

2.125 Similarly, Dr Chartres argued that 'there is no safe level to any chemical, based on the fact that we have huge amounts of human variability':

> … people may come from low-income communities, they may have background exposures to other chemicals, and they may have other comorbidities that they're experiencing which exacerbate the chemical's harm.[120]

2.126 By contrast, Dr Stuart Khan, Professor and Head of the School of Civil Engineering at the University of Sydney expressed a different view about how the term 'no safe level' is derived and the disputed concept of zero risk in toxicology:

> The model that they use—and this is where you hear the term 'no safe level'—is a widely used model in toxicology, but toxicologists understand that it's a serious oversimplification of the real world. They assume that any carcinogenic or genotoxic chemical presents some risk of causing cancer. It doesn't matter if it's one molecule; there's some risk of causing cancer there. That's a hotly disputed point in toxicology, but that's how the model is actually presented. So this is where 'no safe level' comes from. In order to have zero risk, you have to have zero exposure.[121]

2.127 Dr Khan stated that, as yet, there is no toxicological data or cancer slope factor that would enable the setting of safe levels of PFAS exposure. He therefore argued that the US EPA has ignored the current scientific data and simply declared that there is no safe level for PFAS, 'which is a purely aspirational statement'. He added, however, that the US EPA does not use 'no safe level' because it is neither measurable nor achievable and that is how the US EPA arrived at four nanograms per litre for PFAS.[122]

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119 Professor Philippe Grandjean, *Submission 51* (47th Parliament), p. 7; Professor Philippe Grandjean, Private capacity, *Committee Hansard*, 10 June 2025, p. 46; see also Mr Keiran Assheton, Private capacity, *Committee Hansard*, 21 January 2025, p. 12.

120 Dr Nicholas Chartres, Senior Research Fellow, School of Pharmacy, Faculty of Medicine and Health, University of Sydney, *Committee Hansard*, 22 January 2025, p. 9.

121 Dr Stuart Khan, Professor and Head of School, School of Civil Engineering, University of Sydney, *Committee Hansard*, 22 January 2025, p. 10.

122 Dr Stuart Khan, Professor and Head of School, School of Civil Engineering, University of Sydney, *Committee Hansard*, 22 January 2025, pp. 10–11. A cancer slope factor, also known as a cancer potency factor, is a value used in toxicology and risk assessment to estimate the increased cancer risk associated with a specific chemical or agent. It represents the estimated upper bound of the increased cancer risk from a lifetime exposure to a substance, typically expressed as the risk of cancer per unit of daily exposure. See: Suji Jang, Kan Shao, Weihsueh A. Chiu, 'Beyond the cancer slope factor: Broad application of Bayesian and probabilistic approaches for cancer dose-response assessment', *Environment International*, vol. 175, 2023, p. 107959 .

2.128 Dr Khan explained that the World Health Organization uses a tolerable level of risk with respect to chemical exposure:

> The World Health Organization uses a one in 100 000 excess lifetime cancer risk—so, for one person, one additional cancer case by the end of their life occurring as a consequence of exposure to this particular chemical—and it extrapolates effectively what that level of exposure relates to in terms of a risk and what that risk relates to in terms of exposure. That's also the approach that has been taken in Australia for lots of genotoxic and carcinogenic chemicals.[123]

2.129 Dr Khan noted that Australia has adopted the same approach as the World Health Organization, which is to set conservative health-based guidelines based on the current health and toxicological data:

> If the toxicological data, the science that's available, doesn't take you down to four nanograms per litre, they don't set the guideline at four nanograms per litre. They set it where the toxicological data takes you. But there are significant safety factors built into that.
>
> There are a lot of conservative assumptions all the way through, including the selection of the toxicological end point, including the calculation of the tolerable daily intake and including when the guidelines are developed.[124]

Approaches to dealing with uncertainty

2.130 Professor Peter Sly, Fellow at the Australian Academy of Health and Medical Sciences, said the Academy believes that 'scientific uncertainty' must not delay action on PFAS, and the 'precautionary principle' must be paramount:

> I think I'd take that one step further and say one of the problems we have in science, science communication and environmental health in general is that we have the onus of proof on the precautionary principle backwards. Companies and manufacturers are allowed to introduce chemicals into our environment, and it's up to us later on to prove there's something wrong with them. It should be the other way around. They should not be able to introduce something into the environment, particularly for children, unless they have proven that it is safe.[125]

2.131 Senior Advisor to the International Pollutants Elimination Network, Dr Mariann Lloyd-Smith argued that:

> Successive Australian governments have downplayed the dangers of PFAS exposure. A 2021, international review of epidemiological studies confirmed associations between exposure to specific PFAS and a variety of health effects, including altered immune and thyroid function, liver disease, lipid

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123 Dr Stuart Khan, Professor and Head of School, School of Civil Engineering, University of Sydney, *Committee Hansard*, 22 January 2025, p. 10.

124 Dr Stuart Khan, Professor and Head of School, School of Civil Engineering, University of Sydney, *Committee Hansard*, 22 January 2025, p. 11.

125 Professor Peter Sly, Fellow, Australian Academy of Health and Medical Sciences, *Committee Hansard*, 10 June 2025, p. 15.

> and insulin dysregulation, kidney disease, adverse reproductive and developmental outcomes, and cancer. These findings were supported by experimental animal data for many of these effects.[126]

2.132 Ms DeWitt disputed the idea that the science around PFAS and human health is uncertain, saying 'the level of uncertainty is actually quite low if you look at consistency across studies and if you look at the data from experimental animal studies that are supportive'. Ms DeWitt referred to a 2023 study outlining 'the epidemiological findings for PFAS'. This 'systematic review and meta-analysis' looked at five different PFAS and considered their effects on 'antibody responses across different vaccines in adults and in children':

> They found that the results of these different studies were actually very homogeneous, or consistent. There was agreement among the studies, even across different types of vaccines, that these PFAS were all able to reduce the responses to vaccines and that children were more sensitive.[127]

> According to Ms DeWitt, studies related to cholesterol elevation, and those that indicate decreased birthweight, also show consistent results. Studies may find 'differences in terms of the magnitude of the outcome, but we see that there are still reductions in birth weight and in antibody responses, and there are elevations in cholesterol'.[128]

2.133 Ms DeWitt concluded that, while scientific data for PFAS 'are still evolving', there is sufficient evidence to justify phasing out non-essential uses:

> Many have been understudied with respect to their toxicity, but there's really no reason to continue to allow exposures to these PFAS. Absence of evidence isn't the same as evidence of absence, so why should we as a society wait for people to get sick before we take action to reduce or eliminate exposures or risks?[129]

Reducing blood PFAS levels

2.134 The committee considered evidence from people exposed to large amounts of PFAS, including evidence on PFAS blood testing and reduction methods.

2.135 Mr Mick Tisbury, Assistant Chief Fire Officer with Fire Rescue Victoria, reported that he developed, co-authored and commissioned a world-first study which established that regular plasma and blood donations were successful in significantly reducing blood PFAS levels.[130] The study did not examine the

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126 Dr Mariann Lloyd-Smith, *Submission 3* (47th Parliament), p. 4.

127 Ms Jamie DeWitt, Private capacity, *Committee Hansard*, 10 June 2025, p. 5.

128 Ms Jamie DeWitt, Private capacity, *Committee Hansard*, 10 June 2025, p. 5.

129 Ms Jamie DeWitt, Private capacity, *Committee Hansard*, 10 June 2025, p. 3.

130 Fire Rescue Victoria, *Submission 9* (47th Parliament), p. [2]. See also: National Health and Medical Research Council, *Annual progress reports: Assessing effectiveness of PFAS exposure control in individuals from exposed communities and occupationally exposed cohorts such as fire fighters (1179111)* (accessed 30 June 2025).

health effects of PFAS or the clinical benefits of its reduction in firefighters. Co-author Professor Mark Taylor, from Macquarie University, advised 'these important questions are worthy of further research to better understand health outcomes from exposure and treatment'.[131]

2.136 Mr Christopher Howe, who was exposed to PFAS at work, discussed how he had volunteered to give blood to a University of Queensland study into PFAS exposure with his results showing higher levels of PFAS than in the general Australian population. Mr Howe undertook his own research to find out his options for reducing the 'extreme levels of PFAS contamination' in his blood and now has his own 'voluntary and self-funded schedule of donating plasma and blood' fortnightly.[132]

2.137 As Mr Howe lives in regional Australia, this involves a three to four hour, 100-kilometre round trip to his closest LifeBlood donation centre, despite restrictions and challenges in giving blood or plasma, such as inability to find a vein, high ferritin levels, illnesses such as a cold, and certain overseas travel which may restrict donations.[133]

2.138 The United Firefighters Union Australia Aviation Branch underscored the difficulties associated with plasma donation, noting that exclusions exist for some people, and plasma donation facilities are not available on Norfolk Island. It suggested:

> The Commonwealth Government and NIRC [Norfolk Island Regional Council] are jointly responsible for administering the island's affairs and must implement and fund opportunities for affected fire fighters and members of the public to access the most effective method of ridding the body of PFAS chemicals.[134]

2.139 Mr Howe's most recent blood test results showed a decrease in PFAS levels; however, he acknowledged 'it is likely to take many more years—most likely decades—before my blood levels return to average'.[135]

2.140 Mr Howe's partner, Ms Jayne Newgreen spoke to the impacts of this regime on Mr Howe and his family, saying:

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131 Dr Robin Gasiorowski & Professor Mark Taylor, Macquarie University, 'World-first trial finds regular blood and plasma donation reduces firefighters' PFAS levels', *The Lighthouse / Media release*, 11 April 2022 (accessed 30 June 2025).

132 Mr Christopher Howe, *Submission 91* (47th Parliament), [pp. 3 and 5]; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [pp. 4–5].

133 Mr Christopher Howe, *Submission 91* (47th Parliament), [pp. 3 and 5]; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [pp. 4–5].

134 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 9.

135 Mr Howe, Private capacity, *Committee Hansard*, 4 June 2025, p. 2; Mr Christopher Howe, *Submission 91*, [p. 6].

> Christopher has been dedicated to a self-imposed treatment plan of regular plasma donations. I am extremely proud and very grateful for his incredible efforts to take action in remediating his body and mitigate the risks of this exposure to his life.[136]

2.141 Asked if it is assessing the benefits of therapeutic donation, the Department of Health submitted that, any 'decision to recommend therapeutic blood or plasma donation for an individual is a clinical matter and therefore requires a discussion between a patient and their relevant medical practitioner'.[137]

2.142 Several submitters suggested that firefighters and other exposed workers with elevated levels of PFAS in their blood be given access to Medicare benefits for therapeutic plasma/blood treatment, to reduce costs.[138] The United Firefighters Union of Australia Aviation Branch submitted:

> There is a precedent for subsiding venesection solely for treatment purposes under Medicare, whereby patients diagnosed with Hemochromatosis have access to a dedicated item number to claim for this service. This should be extended to firefighters with elevated blood levels of PFAS chemicals and whose blood is not accepted by blood banks.[139]

2.143 The Department of Health advised that, while plasma and blood donations reduce blood PFAS levels, 'noting the lack of clinical usefulness, an application would require a comprehensive dossier justifying clinical need and financial cost-effectiveness'. The Medical Services Advisory Committee would need to assess the 'comparative safety, clinical effectiveness, cost-effectiveness, and total cost, using the best available evidence' before any such amendment could be made.[140]

Biomonitoring

2.144 Scientific and medical organisations who gave evidence throughout the inquiry emphasised the benefits of large-scale biomonitoring to track PFAS levels, and impacts, over time.

2.145 The Australian Academy of Health and Medical Sciences recommended:

- establishing a national biomonitoring program to track the accumulation of PFAS and other chemical contaminants in Australia;

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136 Ms Jayne Newgreen, *Submission 92* (47th Parliament), [p. 4].

137 Department of Health, Disability and Ageing, response to written question from Senator Thorpe (received 24 September 2025), [p. 13].

138 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), pp. 2–3; Mr Christopher Howe, *Submission 91* (47th Parliament), [p. 7]; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [pp. 6–7].

139 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 9.

140 Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100* (47th Parliament), pp. 7–8.

- immediately begin monitoring pregnant women's exposure levels, as an interim step;
- expand research into the health effects of PFAS exposure, 'especially the impact during early life'; and
- 'regularly review and update the legal limits for PFAS exposure based on emerging evidence'.[141]

2.146 Professor Sly suggested leftover blood samples held by pathology providers could be used to conduct wider population biomonitoring:

> We've developed relationships with pathology groups in Queensland—with Sullivan Nicolaides, for example—and we can get leftover blood and urine samples which are pooled and de-identified, and we've used these to monitor levels of plasticisers in the population in Queensland. This is a technique that is cheaper because, in pooling samples, firstly, you protect individuals' identities, but, secondly, you only have to measure one sample rather than 10 or 100, and you can get levels across the population. … These same things could be applied here, because, while the concentrations of PFAS and things are low, they are measurable.[142]

2.147 According to the Academy of Health and Medical Sciences, Australia 'stands out among comparable nations such as Canada, the US, Germany, South Korea, and Japan for not operating a population-level human biomonitoring (HBM) program'. This is despite Australia having 'some of the highest PFAS exposure levels globally'. The Academy suggested:

> To identify the extent of PFAS bioaccumulation across the population, and then investigate possible connections between PFAS exposure and health outcomes, Australia must begin tracking levels of PFAS and related chemical contaminants that co-accumulate in the human body.[143]

2.148 Asked to comment on proposals for national biomonitoring, Mr Bouwhuis said:

> There's not currently a biomonitoring program at the Commonwealth level. That isn't something that's been introduced by successive Australian governments. But we did pay for the ABS to do a study on levels of PFAS in the Australian community generally—so 7½ thousand volunteers donated their blood to sample to see what the PFAS levels were like. That does give us a baseline population level for population exposure to PFAS, and that's similar to biomonitoring.[144]

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[141] Professor Peter Sly, Fellow, Australian Academy of Health and Medical Sciences, *Committee Hansard*, 10 June 2025, p. 15.

[142] Professor Peter Sly, Fellow, Australian Academy of Health and Medical Sciences, *Committee Hansard*, 10 June 2025, p. 16.

[143] Australian Academy of Health and Medical Sciences, *Submission 35.1*, p. 2.

[144] Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 10 June 2025, p. 38.

2.149 The Cancer Council recommended:

- further research and monitoring, including longitudinal studies in large cohorts or whole-of-population studies; and
- a national approach to monitoring and disseminating information regarding PFAS in drinking water.[145]

2.150 Ms Sophie Barrett—a mother who lost her daughter after a battle with childhood leukaemia—noted that there has been an increase of 34 per cent in childhood cancers between 1983 and 2015, and suggested chemicals, including PFAS may be responsible. Ms Barrett recommended governments fund independent long-term studies 'to definitively establish the causal links between PFAS exposure and long-term health effects, particularly the rise in childhood cancers'.[146]

Health screening and biomonitoring for exposed cohorts

2.151 The enHealth Statement advises that individual blood tests are 'not recommended' and 'have no current value in informing an individual's clinical management'. It states:

> … there is at present insufficient scientific evidence for a medical practitioner to be able to tell a person whether their blood level will make them sick now or later in life, or if any current health problems are related to the PFAS levels found in their blood.[147]

2.152 Ms Jayne Newgreen—whose partner has high blood PFAS levels after unknowingly drinking contaminated water for a number of years—recommended free health monitoring be made available for people who have or have had high blood PFAS levels; and that free mental health support be made available 'for people who are contaminated'.[148]

2.153 The committee heard that Commonwealth agencies provided access to targeted mental health and counselling services in PFAS-contaminated communities in the past. However, this is reported to have ceased in 2019–20.[149]

2.154 Community members impacted by PFAS contamination at Wreck Bay similarly expressed a strong desire for government-funded blood testing, cancer

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145 Cancer Council Australia, *Submission 62* (47th Parliament), pp. 8–9. See also: Dr Cameron Shearer, *Submission 49* (47th Parliament), p. 1.

146 Ms Sophie Barrett, *Submission 9* (48th Parliament), pp. [1–2].

147 Australian Academy of Health and Medical Sciences, *Supplementary submission 35.1*, pp. 5–6.

148 Jayne Newgreen, *Submission 92* (47th Parliament), [p. 7].

149 Joint Standing Committee on Foreign Affairs, Defence and Trade, *Inquiry into PFAS remediation in and around Defence bases: Final report*, March 2022, p. 53.

screening, and general health monitoring for all impacted residents, but especially for children and pregnant women.[150]

2.155 Ms Annette Brown, Chairperson of the Wreck Bay Aboriginal Community Council (WBACC) said the community recognises 'causation connected to PFAS may never come'. Ms Brown recommended the Commonwealth establish a monitoring committee, including Aboriginal people from Wreck Bay, to monitor the health effects of PFAS, particularly on children, establish a database of health data, and inform the community in language they can understand, instead of relying on second-hand information.[151]

2.156 A similar proposal was made by Dr Goldberg, who suggested that accessible primary care for residents of Wreck Bay is inadequate, highlighting the need for a targeted program.[152]

2.157 Asked why blood testing was not offered to residents of Wreck Bay as part of the ANU's PFAS health study, Mr Bouwhuis said the decision predates his tenure and he 'is not sure why' three other communities were chosen over Wreck Bay.[153] At the committee's September 2025 hearing, Mr Bouwhuis clarified that 'blood testing is not something we generally recommend, because it doesn't have any clinical benefit' and cannot 'tell you anything clinically relevant'.[154]

2.158 This claim has been refuted by Mr Mick Tisbury, from Fire Rescue Victoria, who told the committee that his organisation provides blood testing for exposed firefighters and has worked with physicians to develop health advice which is provided to firefighters who seek advice following their PFAS blood testing.[155]

2.159 The advice aims to 'dispel myths and promote management options, aiming to reduce the risk of those health conditions that have been associated with elevated serum PFAS'. The advice outlines what constitutes a 'normal' blood PFAS level, and lists possible health effects, saying:

> A few of these health effects have been well established and found repeatedly in research studies showing robust evidence that the relationship

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150 Ms Annette Brown, Chairperson, Wreck Bay Aboriginal Community Council, *Committee Hansard*, 21 January 2025, p. 3.

151 Ms Annette Brown, Chairperson, Wreck Bay Aboriginal Community Council, *Committee Hansard*, 21 January 2025, p. 14.

152 Dr David Goldberg, Private capacity, *Committee Hansard*, 21 January 2025, pp. 22–23.

153 Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 10 June 2025, p. 40.

154 Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 5 September 2025, p. 21.

155 Mr Mick Tisbury, Assistant Chief Fire Officer, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, p. 17. See also: Fire Rescue Victoria, PFAS Clinician's Advice, provided by ACFO Tisbury and Commander Hamilton (received 10 September 2025).

> cannot be questioned. For many more conditions, the evidence of association is less clear, with ongoing research increasing our knowledge, confirming some theories, and excluding others. For many health effects, we know little about why PFAS influences health, but observe a correlation …[156]

2.160 The advice then provides clinical management recommendations—primarily blood tests and cancer screening—using a 'tiered approach', based on the serum PFAS level detected, and provides information about interventions to reduce serum PFAS levels (including blood or plasma donation).[157]

2.161 The Australian Academy of Science argued there is a need to provide testing in heavily exposed communities, while also conducting broader biomonitoring so there is a 'benchmark'.[158]

2.162 Professor Stewart said that, while the Cancer Council would not recommend broad PFAS blood testing, it *may* support increased monitoring for cancer in 'exposed workers', such as firefighters, and others exposed to unusually high levels of PFAS and other chemicals through the course of their work. The Cancer Council also submitted that there is 'a need for guidance on PFAS and cancer risks for healthcare professionals to provide information and advice to the community concerning their risks of cancer'.[159]

2.163 The Catholic Women's League Australia Inc. was also concerned about the impacts of PFAS on developing foetuses and recommended a 'brochure be produced for pregnant women to be distributed with other pregnancy brochures handed out, containing information re PFAS chemicals and how to minimise exposure'.[160]

Department of Health response

2.164 The Department of Health was asked about health services provided to the Aboriginal community at Wreck Bay. It submitted:

> Through the Indigenous Australians' Health Program, the Commonwealth Government is investing $14.5 million over two years to support two Aboriginal Community Controlled Health Services in delivering primary

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156 Fire Rescue Victoria, PFAS Clinician's Advice, provided by ACFO Tisbury and Commander Hamilton (received 10 September 2025), [p. 1].

157 Fire Rescue Victoria, PFAS Clinician's Advice, provided by ACFO Tisbury and Commander Hamilton (received 10 September 2025), [p. 3 and pp. 6–7].

158 Dr Nathan Kilah, Senior Lecturer in Chemistry, University of Tasmania, Australian Academy of Science, *Committee Hansard*, 10 June 2025, p. 13. See also: Bygen, *Submission 145* (47th Parliament), p. 4.

159 Professor Bernard Stewart, Member, Occupational and Environmental Cancer Committee, Cancer Council Australia, *Committee Hansard*, 10 June 2025, p. 31; Cancer Council Australia, *Submission 62* (47th Parliament), p. 8.

160 Catholic Women's League Australia Inc., *Submission 108* (47th Parliament), [p. 1].

health care, as well as maternal and child health services to the Wreck Bay community and surrounding regions.[161]

2.165 The department was asked to quantify potential costs of providing additional health screening to the small community at Wreck Bay, which, according to the 2021 census, has a population of 152 people.[162]

2.166 The department noted that, while Medicare 'does not provide general screening services for potential associations found for PFAS in some studies', a range of population-based cancer screening programs are available in Australia, including BreastScreen, the National Bowel Cancer Screening Program and the National Cervical Screening Program. It provided the following estimates for the cost of individual tests for some of the biological effects associated with PFAS exposure:

- cholesterol and lipids: $30–$100
- kidney function tests: $50–$150
- thyroid function tests: $60–$120
- an ultrasound scan for testicular cancer would typically cost around $211.[163]

2.167 The committee's views and recommendations are provided in Chapters 11 and 12 of this report.

[161] Department of Health, Disability and Ageing, response to questions taken on notice, public hearing 10 June 2025 (received 9 July 2025), [p. 1].

[162] Australian Bureau of Statistics, *Wreck Bay: 2021 Census Aboriginal and/or Torres Strait Islander people QuickStats* (accessed 12 September 2025).

[163] Department of Health, Disability and Ageing, response to questions taken on notice, public hearing 10 June 2025 (received 22 July 2025), [p. 1].

Chapter 3
Firefighters and others exposed at work

Introduction

3.1 Given the extensive use of foams containing per- and polyfluoroalkyl substances (PFAS) in fighting fires, firefighters are among the most PFAS-exposed groups in the Australian population.

3.2 Evidence to the inquiry indicated that cohorts exposed to PFAS contamination at work include firefighters, persons responsible for maintaining, repairing and decontaminating fire trucks, equipment and training facilities, and persons working at civilian airports.

3.3 This chapter examines considerations specific to firefighters and other occupational groups exposed to PFAS in the course of their work and outlines suggestions for reform proposed by these cohorts.

Firefighters

3.4 Over the course of the inquiry, the committee heard that firefighters are one of the most PFAS-exposed occupational groups due to their substantial, 'direct frequent and occupational' exposure to firefighting foam containing PFAS.[1]

3.5 Firefighters include members of state and territory firefighting services, as well as volunteer firefighters, aviation, Defence, private and contractor firefighters, including those in industrial settings, such as oil and gas rigs and plants.[2]

3.6 Exposure to PFAS-containing foam has occurred during regular training activities, active firefighting duties and emergency responses—through dermal contact, as well as inhalation.[3] At the time, firefighters claim they were 'completely unaware of the risks' and had been told that the firefighting foam was safe.[4]

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1 Also known as Aqueous Film Forming Foam (AFFF). Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), pp. 1 and 6; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 5.

2 See: United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), pp. 3 and 5; Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), p. 1; Department of Defence, response to written questions on notice from Senator Thorpe (received 17 February 2025), p. [6]; Mr Greg McConville, National Secretary, United Firefighters Union of Australia, *Committee Hansard*, 4 June 2025, p. 18.

3 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 5.

4 Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), pp. 2 and 5.

3.7 Retired members of the Royal Australian Army Fire Service (and successor units)—a cohort which has been largely unacknowledged to date—explained to the committee that:

> We routinely handled it—often without protective gear—coming into direct contact with it on our skin, eyes and mouths, we inhaled its fumes, and it saturated and contaminated our clothing and equipment.[5]

3.8 Retired members described other ways in which PFAS-containing foam was used:

> AFFF [Aqueous Film Forming Foam] was a regular part of everyday life for our members, at every Army Fire Station, not just Oakey. We were told that it was safe, and for example we:
>
> - used it to wash trucks,
> - we washed dishes and clothes in it
> - we soaked our mates in it to celebrate a birthday,
> - on barracks open days we would fill the vehicle bays with AFFF foam and let children run through it, playing hide and seek,
> - we trained with it regularly, getting it on our skin and in our eyes,
> - we took our AFFF soaked uniforms home and washed them with the rest of the families clothing,
> - At Oakey, where married quarter water was supplied via bore water, members would carry rain water home, for the family's consumption, in rinsed out AFFF containers.[6]

3.9 National Secretary of the United Firefighters Union of Australia (UFUA), Mr Greg McConville, stated, 'the fact of the matter is that our members are the crash-test dummies and the lab rats in this kind of occupational exposure because they experience it before anyone else does and they experience it at greater doses'.[7]

Other occupations

3.10 Other occupations have also experienced exposure at work. For example, emergency vehicle technicians (EVTs) responsible for maintaining, repairing and decontaminating fire trucks, equipment and training facilities have also been significantly exposed to PFAS.

3.11 The Community and Public Sector Union (CPSU) reported that an occupational exposure study detected higher levels of PFAS in certain EVTs compared to firefighters. It concluded 'it is possible that EVTs were exposed to AFFF

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5 Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), p. 2.

6 Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), pp. 5. See also: Mr Wesley Garrett, Secretary, Aviation Branch, United Firefighters Union of Australia, *Committee Hansard*, 4 June 2025, p. 19.

7 Mr McConville, United Firefighters Union of Australia, *Committee Hansard*, 4 June 2025, p. 18.

concentrate more frequently than firefighters, whereas the firefighters were more likely to be exposed to the foam (which is less concentrated)'.[8]

3.12 Occupational exposure also includes those exposed to PFAS because of their place of work. For example, air traffic controllers at Avalon Airport were exposed to PFAS in drinking water in the course of their employment.[9]

3.13 The committee heard evidence from Mr Christopher Howe and his partner Ms Jayne Newgreen. Mr Howe worked for a private company which operated out of a sub-leased building at Avalon Airport. He advised that, by chance, he became aware of PFAS contamination of the drinking water at the site.[10]

3.14 Mr Howe estimated he consumed two to three litres of water a day over the 15 months he worked at Avalon. Mr Howe described his exposure to PFAS:

> … results show the water I was drinking daily while employed at Avalon Airport was contaminated with PFOS [perfluorooctane sulfonate] + PFHxS [perfluorohexane sulfonate] almost 200 times the NHMRC [National Health and Medical Research Council] 2018 guidelines for safe drinking water
>
> …
>
> Under the proposed new guidelines, laboratory results show the water I was drinking while employed at Avalon Airport was contaminated with PFOS at 3,000 times the new guideline, and PFHxS at over 56 times the new guideline … To think this all could have been easily avoided if I knew the risk, and simply took my own drinking water to work …[11]

3.15 Ms Newgreen explained the impacts on Mr Howe and their family. This included the need for Mr Howe to do much of his own research and advocacy, without occupational supports:

> I understand that there are a lot of other people affected on this Avalon site. We don't know them; we're not connected and associated. I hope others have their own peer support or unions or people around them that are supporting

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8 Community and Public Sector Union (CPSU), *Submission 144* (47th Parliament), pp. 2–3. The exposure study was conducted by the Queensland Alliance for Environmental Health Sciences Unit in the University of Queensland. See, also: Mr Jay Aspros, Elected Health and Safety Representative, Aviation Rescue and Fire Fighting Service, Avalon Airport, *Committee Hansard,* 4 June 2025, p. 20.

9 See, for example: Mr Garrett, United Firefighters Union of Australia, *Committee Hansard,* 4 June 2025, p. 19; Mr Aspros, Aviation Rescue and Fire Fighting Service, Avalon Airport, *Committee Hansard,* 4 June 2025, p. 23; Airservices Australia, Response (received 22 July 2025), p. 4.

10 Mr Christopher Howe, *Submission 91,* pp. [2–3]; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [p. 2].

11 Mr Christopher Howe, *Submission 91,* pp. [4 and 8]; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [pp. 2–3].

> each other. We're very much alone, because there's no structure to help people who are in a similar boat to us.[12]

3.16 Similarly, Mr Roger Hart wrote of his time in the Jervis Bay area, as an employee of the now Booderee Botanic Gardens and as a firefighter, for various periods between 1979 and 2005. Mr Hart relayed his potential exposure to PFAS as part of his work operating the irrigation system, including the pump, pipes, and sprinklers. He described local waterways with run-off containing PFAS after heavy rain, flowing down from the Jervis Bay airfield causing foaming. Mr Hart and his colleagues also used PFAS foam during controlled burns to put out smouldering stumps, logs and roots. Mr Hart would sometimes swim and bathe in contaminated water at work, causing concern for the potential impacts on his health.[13]

Exposure pathways

3.17 PFAS exposure pathways in different populations are not yet fully understood.[14] Given some PFAS' longevity in the environment, and their ability to migrate through soil and water, firefighters and other people working in facilities contaminated with PFAS face ongoing exposure.[15]

3.18 Submitters identified a variety of workplaces (and their surrounds) which are contaminated with PFAS, including current and former fire stations, firefighting training facilities, airports and Defence facilities.[16]

3.19 The UFUA Aviation Branch reported that:

> Despite [the] use of PFAS-containing fire fighting foams ceasing, aviation fire fighters remain at high risk of acute PFAS exposure, including through the water they drink and use at work. This is due to high levels of legacy contamination arising from decades of use of PFAS foams in and around the fire stations where they work.[17]

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12 Ms Jayne Newgreen, Private capacity, *Committee Hansard,* 4 June 2025, p. 4; Ms Jayne Newgreen, *Submission 92,* [p. 6].

13 Mr Roger Hart, *Submission 139* (47th Parliament), [pp. 1–2].

14 See, for example: Professor Albert Juhasz, 'Impact of exposure pathway and source on PFAS absorption and bioavailaibility (1186337)', *NHMRC Annual progress reports* (accessed 26 June 2025).

15 See, for example: United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 5; Mr Lance Quintal, *Submission 123* (47th Parliament), p. [2]; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 5.

16 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 6; Mr Garrett, United Firefighters Union of Australia, *Committee Hansard*, 4 June 2025, p. 19; Fire Rescue Victoria, *Submission 9* (47th Parliament), [p. 4]; Cancer Council Australia, *Submission 62* (47th Parliament), p. 6; Mr Lance Quintal, *Submission 123* (47th Parliament), [p. 1].

17 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 15. See also: Fire Rescue Victoria, *Submission 9* (47th Parliament), p. [4]; Mr Lance Quintal, *Submission 123*

3.20 In other instances, the use of PFAS foams in firefighting continues, with new workers exposed, as discussed later in this chapter.[18]

Potential impacts of occupational exposure

3.21 As discussed at length in Chapter 2, evidence about the impacts of PFAS on human health is contested, with the committee hearing a range of views.

3.22 Generally, evidence from firefighters and other exposed groups submitted that the health impacts of occupational exposure to PFAS and other chemicals are significant:

> Professional firefighters go to work every day with the risk that they will be exposed to a cocktail of harmful chemicals; exposures that are shown to significantly impact their health and wellbeing. The impacts vary based on the type and extent of the exposure, but overall, the physical and psychological injuries that result are felt by thousands of firefighters in Australia.[19]

Physical health effects

3.23 Firefighters told the committee that they are aware of:

> … findings [that PFAS] exposure is associated with serious conditions including reduced immunological function, liver and kidney disfunction, altered reproductive function and higher cholesterol. They are particularly concerned about established associations between PFAS exposure and higher levels of testicular and kidney cancer.[20]

3.24 The Retired Firefighters Group submitted that:

> Today members of our Group are suffering from many PFAS related diseases including:
>
> - kidney failure
> - throat cancer
> - testicular cancer
> - bladder cancer
> - non-Hodgkin lymphoma
> - nasopharyngeal carcinoma
> - infertility

(47th Parliament), [p. 2]; United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 5.

18 See, for example: Mr Mick Tisbury, Assistant Chief Fire Officer, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, pp. 24–25 and 27; Australian Government, *PFAS Per- And Polyfluoroalkyl Substances FAQs* (accessed 30 June 2025); Department of Defence, *PFAS Investigation and management program*, May 2025 (accessed 30 June 2025); Airservices Australia, response to written questions from Senator Thorpe (received 6 June 2025), [p. 5].

19 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 3.

20 United Firefighters Union of Australia, Aviation Branch, *Submission 113*, p. 7. See also: Mr Roger Hart, *Submission 139* (47th Parliament), [p. 2].

- erectile dysfunction
- chronic fatigue syndrome
- prostate cancer.

… As a group our health has deteriorated significantly. The economic burden of medical costs, loss of earning capacity, and early disability is immense. The social toll—on us and our families—is equally severe, marked by anxiety, hardship, and grief.[21]

3.25 Mr Mick Tisbury, Assistant Chief Fire Officer with Fire Rescue Victoria, was more overt in his assessment:

> We do have skin in the game. We're sick of burying our mates. And, at every one of those funerals we attend, there are never any politicians, there are never any regulators, there are never any of these supposed experts, and there are certainly no representatives of the chemical companies that should be held to account—because, at the end of the day, they knew; 3M knew in the seventies how dangerous this was, and they've never been held to account.[22]

3.26 Similarly, workers exposed to PFAS at Avalon Airport have reported health impacts with staff identifying 'numerous previously undiagnosed medical conditions with links to PFAS exposure'.[23]

3.27 As discussed in the previous chapter, the Australian Government advises that PFAS exposure is associated with—but not proven to cause—a range of health effects.[24]

3.28 The Department of Health's Expert Panel on PFAS notes that knowledge around PFAS is still evolving and concludes, 'there is no current evidence that supports a large impact on a person's health as a result of high levels of PFAS exposure' and 'mostly limited or no evidence for any link with human disease', and, in addition, that there is 'no current evidence that suggest an increase in overall cancer risk'.[25]

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21 Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), p. 6.

22 Mr Tisbury, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, p. 17.

23 Mr Aspros, Aviation Rescue and Fire Fighting Service, Avalon Airport, *Committee Hansard*, 4 June 2025, p. 20.

24 Department of Health and Aged Care, *EnHealth Guidance Statement: Per- and Polyfluoroalkyl Substances (PFAS)*, 5 February 2024, updated 11 June 2025, p. 4.

25 Australian Government Department of Health and Aged Care, Expert Health Panel on PFAS, *Report Summary*, May 2018, p. 2.

3.29 Current Australian Government PFAS guidance still recommends exposure to PFAS be minimised wherever possible, in line with the precautionary principle.[26]

3.30 A number of submitters expressed concern at potential health impacts of PFAS based on research and conclusions about the safety of PFAS developed overseas (for example the International Agency for Research on Cancer).[27] Submitters also acknowledged that the scientific understanding of firefighter exposure to PFAS and potential health impacts is constantly evolving.[28]

Elevated PFAS blood levels

3.31 It is well recognised that firefighters and other highly exposed groups have higher levels of PFAS in their blood than the general Australian population.[29] However, the Department of Health advised that routine blood testing of PFAS levels is not recommended because results cannot currently be used to provide any specific health advice.[30]

3.32 Blood testing for PFAS levels has been undertaken for certain populations—including firefighters—for research purposes to determine whether communities have been exposed at higher than general population levels and, over time, to determine the success of PFAS exposure reduction strategies in reducing PFAS blood levels.[31]

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[26] Department of Health and Aged Care, *EnHealth Guidance Statement: Per- and Polyfluoroalkyl Substances (PFAS)*, 5 February 2024, updated 11 June 2025, p. 4.

[27] See, for example: United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 7; Mr Lance Quintal, *Submission 123* (47th Parliament), p. [2]; Minderoo Foundation, *Submission 115* (47th Parliament), pp. 4–6; Mr Christopher Howe, *Submission 91* (47th Parliament), p. [3].

[28] See, for example: United Fire Fighters Union of Australia, *Supplementary submission 104.1* (47th Parliament), p. 1; Cancer Council Australia, *Submission 62* (47th Parliament), p. 3.

[29] See, for example: Department of Health and Aged Care, *Expert Health Panel for PFAS: Summary*, 2018, pp. [1–2]; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), pp. 5–6; Mr Garrett, United Firefighters Union of Australia, *Committee Hansard*, 4 June 2025, p. 20; Fire Rescue Victoria, *Submission 9* (47th Parliament), p. [3]; Mr Lance Quintal, *Submission 123* (47th Parliament), [p. 2]; Dr Robin Gasiorowski & Professor Mark Taylor, Macquarie University, 'World-first trial finds regular blood and plasma donation reduces firefighters' PFAS levels', *The Lighthouse / Media release*, 11 April 2022 (accessed 30 June 2025).

[30] Department of Health and Aged Care, response to questions on notice, public hearing 22 January 2025 (received 11 February 2025), [p. 2].

[31] Department of Health and Aged Care, response to questions on notice, public hearing 22 January 2025 (received 11 February 2025), [p. 2].

3.33 For example, Fire Rescue Victoria has established regular health monitoring for its firefighters, but this kind of testing is not routinely available to all firefighters.[32]

3.34 Ms Newgreen considered that testing of blood PFAS levels was empowering:

> To this day, the government tells people not to test for PFAS and that testing isn't helpful. But I can assure you that our lived experience proves otherwise. Testing has given us clarity. It has allowed us to take action, and it has provided us with hope. Without testing, we would still be in the dark.[33]

Mental health

3.35 The Australian Government recognises research showing people living in PFAS affected communities are more likely to experience psychological distress.[34] Indeed, the mental health impacts of PFAS exposure on firefighters and other exposed groups was borne out in evidence received by the committee.

3.36 Mr Tisbury explained the concern felt by firefighters because of PFAS exposure and the uncertainty associated with their future health.[35] Mr Jay Aspros from the Aviation Rescue and Fire Fighting Service at Avalon Airport spoke of the worry he felt after PFAS exposure at work, noting some staff still felt unsafe and were unable to return to work, and others had sought employment elsewhere:

> I can personally attest to the stress, anxiety and fear that Avalon staff and I felt when we were advised that we'd been drinking, bathing in and washing in water that had PFAS levels 44 times higher than the human health guidelines … What caused and is still causing the most stress and anxiety is the fact that we have no information of the following: exactly what we've been ingesting, how long this has been occurring for, how the chemical got into our drinking water and where the excessive levels of contamination were coming from.[36]

3.37 Mr Howe, who undertakes regular health monitoring on the recommendation of his health care team, described his fear and anxiety about his future health, and impacts on his family, saying:

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[32] Mr Tisbury, Fire Rescue Victoria, *Committee Hansard,* 4 June 2025, p. 17; Mr Garrett, United Firefighters Union of Australia, *Committee Hansard,* 4 June 2025, p. 20.

[33] Ms Jayne Newgreen, Private capacity, *Committee Hansard,* 4 June 2025, p. 3; Mr Christopher Howe, *Submission 91,* p. 6.

[34] Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100* (47th Parliament), p. 6.

[35] Mr Tisbury, Fire Rescue Victoria, *Committee Hansard,* 4 June 2025, p. 23.

[36] Mr Aspros, Aviation Rescue and Fire Fighting Service, Avalon Airport, *Committee Hansard,* 4 June 2025, p. 20; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), pp. 7 and 12.

> These issues further manifest themselves in my day-to-day lifestyle, affecting my sleep, wellbeing, relationships, concentration, employment, and general hope and outlook for the future.[37]

Exposure management strategies and impacts

3.38 Firefighters and other exposed occupational groups discussed a range of regulatory and management strategies to reduce the current and future impacts of PFAS exposure associated with firefighting, as well as issues with these strategies.

Regulation of PFAS in Australia

3.39 Australia does not have nationally consistent legislation prohibiting the occupational use of PFAS. Regulatory frameworks—particularly in relation to firefighting foams containing PFAS—vary across state and territory jurisdictions.[38]

3.40 While Australian governments have agreed to work towards phasing out ongoing use or sale of industrial and commercial products containing long-chain PFAS, at present, the position is that:

> Where short-chain PFAS are used in aqueous film forming foam (AFFF), they should only be used in emergency situations and in accordance with all relevant regulations. Any releases should be fully contained and wastes managed in accordance with the PFAS National Environmental Management Plan (NEMP).[39]

3.41 In response to the prohibition on the import, manufacture and use of PFAS chemicals under the Industrial Chemicals Environmental Management Standard (IChEMS), Mr Tisbury warned that transition periods would still put firefighters at risk:

> Now, there's a lot of publicity about IChEMS. From 1 July, there's going to be a ban on PFAS-containing foam. It's smoke and mirrors … If you're currently using PFAS-containing foam, right now, you can keep using it. You're going to get five years to transition, because, apparently, 25 years hasn't been long enough; you need longer. And there are some accepted uses, like emergencies. Who do you reckon goes to the emergencies? It's us.

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[37] Mr Christopher Howe, *Submission 91* (47th Parliament), p. 3. See also: Ms Jayne Newgreen, *Submission 92* (47th Parliament), p. 3; Ms Jayne Newgreen, Private capacity, *Committee Hansard*, 4 June 2025, pp. 4 and 6.

[38] United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 4; Cancer Council Australia, *Submission 62* (47th Parliament), p. 6.

[39] *National per- and polyfluoroalkyl substances (PFAS) Position Statement: Appendix D to the Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination*, 21 October 2019, p. 2 (accessed 3 July 2025).

> Who are the ones who keep getting exposed? It's us, all because the industry doesn't want to change that …[40]

3.42 At a state level, to date three states have introduced bans on the use of firefighting foams which contain PFAS: South Australia in 2018, Queensland in 2019, and New South Wales (NSW) in 2022.[41]

3.43 Other submitters noted that local exemptions mean that PFAS continues to be used; for example, in Class B foams used for fighting liquid fuel fires.[42]

3.44 According to UFUA, a piecemeal approach to regulation has meant that 'PFAS foams are still being used in operational and training scenarios in some jurisdictions across Australia'. As a result, the Union states there is 'significant concern … that the regulatory environment is failing to ensure firefighter and community safety'.[43]

3.45 As a national operator, Airservices Australia highlighted its frustration with inconsistencies in regulation and implementation between jurisdictions, stating:

> Airservices has also observed inconsistencies in approach by some jurisdictions of other non-Commonwealth agencies that have also historically used PFAS containing foams, who do not appear to be expected to meet the same timeframes and requirements for management and/or remediation by their own regulators.[44]

3.46 PFAS policy, regulation and coordination are further discussed in Chapter 10.

Flow on effects of Commonwealth regulatory treatment of PFAS to the states

3.47 The committee heard evidence that the Australian Government's regulatory treatment of PFAS has flow on effects to states and territories, particularly in terms of work health and safety regulation.

3.48 Mr Samuel Jenkin from WorkSafe Victoria (WorkSafe) outlined that, when it comes to PFAS, the *Australian Code for the Transport of Dangerous Goods by Road*

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40 Mr Tisbury, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, pp. 24–25.

41 Environmental Protection Authority South Australia, *Per- and poly-fluoroalkyl substances (PFAS)*, 5 March 2025 (accessed 3 July 2025); Queensland Government, *Firefighting foam management policy*, 23 November 2021 (accessed 3 July 2025); NSW Environment Protection Authority, *Guidance on complying with the PFAS Firefighting Foam Regulation*, 25 May 2023 (accessed 3 July 2025).

42 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 5, Mr Tisbury, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, pp. 24–25 and 27; Australian Government, *PFAS Per- And Polyfluoroalkyl Substances FAQs* (accessed 30 June 2025); Fire Rescue Victoria, *Submission 9* (47th Parliament), pp. [4–5]. See also: United Firefighters Union of Australia, Aviation Branch, *Submission 113*, p. 8. Class B foams are fire-fighting foams specifically designed for flammable liquid fires, such as those involving gasoline, oil, and other hydrocarbons.

43 United Firefighters Union of Australia, *Submission 104* (47th Parliament), pp. 3–4.

44 Airservices Australia, response to written questions from Senator Thorpe (received 6 June 2025), p. 5.

& Rail does not classify PFAS as a 'dangerous good', which means that the Victorian *Dangerous Goods Act 1985* also does not recognise PFAS as a 'dangerous good'.[45]

3.49 Furthermore, Mr Jenkin explained that 'PFAS is [also] not included in the nationally agreed workplace exposure standards, which are called up directly by the Victorian legislation'.[46]

3.50 As a result of this lack of classification, WorkSafe's role as a regulator is reduced to merely expecting duty holders in a workplace to take a 'precautionary approach' to the use of PFAS, with little scope to conduct investigations or enforcement against workplaces suspected of PFAS contamination.[47]

3.51 Similarly, in a response to questions on notice provided to the committee, the Tasmanian Department of Health stated that it follows the Australian Government on the classification of PFAS:

> The Department of Health adopts the position of the Australian Government Department of Health and Aged Care and of its Environmental Health Standing Committee (enHealth) with regards to the health impacts of PFAS. The current view is that whilst PFAS have not definitely been shown to be a cause of disease in humans, enHealth notes that the science and our understanding of these issues will continue to evolve.[48]

Workers' compensation legislation and PFAS

3.52 While the link between PFAS and cancer is disputed, since 2011, the Australian, state and territory governments (except the ACT) have enacted presumptive workers' compensation legislation that presumes firefighters (or volunteer firefighters) who develop certain cancers or asbestos related diseases have done so because of their firefighting duties and are therefore entitled to compensation under the relevant scheme.[49]

3.53 The extent of cancers covered and the relevant qualifying periods of service—that is, the minimum length of time a firefighter must have served to

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45 Mr Samuel Jenkin, Executive Director, Health and Safety, WorkSafe Victoria, *Committee Hansard*, 4 June 2025, p. 29. While WorkSafe could classify PFAS as a 'hazardous substance' under the Victorian Work Health and Safety Act and Regulations, it also does not currently do so as PFAS is not classified under the globally harmonised system as a 'hazardous substance'.

46 Mr Jenkin, WorkSafe Victoria, *Committee Hansard*, 4 June 2025, p. 29.

47 Mr Jenkin, WorkSafe Victoria, *Committee Hansard*, 4 June 2025, p. 29, 33–34.

48 Department of Health (Tasmania), answer to questions on notice, 13 March 2025 (received 2 April 2025), p. 1.

49 SafeWork Australia, *Presumptive Legislation for Firefighters* (accessed 1 July 2025).

be eligible for compensation—depends on the legislation in the relevant jurisdiction.[50]

PFAS exposure and workers not covered by workers compensation schemes

3.54 Despite the presumptive workers' compensation legislation, the committee heard certain groups of firefighters are not covered in the relevant legislation. Groups which are not covered by presumptive workers compensation include private sector firefighters engaged at military bases across Australia,[51] as well as firefighters on Norfolk Island whose workers compensation legislation lacks any presumption provision.[52]

3.55 The CPSU also advised that Airservices Australia EVTs are not covered under the Commonwealth workers' compensation scheme, in the *Safety, Rehabilitation and Compensation Act 1988*, despite research indicating they are subject to greater levels of PFAS exposure than firefighters.[53]

3.56 The Retired Firefighters Group submitted that the criteria for workers compensation schemes have been 'inconsistently applied' with some exposed veterans being excluded despite meeting the relevant qualifications.[54]

Conditions not covered by workers compensation

3.57 Moreover, the committee heard that the conditions which are presumptively compensated depends on the jurisdiction in which a firefighter serves.

3.58 For example, NSW, South Australia and Victoria do not provide presumptive compensation for lung, skin, pancreatic or thyroid cancer, while only Queensland and the Northern Territory provide presumptive compensation for asbestos-related disease and liver cancer. Commonwealth legislation does not provide presumptive compensation for uterine cancer, asbestos-related disease or liver cancer.[55]

3.59 The Department of Health confirmed that most firefighters are covered under state and territory workers' compensation schemes and that no two schemes are the same. Commonwealth and Australian Capital Territory government employees are covered under Commonwealth legislation, as are a 'small

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50 United Firefighters Union of Australia, *Submission 104.1* (47th Parliament), p. 9.

51 United Firefighters Union of Australia, *Submission 104.1* (47th Parliament), p. 4.

52 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 16. The legislation being the *Employment Act 1988* [Norfolk Island (NI)].

53 CPSU, *Submission 144* (47th Parliament), p. 2.

54 Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), p. 7.

55 United Firefighters Union of Australia, *Supplementary submission 104.1* (47th Parliament), p. 4, Attachment 1—Current presumptive cancer table.

number of private corporations who self-insure under the Commonwealth workers' compensation scheme'.[56]

3.60 In relation to Norfolk Island, the Department of Health explained that employment legislation in that jurisdiction is the responsibility of the Commonwealth Infrastructure Department, and:

> While the Employment Act 1988 (NI) does not currently contain specific reference to presumptive cancer compensation, Infrastructure is considering mechanisms under the legislation that would assist in addressing this.[57]

3.61 The matter was addressed during the course of the inquiry with the committee informed in October 2025 that, in August 2025, the Government had written, through the Department of Infrastructure, to the service provider for the Norfolk Island workers compensation scheme and extended the disease provisions relating to firefighters under the Federal Comcare Scheme to firefighters on Norfolk Island.[58]

Submitters proposals for addressing gaps in workers compensation legislation

3.62 Submitters recommended changes to workers' compensation legislation to extend the diseases and workers covered. The UFUA called for the committee to recommend that the Australian Government:

(a) give consideration to the addition of liver cancer to the list of cancers covered by the *Safety Rehabilitation and Compensation Act 1988*;
(b) work cooperatively with state and territory governments to facilitate the inclusion of liver cancer in their presumptive workers compensation legislation; and
(c) secure presumptive workers compensation rights for firefighters engaged at defence facilities, most particularly those employed by Ventia.[59]

3.63 The UFUA Aviation Branch recommended the Australian Government amends the *Employment Act 1988* (Norfolk Island) to incorporate presumptive legislation for firefighters based in Norfolk Island and that this cover a number of cancers and diseases, with specified qualifying periods.[60]

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56 Department of Health, Disability and Ageing, responses to written questions from Senator Thorpe—firefighters (received 28 July 2025), [p. 3].

57 Department of Health, Disability and Ageing, responses to written questions from Senator Thorpe—firefighters (received 28 July 2025), [p. 3].

58 Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts, approval of Comcare Scheme Guidance—disease provisions relating to firefighters in Norfolk Island, provided by United Firefighters Union Aviation Branch (received 22 October 2025), [p. 1].

59 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 4.

60 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 2.

3.64 The CPSU recommended that amendments be made to the *Safety, Rehabilitation and Compensation Act 1988 (Cth)* to extend current firefighter provisions to emergency vehicle technicians employed by Airservices Australia.[61]

Sector-led mitigation and remediation strategies

3.65 The committee was told that 'the voice of firefighters is an important one, and one that has played a leading role in advocating for domestic and international bans, regulation and remediation of PFAS'.[62]

3.66 As representatives of a community with a vested interest in its own health and safety, Fire Rescue Victoria has taken the initiative and shown leadership in world-leading practices and research to address PFAS exposure, writing:

> Every PFAS mitigation strategy FRV have implemented has been not only measurable and successful, but prior to implementation, the 'experts' have said our goals were impossible to achieve. The fire appliance decontamination process, the PFAS blood reduction treatment, and the fire station remediation processes focussing on immobilisation, were all deemed impossible, until we did them. Never tell firefighters that something is impossible, because that's what we do every day.[63]

3.67 This section looks at sector-led mitigation and remediation strategies, including phasing out PFAS -containing foams, and research and data collection. Evidence on reducing blood PFAS levels is presented in Chapter 2 of this report.

Phase out of PFAS containing firefighting foams

3.68 The Department of Defence (Defence) started phasing out PFAS-containing foams in 2004 and no longer uses foams containing perfluorooctanoic acid, perfluorooctane sulfonate or perfluorohexane sulfonate. It has moved to using foam which contains only trace amounts of other PFAS and has indicated the phase out of PFAS foams may take up to 10 years. These PFAS foams are only used in emergency situations where lives or Defence assets are at risk or in controlled testing environments, and with pollution control measures.[64]

3.69 By 2020, Defence had completed the transition of 'all handheld fire extinguishers to fluorine free foams' and later transitioned all firefighting vehicles in 2022. However, the program to transition 'fixed infrastructure' that utilises PFAS-containing firefighting foam—including hangars, fuel installations and 'hot

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61 CPSU, *Submission 144* (47th Parliament), p. 3.

62 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 2.

63 Fire Rescue Victoria, *Submission 9* (47th Parliament), [pp. 3–4].

64 See: Australian Government, *PFAS Per- And Polyfluoroalkyl Substances FAQs* (accessed 30 June 2025); Department of Defence, *PFAS Investigation and management program*, May 2025 (accessed 30 June 2025); Department of Defence, response to written questions on notice from Senator Thorpe (received 17 February 2025), [p. 6]; Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025), [p. 3].

refuelling' (the process of refuelling an aircraft while its engines are running)—is still in the planning stages, with Defence estimating it could 'take up to 10 years'. Navy vessels will continue to be equipped with PFAS-containing foams until the 'United States Navy updates their requirements for inter-operability'. Defence stated it:

> … only uses these products in emergencies where lives and/or Defence assets are at risk, or in controlled testing situations and not used for training purposes. Pollution control measures are in place to manage any use of foam.[65]

3.70 The Australian Government's position statement on PFAS states that certain PFAS may need to be used 'until effective and economically feasible non-PFAS alternatives are developed'.[66] Defence is continuing to research the use of alternative non-PFAS foams and alternate solutions.[67]

3.71 However, the UFUA contended that:

> Despite there being tested and approved PFAS-free alternatives, continued lobbying efforts from the manufacturers and suppliers of these PFAS foams have allowed exemptions to be carved into regulation to allow for the continued sale of these harmful products.[68]

3.72 Submitters noted that PFAS continues to be used in some Class B foams.[69] Firefighters and others recommended a nationwide ban on the use of any firefighting foam which contains PFAS, including Class B foam extinguishers.[70]

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65 Department of Defence, response to written questions on notice from Senator Thorpe (received 17 February 2025), [pp. 5–6]; Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025), [p. 3].

66 Australian Commonwealth, state and territory governments, National PFAS Position Statement, *National per- and polyfluoroalkyl substances (PFAS) Position Statement: Appendix D to the Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination*, 21 October 2019, p. 2.

67 Department of Defence, response to written questions on notice from Senator Thorpe (received 17 February 2025), [pp. 5–6]; Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025), [p. 3].

68 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 4.

69 See: Fire Rescue Victoria, *Submission 9* (47th Parliament), [pp. 4–5]. United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 5; Mr Tisbury, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, pp. 24–25 and 27; Australian Government, *PFAS Per- And Polyfluoroalkyl Substances FAQs* (accessed 30 June 2025); See also: United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 8.

70 See: Fire Rescue Victoria, *Submission 9* (47th Parliament),p. 5; Christopher Howe, *Submission 91* (47th Parliament), [p. 7]; Mr Christopher Howe, *Submission 91* (47th Parliament), [p. 7]; Ms Jayne Newgreen, *Submission 92* (47th Parliament),p. 7; United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 5; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 2–3.

3.73 Mr Tisbury pointed out that Fire Rescue Victoria had successfully transitioned to PFAS-free alternative foams even for B-class fires:

> We wouldn't be advocating for the use of fluorine-free foam if it didn't work, because we'd be at risk not just of disease but of immediate death … Not only did we transition a decade ago to the fluorine-free foam and not only did we do extensive testing; every single B-class fire that we've fought in Victoria … has been extinguished using only fluorine-free firefighting foam. So it works.[71]

3.74 Professor Bogdan Dlugogorski, an expert in fluorine-free firefighting foams, told the committee that 'fluorine-free foams are approaching the performance of PFAS-containing foam' and should replace PFAS-containing foams:

> In all applications on land, the fluorine-free foams can be employed in exactly the same situation as the foams that contained PFAS in the past. So there's no excuse, in my view, not to employ fluorine-free foams on land. The situation is a little bit different on ships, where there is a requirement to use salty sea water for generating foams. Those fluorine-free foams are not yet fully compatible with sea water. Except of that application, we should be using fluorine-free foams everywhere else.[72]

3.75 Mr Tisbury disagreed with the suggestion that fluorine-free foams do not work with saltwater, noting that offshore oil rigs utilise fluorine-free foams, as do Victorian firefighting services when fighting fires at major hazard facilities on docks (using saltwater).[73]

3.76 Professor Dlugogorski noted that fluorine-free firefighting foams still contain chemical surfactants—just not PFAS. They still have an impact on the environment. However, unlike PFAS, they biodegrade within 28 days.[74]

Workplace remediation and innovation

3.77 Fire Rescue Victoria advised 'Major Hazard Facilities and Industrial areas across the country are heavily contaminated due to the ongoing use and testing of PFAS containing foams in fire protection systems'.[75]

3.78 Firefighters contended that deficiencies in managing risks, significant delays and failure to remediate PFAS-contaminated work sites 'is creating new and

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71 Mr Tisbury, Fire Rescue Victoria, *Committee Hansard,* 4 June 2025, p. 25. See also: Mr Tisbury, Fire Rescue Victoria, *Committee Hansard,* 4 June 2025, pp. 17 and 23–24. See also: Fire Rescue Victoria, *Submission 9* (47th Parliament), [p. 3]; Professor Bogdan Dlugogrski, Private capacity, *Committee Hansard,* 4 June 2025, pp. 25–26.

72 Professor Bogdan Dlugogorski, Private capacity, *Committee Hansard,* 4 June 2025, p. 25.

73 Mr Tisbury, Fire Rescue Victoria, *Committee Hansard,* 4 June 2025, p. 25. See also: Mr Tisbury, Fire Rescue Victoria, *Committee Hansard,* 4 June 2025, p. 26.

74 Professor Bogdan Dlugogorski, Private capacity, *Committee Hansard,* 4 June 2025, p. 27.

75 Fire Rescue Victoria, *Submission 9* (47th Parliament), [pp. 4–5].

acute exposure pathways, namely ingestion via contaminated potable water supplies'.[76]

3.79 Submitters spoke to the contamination at both the Avalon and Norfolk Island airports, suggesting that employers had failed in their duty of care to employees. Mr Wesley Garrett from UFUA claimed:

> … the failures at Avalon Airport are not an isolated incident. It is symptomatic of a much wider disregard for worker safety and environmental accountability in PFAS management. Immediate action is required to ensure comprehensive site remediation, long-term health monitoring and policy reform to protect firefighters and Australians from continued exposure.[77]

3.80 The CPSU and UFUA recognised the significant remediation actions undertaken across numerous PFAS-contaminated worksites, while Airservices Australia, the Department of Infrastructure, and Defence highlighted their ongoing investigations and remediation of contaminated facilities.[78]

3.81 Firefighters acknowledged that a combination of technologies, products, equipment and processes is required to effectively remediate contaminated sites, with no single solution able to meet the requirements for all sites and exposure pathways.[79]

3.82 Innovations to address site contamination are evolving rapidly, as discussed in Chapter 6 of this report. Fire Rescue Victoria discussed its work on developing remediation strategies for fire stations and surrounds, including use of products and processes which immobilise PFAS onsite, as well as soil treatment and

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[76] See: United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 5; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 5. See also: Mr Lance Quintal, *Submission 123* (47th Parliament), [p. 2]; Mr Wesley Garrett, United Firefighters Union of Australia, *Committee Hansard*, 4 June 2025, p. 19.

[77] Mr Wesley Garrett, United Firefighters Union of Australia, *Committee Hansard*, 4 June 2025, pp. 19–20; Mr Lance Quintal, *Submission 123* (47th Parliament), [p. 1]. See also: United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 5.

[78] CPSU, *Submission 144*, p. 2; United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 6; Airservices Australia, response to written questions from Senator Thorpe (received 6 June 2025), [pp. 6–7]; Capital Airport Group, *Submission 43* (47th Parliament),p. 2; Department of Defence, response to written questions from Senator Thorpe (update on Defence actions) (received 12 December 2024), p. 3; Department of Defence, *PFAS Investigation and Management Program* (accessed 30 June 2025).

[79] United Firefighters Union of Australia, *Submission 104* (47th Parliament), pp. 5–6; Fire Rescue Victoria, *Submission 9* (47th Parliament), [p. 5].

stormwater filtering.[80] This work is being shared both nationally and internationally.[81]

3.83 Nevertheless, some firefighters suggested that for fire services and other employers wanting to take positive steps to remediate a contaminated worksite, it can be difficult to know where to start as 'there is no organisation that can advise or provide assistance on what they need to do'.[82]

Research and data collection on exposed groups

3.84 The committee heard of studies and data collected on PFAS-affected occupation groups, particularly firefighters. Notable studies which the committee received evidence about included:

- *Assessing Effectiveness of PFAS Exposure Control in Exposed Communities and Firefighters* (University of Queensland) which aimed to 'assess the changes over time in PFAS blood serum concentrations, particularly in those identified as having elevated serum PFAS concentrations, to investigate the effectiveness of exposure control and identify factors governing successful exposure reduction'.[83]
- *Effect of Plasma and Blood Donations on Levels of Perfluoroalkyl and Polyfluoroalkyl Substances in Firefighters in Australia* (Macquarie University) which conducted a clinical trial of 285 firefighters from Fire Rescue Victoria and found both blood and plasma donations resulted in significantly lower PFAS levels.[84]
- *Evaluation of per- and poly- fluoroalkyl substances (PFASs) in Airservices Australia's Aviation Rescue Fire Fighting Service (ARFFS) Staff* (University of

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80 Mr Tisbury, Fire Rescue Victoria, *Committee Hansard,* 4 June 2025, p. 24. See, for example: Mr Robert Lancaster, Senior Business Development Manager, Fire and Test Australasia, *Committee Hansard,* 4 June 2025, p. 47.

81 Fire Rescue Victoria, *Submission 9* (47th Parliament), [p. 2]; Fire Rescue Victoria, Response to written questions from Senator Thorpe (received 12 June 2025), [pp. 1–2]. United Fire Fighters Union of Australia, *Submission 104* (47th Parliament), p. 7.

82 United Fire Fighters Union of Australia, *Submission 104* (47th Parliament), p. 7; Fire Rescue Victoria, *Submission 9* (47th Parliament), [p. 2]; Fire Rescue Victoria, Response to written questions from Senator Thorpe (received 12 June 2025), [pp. 1–2].

83 University of Queensland, *Assessing Effectiveness of PFAS Exposure Control in Exposed Communities and Firefighters*, April 2025 (accessed 3 July 2025). See also Ms Jayne Newgreen, *Submission 92* (47th Parliament), pp. 2 and 6; Mr Christopher Howe, *Submission 91* (47th Parliament), p. 2.

84 Robin Gasirowski, Michael Tisbury et al, 'Effect of Plasma and Blood Donations on Levels of Perfluoroalkyl and Polyfluoroalkyl Substances in Firefighters in Australia: A Randomized Clinical Trial', *JAMA Network Open*, vol. 5, no. 4, 2022 (accessed 3 July 2025). See also Mr Tisbury, Fire Rescue Victoria, *Committee Hansard*, p. 17; Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100* (47th Parliament), p. 7.

Queensland) which found that emergency vehicle technicians may potentially have higher serum PFAS levels than firefighters.[85]

- *PFAS Exposure Study for current and former Norfolk Island Fire Service firefighters (2020–2021)* (University of Queensland) which found that former Norfolk Island Fire Service employees had higher average PFAS concentrations than current employees, but also that both classes of employees with more than 10 years of service exhibited higher concentrations of PFHxS and PFOS compared to those with shorter service periods.[86]

3.85 Despite the various studies that have been conducted on PFAS-affected workforces, the Cancer Council submitted that research to-date on affected groups—and PFAS contamination more generally—is limited in its usefulness:

> The quality of available research evidence is a significant barrier to interpretation, with limits in sample size, information about confounders, and a lack of consistent methodology in primary studies … Studies also differed in the populations studied, including PFAS manufacturing workers, communities exposed to contaminated water supplies, and specific cancer patient populations. These inconsistencies make it difficult to compare studies and draw robust conclusions.[87]

3.86 While the Cancer Council approved of the Australian Government's investment into the potential health effects of PFAS via the National Health Research Program and the Australian National University's epidemiological study in PFAS-exposed communities, it recommended that environmental and human biomonitoring be implemented for the 'general population, and specific groups at high risk of exposures, such as firefighters'.[88]

3.87 The Retired Firefighters Group identified limitations in data collection regarding former firefighters who were exposed to PFAS:

> There is a critical lack of historical data on PFAS exposure among Australian Army firefighters who served from the 1970s through the 1990s … Research into PFAS-related illnesses among defence personnel remains fragmented and insufficient. A robust, independent study focused specifically on all veterans who handled AFFF is urgently needed.[89]

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85 Sandra Nilsson, Lesa Aylward et al, *University of Queensland, Evaluation of per- and poly- fluoroalkyl substances (PFASs) in Airservices Australia's Aviation Rescue Fire Fighting Service (ARFFS) Staff—2018/2019*, 14 December 2020 (accessed 2 July 2025).

86 Mr Lance Quintal, *Submission 123* (47th Parliament), p. 2.

87 Cancer Council Australia, *Submission 62* (47th Parliament), p. 5.

88 Cancer Council Australia, *Submission 62* (47th Parliament), p. 6.

89 Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), p. 6–7.

3.88 In 2019, the NHMRC provided over $10.8 million for nine research applications through the PFAS 'Targeted Call for Research' (TCR) scheme. The scheme was designed to 'further increase understanding of the acute and long-term potential human health effects from exposure to PFAS'.[90]

3.89 However, while some findings from the approved projects under the TCR scheme have been published, the Department of Health advised the committee that the findings have 'not contributed to the NHMRC's current review which is considering existing guidance guideline values and reviews from overseas jurisdictions'. If the findings were to form part of the NHMRC's review, the Department stated they would need to be 'peer-reviewed, published and considered as part of a body of evidence rather than as individual studies'.[91]

3.90 Further, projects which are funded under the TCR scheme are expected to conclude by June 2026,[92] and there is no indication the scheme will be extended beyond this date.

Further proposals for regulation and remediation

3.91 Firefighters and those in other occupations with elevated exposure to PFAS firefighting foams uniformly called for changes to prevent further exposure, to mitigate legacy and ongoing exposure from contaminated sites, and address potential health impacts from PFAS foam exposure.

3.92 There were calls for regulatory changes for PFAS. The Cancer Council recommended that PFAS be recognised as an environmental pollutant 'across the regulatory spectrum', while Ms Newgreen called for the designation of PFAS as a 'hazardous substance' under the relevant legislation and for the polluter to be held accountable for its dispersion.[93]

3.93 To improve the integration and availability of PFAS contamination information, and to help workers and other exposed people reduce their exposure and health risks, Mr Howe and Ms Newgreen called for mandatory reporting of contaminations and a national public register of PFAS contaminated sites. It was suggested the register include details of the sites—including those owned or

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[90] Department of Health and Aged Care, answer to questions on notice, public hearing 22 January 2025 (received 11 February 2025), p. 9.

[91] Department of Health and Aged Care, answer to questions on notice, public hearing 22 January 2025 (received 11 February 2025), p. 1.

[92] Department of Health and Aged Care, answer to questions on notice, public hearing 22 January 2025 (received 11 February 2025), p. 1.

[93] Cancer Council Australia, *Submission 62* (47th Parliament), p. 9; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [p. 8].

managed by the Australian, state, territory or local governments, as well as privately owned or managed land.[94]

3.94 In recognition of the significant costs of remediation, other submitters advocated for the establishment of an Australian Government fund to enable the remediation of severely PFAS-contaminated sites. In particular, UFUA sought funding to support remediation of current and former fire stations (and surrounds), firefighting training facilities, airports and water catchments.[95]

3.95 There were calls from firefighters and others for the Commonwealth to commence litigation against 3M and Dupont for the alleged harm their products caused firefighters, other workers, and the environment, as well as for 3M's alleged false marketing of harmful products.[96] It was suggested that monies from any litigation be used to partly fund the remediation of fire stations, airports and related facilities.[97]

3.96 UFUA recommended the Commonwealth establish an expert tripartite panel, with membership comprised of government, private sector, and unions, with responsibility for reducing risks to workers, and to advise parties on effective remediation of PFAS contaminated sites, providing:

> … clear, well founded and genuine technical and logistical advice. We recommend the establishment of an expert tripartite panel by the Australian Government, to guide parties in addressing PFAS site remediation. Importantly, the body should have a 'solutions focus', providing resources and guidance from testing through to remediation.[98]

3.97 UFUA Aviation Branch recommended that the Department of Infrastructure assumes full responsibility for remediation and management of PFAS contamination on and around Norfolk Island airport.[99]

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94 Mr Christopher Howe, *Submission 91* (47th Parliament), [p. 7]; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [p. 7].

95 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 6; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 2. See also: Mr Christopher Howe, *Submission 91* (47th Parliament), [p. 7].

96 Fire Rescue Victoria, *Submission 9* (47th Parliament), p. 5; Christopher Howe, *Submission 91*, [p. 7] (47th Parliament), Ms Jayne Newgreen, *Submission 92* (47th Parliament), [p. 7]; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 2.

97 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 6; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 2. See also: Christopher Howe, *Submission 91* (47th Parliament), [p. 7].

98 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 7; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 2; United Firefighters Union of Australia, *Submission 104.1* (47th Parliament), p. 5.

99 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 2.

Addressing health concerns

3.98 There were calls from firefighters and other affected workers for equitable, funded, long-term health monitoring for those exposed to PFAS at work—in particular monitoring of blood PFAS levels.[100]

3.99 Affected workers underlined that access to testing would help them understand their levels of exposure, mitigate future health risks (for example, through plasma and blood donation and early detection of potential health issues) and help address the anxiety associated with exposure.[101]

3.100 Submitters recommended that workers with elevated PFAS levels be made eligible to access Medicare benefits for therapeutic plasma/blood donations, where their blood is not accepted by blood banks.[102]

3.101 Some submitters went further, requesting access to plasma donation facilities for those in isolated or regional areas (such as Norfolk Island) and cost reimbursement for associated costs such as time and travel.[103]

3.102 Given the work-related nature of their PFAS exposure, and challenges to having PFAS exposure recognised as an injury under compensation schemes, highly exposed workers—including former members of the Royal Australian Army Fire Service—recommended that they be given free and accessible medical and mental health supports.[104]

3.103 The Australian Army Fire Service, Retired Firefighter's Group, recommended that Australia adopt similar practices to those in international compensation programs, such as health screening and lifetime medical support for all veterans

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100 See, for example: Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), p. 7; *Submission 91* (47th Parliament), [p. 7]; Airservices Australia, Response (received 22 July 2025), p. 8; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [pp. 5–7]; Mr Lance Quintal, *Submission 123* (47th Parliament), [p. 3]; Mr Wesley Garrett, United Firefighters Union of Australia, *Committee Hansard,* 4 June 2025, p. 20.

101 See, for example: Ms Jayne Newgreen, *Submission 92* (47th Parliament), [p. 5]; Ms Newgreen, Private capacity, *Committee Hansard,* 4 June 2025, p. 2; Mr Wesley Garrett, United Firefighters Union of Australia, *Committee Hansard,* 4 June 2025, p. 20; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 7; Cancer Council Australia, *Submission 62* (47th Parliament), p. 6.

102 United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), pp. 2–3; Mr Christopher Howe, *Submission 91* (47th Parliament), [p. 7]; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [pp. 6–7]

103 Mr Christopher Howe, *Submission 91* (47th Parliament), [p. 7]; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 9.

104 Mr Christopher Howe, *Submission 91* (47th Parliament), [p. 7]; United Firefighters Union of Australia, Aviation Branch, *Submission 113* (47th Parliament), p. 9; Ms Jayne Newgreen, *Submission 92* (47th Parliament), [pp. 6–8]; Australian Army Fire Service, Retired Firefighter's Group, *Submission 141* (47th Parliament), p. 7.

exposed to PFAS. The Group also recommended legislative and policy changes to:

- recognise PFAS exposure as service related; and
- establish a national registry of all Defence personnel exposed to PFAS.[105]

Extending research, especially into health impacts

3.104 Submitters underscored the need for further data collection and funded research to establish the current levels of PFAS in firefighters and the health implication of PFAS exposure for firefighters and other exposed workers.[106]

3.105 Given the lack of historical data on PFAS exposure among Australian Army Firefighters who served from the 1970s–1990s, the Australian Army Fire Service, Retired Firefighter's Group, recommended that a robust, independent study focused specifically on all veterans who handled AFFF be conducted.[107]

3.106 The committee's views and recommendations are provided in Chapters 11 and 12 of this report.

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[105] Australian Army Fire Service, Retired Firefighter's Group. *Submission 141* (47th Parliament), p. 7.

[106] See, for example: Cancer Council Australia, *Submission 62* (47th Parliament), pp. 6 and 8.

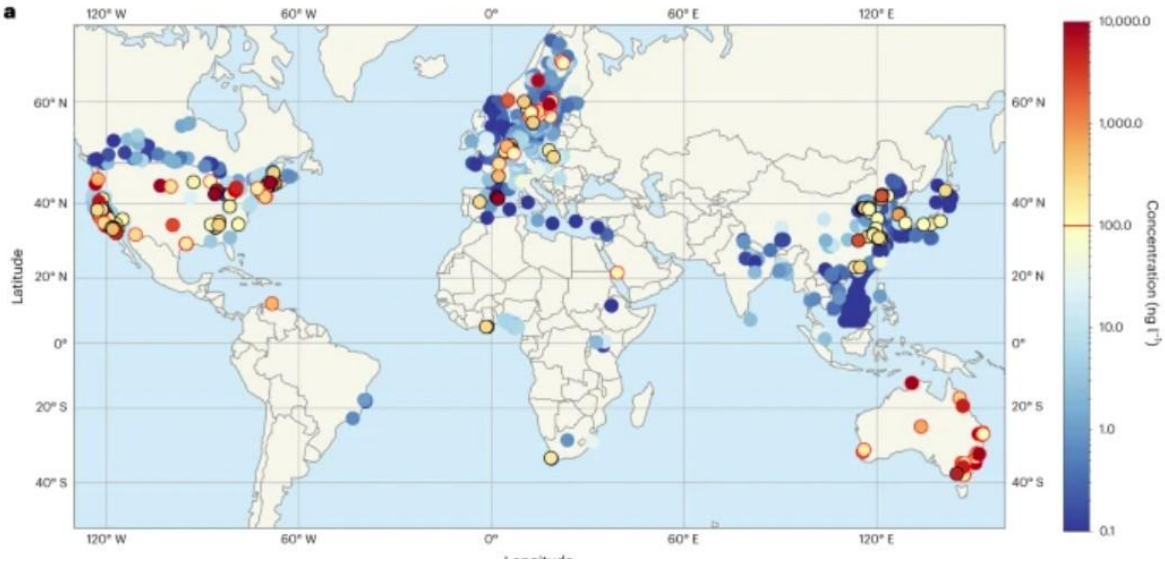
[107] Australian Army Fire Service, Retired Firefighter's Group. *Submission 141* (47th Parliament), pp. 6–7.

Chapter 4
Social and ecological impacts of PFAS contamination

Introduction

4.1 Environmental studies have shown that per- and polyfluoroalkyl substances (PFAS) are widespread in the Australian environment, including surface water and groundwater—generally at low levels. However, due to historic industrial and occupational practices, some environments are affected by significant PFAS contamination levels. Figure 4.1 below indicates that several parts of Australia have higher concentrations of PFAS in surface, ground, and drinking waters.

Figure 4.1 Global map of PFAS concentration in water (published 2024)



Source: Ackerman Grunfeld, D., Gilbert, D., Hou, J. et al. Underestimated burden of per- and polyfluoroalkyl substances in global surface waters and groundwaters. Nat. Geosci. 17, 340–346 (2024).

Note: Sum of concentration of 20 PFAS subject to EU guidance in surface water, groundwater and drinking water samples. Those above the EU drinking water limit of 100 ng l−1 (marked red on scale bar) are circled in red (for known contamination sources (for example, AFFF or non-AFFF)) or black (unknown sources).

4.2 This chapter looks at the social and ecological impacts of PFAS contamination in Australian environments, including impacts on lifestyle and recreation, and impacts on Australian wildlife and habitats. Impacts on First Nations communities and culture are considered separately in Chapter 5.

4.3 The chapter then reflects on national regulation and guidance, the collection and availability of data, and compensation and funding. In doing so, the chapter summarises evidence received throughout the inquiry and suggestions made by submitters and witnesses.

4.4 A discussion of the legislative, regulatory and policy settings around PFAS—including the Commonwealth's role in national coordination, environmental monitoring, management, care and remediation of PFAS contamination—is included in Chapter 10 of this report.

Impacts of PFAS on lifestyle and recreation

4.5 Numerous submitters to the inquiry were concerned about the impact that PFAS contamination of soil and waterways is having on the Australian way of life. Residents of areas with heavy contamination face restrictions on what they can do, what they can grow, and how they can interact with the environment. Swimmers, campers, sportspeople, hunters and others who interact with the environment are also affected.

4.6 Cultural studies Professor at the University of Southern Denmark, Dr Charlotte Kroloekke said the health consequences of PFAS are 'well documented', but the cultural impacts are less well understood:

> … beyond these biological effects, PFAS pollution also threatens cultural life. It alters how communities live, work and relate to their environments. It erodes traditions, practices and relationships that are essential to cultural identity and to both individual and collective wellbeing.[1]

4.7 The Concerned Waterways Alliance highlighted the impact of PFAS contamination on waterways that are 'highly valued for recreational activities', such as the Moorabool, Yarra, Maribyrnong and Latrobe Rivers, and the Gippsland Lakes, in Victoria. The Alliance stated:

> PFAS contamination erodes community trust in water safety and diminishes the rivers' roles as cultural and social hubs. Indigenous communities, who have longstanding spiritual connections to waterways, face disproportionate cultural losses if contamination disrupts traditional practices.[2]

4.8 Field & Game Australia discussed the detrimental impacts of PFAS contamination on the Heart Morass—a property in East Gippsland, Victoria, popular with hunters. Having purchased the property for a total of $2.1 million, the organisation's intention was to restore the 'degraded farmland' by creating a wetland ecosystem which would support native wildlife and recreational activities, 'including birdwatching, environmental education, and hunting'. According to Field & Game Australia, PFAS contamination from RAAF Base East Sale has 'wiped out the property's commercial value', hunters 'no longer feel safe consuming game harvested on the property due to health advisories',

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1 Dr Charlotte Kroloekke, Professor, University of Southern Denmark, *Committee Hansard*, 10 June 2025, p. 47.

2 Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 5].

and revenue losses from less people paying access fees 'are significant'. Field & Game Australia maintained:

> The local economy has also been affected. Activities like birdwatching, hunting, and educational programs previously brought business to nearby towns but have now declined substantially.[3]

4.9 Field & Game Australia was frustrated at the lack of authoritative public information about the impacts of PFAS on the environment, and the safety of interacting with contaminated sites. Mr Lucas Cooke, Chief Executive Officer (CEO) of Field & Game Australia, noted that media attention on PFAS at the Heart Morass has led to the cancellation of educational visits to the site. Asked, 'what risk does a daytrip to a wetland site have?', Mr Cooke said there is a lack of adequate information they can provide to allay the fears of schools and parents:

> We can go and try to pull it off websites and out of scientific papers and that sort of thing, but, as a parent sitting at home with a permission slip for your kid to go somewhere, you just recognise: 'Hang on a minute. Heart Morass? PFAS. I don't want them going there.' There's no nice little thing that goes, 'Yes, they're going to be there, but they're not going to be in the water. They're not going to be eating the mud,' or, 'Maybe kids will eat a little bit of the mud, but they're not going to eat a lot of the mud.' A nice educational thing that actually gives some reassurance to people would be amazing, but it just doesn't exist at the moment.[4]

4.10 A number of submitters talked about the impact of PFAS contamination on their lifestyles. Mr Jim Mustica, a resident of Belmont Western Australia whose property was impacted by PFAS from a former fire training ground, explained:

> The dreams of mum and dad were to create a utopia for the family to all be able to enjoy, their lives revolved around preserving and preparing produce grown in the orchard and garden. Chickens were raised for meat and eggs supplied to family and friends. From the late 60s to around the mid-80s the fruit trees and produce thrived, this was very pleasing for dad as he enjoyed following the family tradition of market gardening, we now believe when the PFAS began entering the surface and groundwater, crops and trees began to suffer …[5]

4.11 Years later when the property was being sold to a developer who intended to build a childcare centre, Mr Mustica conducted testing of the water from the bore that serviced the property and found elevated concentrations of 'PFOA between 3.7µg/L to 6.1µg/L, PFOS at 37µg/L to 45µg/L and PFOS+PFHxS between 64µg/L to 82µg/L' (current advice stipulates that the concentration of PFOA in drinking water should not exceed 0.2 µg/L). After taking these results

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3 Field & Game Australia, *Submission 52* (47th Parliament), pp. 1–2.

4 Mr Lucas Cooke, Chief Executive Officer, Field & Game Australia, *Committee Hansard*, 4 June 2025, p. 13.

5 Jim Mustica, *Submission 135* (47th Parliament), [p. 1].

to the developer, Mr Mustica noted that the developer ordered his own testing and eventually abandoned the plan to build a childcare centre on site. The site was then declared 'possibly contaminated—investigation required'. Two investigations were undertaken. However, Mr Mustica argued they did not accurately take into account the daily use of bore water on the property, or the fact that home-grown produce was consumed and chickens were kept.[6]

4.12 The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (crcCARE), which performs research, develops technologies and provides policy guidance on PFAS, argued that PFAS contamination 'has significant social, cultural and economic repercussions'. crcCARE submitted:

> Community anxiety and property devaluation are particularly high in Australia and globally, impacting cultural and economic values linked to affected sites. This economic burden will likely persist unless a risk-based approach is integrated into PFAS management policies.[7]

4.13 Similarly, CSIRO noted that PFAS contaminated waterways may be 'closed or restricted from recreational activities such as fishing', and that residents near contaminated sites often face costs such as paying for alternative water supplies, or switching from bore water to town water. Affected properties may 'be subject to depreciation and/or face difficulty in selling and renting', and agricultural producers in PFAS-affected areas 'can suffer reputational harm and income loss from being unable to sell or export crops and/or livestock'.[8]

4.14 The Department of Defence (Defence) acknowledged that communities around Defence sites affected by PFAS contamination have expressed concerns about 'impacts to their physical health, and wellbeing', restrictions on how they can use their properties, contamination of drinking water, groundwater, surface water and the environment, as well as 'reduced property values, both actual and perceived'. Defence noted these concerns 'are ongoing despite the settlement of legal claims' for compensation.[9]

4.15 While acknowledging the ongoing impacts of PFAS contamination on communities, Defence submitted that its priority is to 'manage, remediate and monitor PFAS contamination to mitigate the environmental impacts of PFAS contamination and reduce the pathways that might expose people to contamination, such as for example, the use of bores'.[10]

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6 Jim Mustica, *Submission 135* (47th Parliament), [pp. 2–3].

7 crcCARE, *Submission 36* (47th Parliament), p. 8.

8 CSIRO, *Submission 22* (47th Parliament), pp. 9–10.

9 Department of Defence, *Submission 66* (47th Parliament), [pp. 2–3].

10 Department of Defence, *Submission 66* (47th Parliament), [p. 3].

4.16 The PFAS Independent review of land uses around Defence bases (Independent review)—discussed in Chapter 1 of the committee's interim report—recommended a new national coordinating body work to develop 'additional policy guidance' to address 'risks associated with food production in the context of PFAS contamination'. This recommendation was agreed. Action will include developing new Health Investigation Levels to 'inform risk assessments for the suitability of relevant land uses'.[11]

4.17 Progress on the new national coordinating body and the recommendations of the PFAS Independent review are further considered in later chapters of this report.

Compensation for affected communities

4.18 Field & Game Australia recommended the development of a 'comprehensive compensation package that reflects the loss of land value, revenue, and future conservation opportunities', saying governments should establish a mechanism to fund and support conservation of PFAS-contaminated land, such as the Heart Morass. In addition, Field & Game Australia recommended funding be provided for health monitoring for volunteers and regular site uses, and that safety and risk assessment protocols be developed for volunteers working in contaminated sites.[12]

4.19 crcCARE recommended governments implement 'fair and comprehensive compensation schemes for affected communities'.[13]

Impacts of PFAS on Australian environment, ecology, wildlife, and habitats

4.20 Many inquiry participants were concerned about impacts of PFAS contamination on the environment, ecology, wildlife and habitats. Submitters highlighted the impacts of PFAS contamination of water supplies, with flow on effects to soil contamination and ecosystems. Potential negative impacts could include habitat degradation, biodiversity loss, and escalating toxicity and ecological harm.[14]

4.21 Professor Denis Michael O'Carroll, from the University of New South Wales, said his research demonstrates that 'PFAS is pervasive in the environment', though current testing only identifies a limited range of PFAS chemicals, so 'there is more PFAS out there that potentially we should be concerned about'. Professor O'Carroll's research 'found that a significant number of our surface and groundwaters are at concentrations that would exceed drinking water

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11 Govt response to independent review, [p. 12].

12 Field & Game Australia, *Submission 52* (47th Parliament), [p. 4].

13 crcCARE, *Submission 36* (47th Parliament), p. 23.

14 Dr Ian Wright, *Submission 102* (47th Parliament), pp. 4 and 10–11.

levels, and the [proposed] new drinking water [Guideline] level for example in Australia'.[15]

4.22 The Environmental Defenders Office (EDO) noted that PFAS have been detected 'in soil, household dust, groundwater, wastewater, and even rainfall', and submitted that PFAS contamination has impacts 'beyond the site and may remain in the environment over an unknown time period':

> PFAS chemicals damage endocrine, reproductive and immune system health of both humans and wildlife.
>
> … PFAS contamination in land, food and water sources appears to be increasingly identified across Australian communities.[16]

4.23 Concerned Waterways Alliance submitted that, because PFAS persist in soils, groundwater, and surface water, they impact 'groundwater-dependent ecosystems', interacting with other pollutants to 'amplify toxicity, exacerbating ecological harm'.[17]

Wildlife

4.24 Several submitters and witnesses raised concerns about the bioaccumulation of PFAS in wildlife such as invertebrates, waterbirds and fish, as well as higher-order predators like ducks, platypus and dolphins.[18]

4.25 Dr Matt Landos, Director, Future Fisheries Veterinary Service Pty Ltd, argued that animal studies 'across a whole range of biota', including fish, have identified detrimental impacts from 'very low exposures during critical life phases':

> This is often at the earliest of times, when the cells of the animal are being organised as an embryo, that exposures can lead to permanent changes in the trajectory of the health of that animal. It can lead to changes in the behaviour of that animal that can be biologically important.
>
> … These [studies] are adding evidence to the array of evidence that these compounds are problematic at phenomenally low exposures when we see them contacting human or animal cells.[19]

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15 Professor Denis Michael O'Carroll, Professor, University of New South Wales, *Committee Hansard*, 13 November 2024, p. 18.

16 Environmental Defenders Office, *Submission 55* (47th Parliament), pp. 6 and 13.

17 Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 5].

18 Dr Ian Wright, *Submission 102* (47th Parliament), pp. 4 and 10–11; Dr Wright, Western Sydney University, *Committee Hansard,* 22 January 2025, p. 2; Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 3]; Dr Landos, Future Fisheries Veterinary Service Pty Ltd, *Committee Hansard,* 12 March 2025, p. 5; Gippsland Water, response to questions on notice, public hearing 4 June 2025 and written questions from Senator Thorpe (received 23 June 2025), pp. 8–9.

19 Dr Matt Landos, Director, Future Fisheries Veterinary Service Pty Ltd, *Committee Hansard*, 12 March 2025, p. 5.

4.26 Dr Landos added that a major concern is the accumulation of PFAS in predatory species, such as aquatic birds, which consume contaminated seafood:

> We see similar patterns in seals—which was another of the papers that I provided—such as the endangered Australian sea lion. These are of significant concern over the way in which the PFAS chemicals accumulated in an adult can particularly be passed and transferred in exposure to the young—in seals via maternal milk; in penguins via the egg—leading to critical exposures to the embryo.[20]

4.27 Submitters noted the impacts of PFAS contamination on marine ecosystems, marine mammals, fish, and crustaceans:

- endocrine disruption in seals, dolphins, and other marine mammals;
- reduced fertility and population decline;
- impacts on coral reefs, such as 'reduced growth rates and weakened structural integrity; and
- bioaccumulation in fish, crustaceans, and other seafood species, 'posing risks to human consumers and marine food webs'.[21]

4.28 World Wide Fund for Nature—Australia (WWF—Australia) and the Australian Marine Conservation Society (AMCS) submitted that exposure to PFAS 'is having devastating impacts on wildlife as it can cause cancers, birth defects and infertility, and places already vulnerable populations at greater risk'. According to WWF—Australia and AMCS, research has identified 600 species at risk of harm from PFAS, including species in Australia, such as freshwater turtles, bottlenose dolphin, and platypuses.[22]

4.29 University of Tasmania researchers, Dr Melanie R Wells and Professor Mary-Anne Lea submitted evidence regarding 'widespread dissemination of PFAS in little penguins', which was associated with changes in 'blood parameters of health'—which could be 'indicative of underlying health issues, such as anaemia or nutritional deficiency'[23]—and 'abnormalities in blood cells'. The authors noted a 'higher amount and number of PFAS detected in eggs' and proposed that PFAS studies on wildlife should focus on egg-laying species as a priority.[24]

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[20] Dr Matt Landos, Director, Future Fisheries Veterinary Service Pty Ltd, *Committee Hansard*, 12 March 2025, p. 5.

[21] Dr Melanie Wells and Professor Mary-Anne Lea, *Submission 133* (47th Parliament), [pp. 1–2].

[22] World Wide Fund for Nature—Australia (WWF—Australia) and the Australian Marine Conservation Society (AMCS), *Submission 54* (47th Parliament), pp. 1–4.

[23] Melanie R. Wells, Timothy L. Coggan, Gavin Stevenson, Navneet Singh, Matthew Askeland, Mary-Anne Lea, Annie Philips, Scott Carver, 'Per- and polyfluoroalkyl substances (PFAS) in little penguins and associations with urbanisation and health parameters', *Science of The Total Environment*, Volume 912, 2024, p. 10; in Dr Melanie R Wells and Professor Mary-Anne Lea, *Submission 133* (47th Parliament).

[24] Dr Melanie R Wells and Professor Mary-Anne Lea, *Submission 133* (47th Parliament), [p. 3].

4.30 Dr Wells and Professor Lea noted recently published research on PFAS in tiger snakes from urban wetlands, and research on dolphins, which describes 'record breaking high levels of PFAS'. They also noted the PFAS burden detected in Australia's platypus populations.[25]

4.31 The committee also heard evidence from Professor Susan Wilson about PFAS experiments on a bee colony that her team conducted at the University of New England. The results showed that the PFAS transferred to the next generation and many of the larvae died off:

> We've run a series of experiments from about 2017 onwards to now. In this most recent experiment, which isn't yet published, there were sublethal concentrations. We found that the bee colony itself developed. It produced eggs and larvae that hatched, but there were still concentrations in that second generation. PFAS had transferred through the generations. Those larvae just didn't do well. They died off. There were poor hatchling rates, et cetera. … It was a very significantly different, much less improved hatching of the offspring compared with the control that wasn't exposed to PFAS.[26]

4.32 Referring to findings of recent studies demonstrating impacts on metabolic processes and reproductive success of species, CSIRO suggested PFAS contributes to population decline. It argued that longitudinal studies around the effects of PFAS need to incorporate 'environmental PFAS and effects data', as understanding the impacts of PFAS on the environment 'is crucial':

> Although PFAS effects have been demonstrated in short-term ecotoxicological exposure studies, understanding the effects on aquatic and terrestrial biota exposed to PFAS throughout their lifetime is limited.
>
> … Additional research is essential to understand how PFAS exposure can affect Australian wildlife (especially native and culturally significant species) and ecosystems on a geographical and climatic scale, across Australian states and territories.[27]

Fresh, estuarine and marine water habitats

4.33 Submitters and witnesses raised concerns about PFAS contamination of several fresh, estuarine and marine waterways around Australia.

4.34 For instance, the Concerned Waterways Alliance submitted that PFAS contamination 'disrupts aquatic and terrestrial habitats', impacting the food chain, 'leading to cascading ecological effects, and a shift towards more tolerant,

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25 Dr Melanie Wells and Professor Mary-Anne Lea, *Submission 133* (47th Parliament), [p. 2].

26 Professor Susan Wilson, Professor in Environmental Pollution, University of New England, *Committee Hansard*, 13 November 2024, p. 19.

27 CSIRO, *Submission 22* (47th Parliament), p. 10.

often invasive, species' in Australia's waterways. Because it impairs reproduction, PFAS could also lead to biodiversity loss.[28]

The Heart Morass wetland, Sale, Victoria

4.35 Protection and conservation of wildlife areas in Australia is often dependent on volunteers. Field & Game Australia submitted that its project at the Heart Morass, a wetland near Sale in Victoria, relies on volunteers to regenerate the land. However, PFAS contamination of the area 'raises serious concerns' for the safety of those volunteers, particularly when handling contaminated water, soil, or vegetation, or participating in 'clean-up, maintenance, and monitoring work'.[29]

4.36 Field & Game Australia explained that the Heart Morass 'was intended to be a flagship conservation project, enhancing biodiversity, water quality, and recreational access'. As well as damaging the commercial value of the Heart Morass, PFAS contamination originating from RAAF Base East Sale has undermined 'critical conservation work, exposing volunteers to potential long-term health risks, and limiting our future capacity to purchase and protect additional land'.[30]

4.37 Mr Cooke said the discovery of PFAS contamination at the Heart Morass 'derailed' over a decade's work in establishing a sustainable conservation model:

> In 2016, the contamination of the RAAF East Sale base was a known hotspot, but it was confirmed that the only source of outflow of stormwater from that property is directly onto ours. They have their eastern main drain, which flows directly into the Heart Morass. It discharges only onto our property, and the Heart Morass is a terminal wetland, which means the water that flows onto our property stays on our property except in times of flood or overflow. The water flows on; the water evaporates, but the PFAS does not. It doesn't break down. It accumulates in the sediment and the base of our wetland. With that announcement back in 2016, all of our plans for that property have basically come to a standstill. We're now at a loss.[31]

4.38 Mr Cooke also noted that current PFAS testing practices tend to test only the water. However, PFAS collects in mud and sediment, which is then dislodged in heavy rain events, infiltrating clean water supplies.[32]

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28 Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 5].

29 Field & Game Australia, *Submission 52* (47th Parliament), [p. 2].

30 Field & Game Australia, *Submission 52* (47th Parliament), [pp. 1–2].

31 Mr Lucas Cooke, Chief Executive Officer, Field & Game Australia, *Committee Hansard*, 4 June 2025, p. 11.

32 Mr Lucas Cooke, Chief Executive Officer, Field & Game Australia, *Committee Hansard*, 4 June 2025, p. 12.

4.39 Victorian community and agricultural advocate, Ms Tracey Anton agreed, noting that, in Gippsland near the Latrobe River, there is 'no record of testing of the sediment', only the water itself.[33]

Estuarine and marine ecosystems at Cobaki and Cairns QLD

4.40 One submitter expressed concern about PFAS contamination from the Gold Coast Airport's fire training ground impacting the Cobaki coastal lowland estuarine ecosystems, at the New South Wales (NSW) and Queensland border. According to the submitter:

> Despite groundwater contours/flow vectors from the [fire training ground (FTG)] being to the south, west and [south-west] to the estuary, the drainage network downstream of the FTG which discharges to the estuary has never been sampled on the [Gold Coast Airport] site between the estuary and M1 more than 16yrs on. Also, a further key PFAS exposure pathway to this ecological and human receptor being the Coolangatta Creek overflow to the west with another discharge point to the estuary has never been sampled when surface water PFOS contaminant levels up to 26.4 ug/L were confirmed 2011, more than 13yrs ago.[34]

4.41 The North Queensland Airports Group highlighted the critical role of Queensland's airports in providing access to a number of areas of outstanding natural beauty and world heritage, including the Great Barrier Reef and Wet Tropics, and the Daintree Rainforest. Cairns Airport is positioned within 'a delicate ecosystem considered critical to the maintenance of biodiversity and cultural values in the bordering Barron River estuary', and Mackay Airport is 'adjacent to the popular Whitsundays tourist destination'.[35]

Swan river, Perth WA

4.42 Mr Mustica was concerned that authorities in Western Australia are ignoring PFAS contamination of the Swan River from the former Belmont Fire Training Facility, saying that an investigation undertaken by developers in 2024:

> … states that the lake is a stormwater drain disregarding any environmental value, and the wildlife living in the area, including the southwestern long necked turtles. There's no mention of the effect on the Ascot racecourse or the river system, it's interesting to note that the Swan River dolphins have been found to have more PFAS in their organs than dolphins in any other state of Australia. The PFAS levels at the Swan River discharge point (Belmont South main drain) are 188 times higher than the guideline.[36]

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33 Ms Tracey Anton, *Committee Hansard*, 4 June 2025, p. 12.

34 Name withheld, *Submission 110* (47th Parliament), [p. 1].

35 North Queensland Airports Group, *Submission 29* (47th Parliament), [p. 2].

36 Jim Mustica, *Submission 135* (47th Parliament), [pp. 3–4].

4.43 Mr Mustica provided the following results from testing he commissioned through an environmental consultant:

> Groundwater samples from the Belmont South Main Drain discharge point into the Swan River exceed the 99% ecological protection guidelines for PFOS (0.00023ug/L) by 188 times (0.0565ug/L).
>
> Groundwater samples at the Former Fire Training Facility exceed the 95% ecological protection guidelines for PFOS (0.13ug/L) by 4,092 times (532ug/L).
>
> The sample taken in 2020 at the Former Fire Training Facility exceeded the 95% ecological protection guidelines for PFOS (0.13ug/L) by 18,461 times (2400ug/L).[37]

Botany bay, Sydney NSW

4.44 One submitter expressed concerns about PFAS contamination in Botany Bay, Sydney, from Sydney Airport, former oil refinery Caltex Kurnell, and Botany Industrial Park—sites at which PFAS aqueous film-forming foams were historically used for fire training activities. This submitter was concerned that inadequate information is available to the public, reports about PFAS contamination in Botany Bay are 'withheld from public scrutiny', government agencies will not engage with concerned citizens, and that the NSW Environmental Protection Authority (EPA) lacks the power or the will to 'actually address PFAS issues'.[38]

4.45 The submitter maintained that, despite Sydney Airport being a major source of PFAS contamination for Botany Bay, 'results and data from [Sydney Airport PFAS] investigations have never been publicly released', and the NSW EPA is not investigating the site because it is in the Commonwealth's jurisdiction:

> The EPA's choice to omit Sydney Airport makes their PFAS investigations map extremely misleading for people trying to assess risk in their area. It is a significant site for contamination which makes its omission worse. The EPA will not provide adequate reasons as to why they will not remedy this anomaly and include the site together with the words 'not under NSW EPA jurisdiction'. This EPA map is clearly not being transparent and the EPA is not being accountable in providing adequate explanation.[39]

Belubula river, central west NSW

4.46 Dr Ian A. Wright, an Associate Professor at Western Sydney University, reported that concerned landholders around Australia are conducting their own PFAS testing. For instance, in 2024 landholders along the Belubula River in central-west NSW, noted 'large accumulations of foam that were appearing', collected samples of the foam and river water, and sent them to a commercial

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37 Jim Mustica, *Submission 135* (47th Parliament), [p. 5].

38 Name withheld, *Submission 97* (47th Parliament), [p. 1].

39 Name withheld, *Submission 97* (47th Parliament), [pp. 1–3].

testing laboratory. According to Dr Wright, 'results revealed that the foam contained an extraordinarily large and hazardous amount of PFAS mixed with metals'. Dr Wright has also independently collected samples for his own research:

> I detected PFAS in the water, sediment and also in large accumulations of floating foam accumulating on the Belubula River surface and edges. PFAS was hyper-concentrating in the foam, compared to the concentration measured in the river sediment and water column. This also appeared to be happening with hyper-accumulation of metals. … In the Belubula River investigation the median PFOS concentration in Belubula River foam samples was 375,000 ng/L. This was 18,750 times greater than in Belubula water column (median 20 ng/L). The Belubula River is a high conservation-value river that is protected under *NSW Fisheries Management Act (1994)* as part of the Lachlan River 'Endangered Ecological Community' and is an important Murray Cod and Platypus habitat.[40]

4.47 Dr Wright argued that the protected status of the Belubula River catchment means the Commonwealth Government has 'a major role for this river', with mining proposals triggering the *Environment Protection and Biodiversity Conservation Act 1999 cth* (EPBC Act). Further, that:

> … given that the Belubula River is an endangered ecological community (Murray Cod and platypus habitat) it is appropriate that known or potential PFAS and other impacts from the mining operations are thoroughly investigated. Currently the PFAS pollution in this river is serious—but the nature, source and magnitude of the pollution are unknown.[41]

Medlow Bath, Blue Mountains NSW

4.48 Similarly, STOP PFAS Blue Mountains was concerned about the impact of PFAS contamination on the wildlife and marine life in Medlow Bath, NSW, recommending that the Commonwealth Government mandates PFAS testing in affected waterways across Australia (including waterways used for recreation and those essential to ecological health), and governments at all levels assess the potential to clean up contaminated sites:

> As a result of the 1992 petrol tanker crash, we still have very high levels of PFOS near Adams Creek at 2,200 ng/L. But we're not sure that anything is happening to protect the wildlife and marine life that live in these PFAS contaminated waterways in Medlow Bath NSW.[42]

Australian and New Zealand Guidelines for Fresh and Marine Water Quality

4.49 The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* provide guidance on managing PFAS contamination in fresh, estuarine and marine water. It contains recommended Default Guidelines Values for

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40 Dr Ian Wright, *Submission 102* (47th Parliament), pp. 6–8.

41 Dr Ian Wright, *Submission 102* (47th Parliament), p. 9.

42 STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 9.

managing a range of contaminants, with guidelines in development for PFOS and PFOA in both freshwater and marine water. PFHxS values and the development of a group value for 'all PFAS' have been identified for development.[43]

4.50 In relation to water testing, the Water Services Association of Australia confirmed that it was 'not aware of a nationwide co-ordinated approach to survey or monitor for PFAS in waterways across Australia', but that some coordinated monitoring is done in relation to the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.[44]

4.51 In some cases, testing for PFAS has been conducted at specified sites due to known contamination, such as at Dutson Downs, from an explosion and fire at the Esso Longford gas plant in 1998—an event 'recognised to be a primary contributor of PFAS on and in the environment downstream'. Testing commenced in 2017, PFAS levels before this time are unknown.[45]

4.52 Friends of the Earth Australia has suggested Dutson Downs may be a major source of PFAS pollution into nearby waterways, including Lake Coleman and Lake Reeve.[46]

4.53 EPA Victoria reported that it issued a Clean Up Notice to Esso Longford Pty Ltd in July 2017, 'requiring an environmental audit that addressed contaminated soil, sediment, surface water and groundwater on and from the premises'. The audit was completed in 2020 and is publicly available. EPA Victoria also noted that PFAS contamination at the site 'is attributable to long term fire fighting training rather than solely the 1998 fire'.[47]

Synthetic turf as a source of PFAS entering waterways

4.54 The Natural Turf Alliance submitted that there are emerging concerns in Australia and internationally around the potential environmental impacts of PFAS derived from synthetic turf and artificial ground covering materials,

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43 Australian Government, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, *Pathway for toxicant default guideline value publication*, 24 June 2025 (accessed 16 July 2025); DCCEEW, *Submission 33* (47th Parliament), p. 15.

44 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 5. See also: Dr Ian Wright, *Submission 102* (47th Parliament), pp. 10–11.

45 Gippsland Water, response to questions on notice, public hearing 4 June 2025 and written questions from Senator Thorpe (received 23 June 2025), [pp. 2, 4–5 and 8]. See also: Environment Protection Authority Tasmania (EPA Tasmania), *Submission 73* (47th Parliament), [p. 2].

46 Friends of the Earth Australia, *Is Dutson Downs a Major Source of PFAS Pollution into the Largest Inland Waterways Network in Australia?,* 16 April 25 (accessed 22 October 2025). See also: Mr Anthony Amis, Land Use Researcher, Friends of the Earth Australia, *Committee Hansard*, 4 June 2025, p. 8.

47 EPA Victoria, response to written questions from Senator Thorpe (received 27 June 2025), [p. 2].

including 'contamination impacts to waterways, drinking water, groundwater supplies, aquatic ecosystems, soils, biodiversity and the broader environment'. According to the Alliance, research from the University of Technology Sydney indicates a single synthetic turf field can lose from 800kg, up to 3200kg, of PFAS contaminated particulate 'directly to the environment'. With NSW alone having over 200 synthetic turf fields:

> … this equates to between one hundred and sixty thousand kilograms (160,000kg) to six hundred and forty thousand kilograms (640,000kg) of PFAS contaminated pollutant potentially entering NSW waterways, soils and natural resources generating significant human health and environmental impacts.[48]

4.55 The Alliance noted that a NSW Chief Scientist and Engineer report, first published in 2022, 'identified numerous concerns relevant to the presence of PFAS within synthetic turf', including that concentrations of PFAS would be 'highly variable from each individual field', due to differences in materials and manufacturing processes.[49]

4.56 Community lobby group, Friends of Callan Park, was also concerned about synthetic turf, saying there is no 'assured method of disposal, and for its entire life [synthetic turf] poses risks to marine and terrestrial creatures and their environments'. In addition, Friends of Callan Park argued that installing synthetic turf at Callan Park 'would be destructive of the cultural and social values' of the park.[50]

4.57 The *Independent review into the design use impacts of synthetic turf and public open spaces* made a number of recommendations aimed at better managing approval and funding of synthetic turf fields; managing pollutant 'run-off' and 'walk-off' risks; planning for 'end of life' and disposal of existing synthetic turf fields; better data collection; and the implementation of a research program to better understand human health and environmental impacts.[51]

4.58 The Alliance was concerned that the Federal Government 'has failed to undertake or initiate any of the recommendations outlined' in the 2022 report, despite the fact that the report:

> … clearly identifies the significant risks and unknowns that surround the impacts to human health, the environment and future generations given the identification of PFAS contaminates; via leachates, pollutants and airborne

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48 Natural Turf Alliance, *Submission 79* (47th Parliament), pp. 4–6.

49 Natural Turf Alliance, *Submission 79* (47th Parliament), p. 4.

50 Friends of Cullen, *Submission 131* (47th Parliament), pp. 3–4.

51 New South Wales Government Chief Scientist & Engineer, *Independent review into the design use impacts of synthetic turf and public open spaces: Final report*, 13 October 2022, pp. vii–v iii (accessed 13 May 2025).

> particulate, released from artificial turf and synthetic ground covering materials.[52]

4.59 Considering what it calls the 'substantial unknown risks to future generations', the Alliance recommended 'Federal regulation of PFAS and legislation that removes PFAS chemicals from synthetic turf, artificial ground covering materials and associated products'.[53]

Research, monitoring, and testing

4.60 Several submitters pointed to the importance of further research, monitoring, and testing of a range of environments to improve our knowledge and understanding of the impacts of PFAS on environments, ecology, wildlife, and habitats.

More research into the impacts of PFAS on ecosystems

4.61 There were various calls for more research into the impacts of PFAS on ecosystems, and the mechanisms of transport:

> Defining the mechanisms of PFAS transport through the atmosphere, soils, and surface and groundwaters … The government has a number of mechanisms to promote this research, including targeted grants, direct commissioning of research, reviews of the existing PFAS literature, collaboration with researchers and industry and/or employment of government researchers.[54]

4.62 CSIRO submitted that further research is critical to understanding how PFAS exposure affects Australian wildlife—'especially native and culturally significant species'—and ecosystems across all Australian states and territories.[55] CSIRO recommended the establishment of Australian PFAS 'anthropogenic background levels in media (i.e., soils, waters, atmosphere and biota) across geographic and climatic conditions to support site/regional risk assessments and clean-up levels', proposing governments:

> Expand research on Australian wildlife (especially native and culturally significant species) including sub-lethal exposures and beyond traditional endpoints by employing systems biology (multi-omics) techniques that encompass comprehensive resilience, fitness, and health metrics.[56]

4.63 Dr Wright stated:

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52 Natural Turf Alliance, *Submission 79* (47th Parliament), pp. 4–5.

53 Natural Turf Alliance, *Submission 79* (47th Parliament), p. 5.

54 Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), pp. 2–3. See also: Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 6].

55 CSIRO, *Submission 22* (47th Parliament), pp. 9–10.

56 CSIRO, *Submission 22* (47th Parliament), p. 14.

> There is growing worldwide awareness that many species of wildlife are carrying a heavy burden of PFAS contamination … PFAS contamination of wildlife in Australia is still emerging and both resources and coordination are needed to improve our knowledge on PFAS contamination in natural food-webs and in species of conservation significance. There are many actions that the Commonwealth can take to support further research to improve our knowledge. As well as wildlife, this should also include wild-caught fish and aquaculture.[57]

National monitoring program

4.64 The Australian Academy of Technological Sciences and Engineering recommended the Commonwealth develops 'a standardised national framework for monitoring PFAS levels across all states and territories based on legally binding guidelines'.[58]

4.65 A similar recommendation was made by the Australian Academy of Science, which called for a strategic national monitoring program to determine the extent of PFAS contamination across the country. Such a program would assess environmental and human risk and inform effective management and remediation efforts. Supporting this recommendation, Dr Hayley Teasdale, Head of Science Advice and Policy at the Australian Academy of Science said the time has come for PFAS research in Australia to transition from 'academic science' to 'regulatory science', which is concerned with 'providing certainty for regulatory decisions':

> It's not intended as a generic call for more funding for research; rather, it is an investment in government scientific infrastructure to fulfil the government's responsibilities towards its citizens. … building an evidence base that's consistent, reliable and able to create informed decision-making based upon it, whether that's regulatory decision-making or other decision-making, is very critical at this point.[59]

4.66 Likewise, crcCARE recommended establishing 'a national PFAS monitoring program to track contamination levels and trends', improved data sharing and coordination between federal, state and local agencies, and enhanced public access to PFAS contamination data and information.[60]

4.67 Dr Nathan Kilah, Senior Lecturer in Chemistry, University of Tasmania, Australian Academy of Science, referred to the PFAS map created and maintained by Friends of the Earth, which collates information about PFAS contamination across Australia from media reports, FOI requests, and

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57 Dr Ian Wright, *Submission 102* (47th Parliament), p. 11.

58 Australian Academy of Technological Sciences and Engineering, *Submission 18* (47th Parliament), p. 1.

59 Dr Hayley Teasdale, Head, Science Advice and Policy, the Australian Academy of Science, *Committee Hansard*, 10 June 2025, pp. 9–10.

60 crcCARE, *Submission 36* (47th Parliament), p. 21.

government sources. Dr Kilah argued that is 'something government should be providing through both the testing and the consolidation and availability of that information to the public'.[61]

4.68 Dr Wright recommended that 'all major rivers and groundwaters across Australia' be regularly monitored for PFAS—especially 'waterways of high conservation significance', including those the Commonwealth is responsible for managing under 'Matters of National Environmental Significance'. This will include rivers used for agricultural industries and 'rivers of high conservation-value'.[62]

4.69 However, Dr Landos noted he has found it 'extraordinarily difficult to get any funding to work on toxicants', including PFAS and pesticides in fisheries. He identified a 'genuine lack of enthusiasm to generate data, due to concern about what that data will show—that we have levels of contamination that are problematic'. Dr Landos proposed a role for governments in funding research, to 'try and protect the health of people and indeed the productivity of their environment'.[63]

Testing at sites of PFAS contamination

4.70 STOP PFAS Blue Mountains recommended that, where PFAS contamination is detected, 'testing should be conducted to assess its impact on local fish, marine life, and wildlife'.[64]

4.71 In May 2025, WaterNSW released the findings of its investigation into the source of this PFAS contamination in the Blue Mountains. The findings were reviewed by the NSW PFAS Technical Advisory Group and the EPA. The EPA recommended 'that a detailed site investigation should now be undertaken consistent with the *National Environment Protection Measure 1999*', to 'help inform potential remediation options'.[65]

4.72 The Local Government Association of Queensland recommended state and federal governments work with local councils to 'coordinate and invest in the collection of data relating to PFAS including identification of exposure

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61 Dr Nathan Kilah, Senior Lecturer in Chemistry, University of Tasmania, Australian Academy of Science, *Committee Hansard*, 10 June 2025, p. 12.

62 Dr Ian Wright, *Submission 102* (47th Parliament), p. 10.

63 Dr Matt Landos, Director, Future Fisheries Veterinary Service Pty Ltd, *Committee Hansard*, 12 March 2025, p. 6.

64 STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 9.

65 Water NSW, *First stage of WaterNSW investigation into Blue Mountains PFAS completed*, 16 May 2025 (accessed 14 August 2025).

pathways—ensuring council officers are appropriately resourced to undertake any mandatory testing and monitoring'.[66]

4.73 Defence submitted that it has collected 'a significant data set from sampling on and off the Defence estate near its 28 sites'. This data—which includes soil, groundwater and surface water and biota—is shared with relevant State and Territory environmental regulatory authorities. However, Defence also noted that residents can request 'property identification be kept private'; in this case, identifying data is withheld. Defence explained that it 'maintains a Contaminated Sites Register that contains sampling data for identified contaminated sites across the Defence estate'.[67]

4.74 Asked if the government has considered creating a database or map of PFAS contamination 'hotspots', the Department of the Environment reported that the department 'is currently considering this'. Data is held by the states and territories, private sector and Commonwealth agencies including: Department of Defence; Department of Infrastructure; Airservices Australia; Department of the Environment; Department of Finance; and Department of Industry, Science and Resources. Implementing such a map would require, 'amongst other things: an agreed lead agency and website host; data governance; IT design and build; and access and sharing arrangements between Commonwealth and State government agencies'.[68]

4.75 The committee's views and recommendations are provided in Chapters 11 and 12.

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66 Local Government Association of Queensland, *Submission 137* (47th Parliament), p. 5.

67 Department of Defence, *Submission 66* (47th Parliament), [p. 2].

68 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 21 July 2025), p. 1.

Chapter 5
Impact of PFAS on First Nations communities, lands and waters

Introduction

5.1 In its interim report, the committee presented evidence of the substantial impacts of PFAS contamination from Defence facilities on the community and environment at Wreck Bay, in the Jervis Bay Territory on Australia's South-East coast. Wreck Bay provides a striking example of the unique impacts of PFAS on Australia's First Nations communities. Other Aboriginal communities that have been substantially impacted include Williamtown (New South Wales (NSW)), Oakey (Queensland) and Katherine (Northern Territory).

5.2 This chapter summarises evidence received during the course of the inquiry on the unique and specific impacts of PFAS contamination on First Nations communities, lands and waters. It also presents evidence from academics, research and science organisations about the need for more investment and effort in culturally sensitive research methodology and remediation practice.

Unique and significant impacts

5.3 There are First Nations communities in many locations impacted by PFAS contamination. In these areas, First Nations people are often disproportionately impacted due to restrictions on traditional and cultural practices, such as swimming, birthing on Country, hunting, gathering bushfoods and fishing. These practices have historically led to higher exposure to PFAS among First Nations people. While the experiences of different communities vary, impacts are often further compounded by socio-economic factors, including lower incomes, geographical isolation, poorer access to healthcare services, education, and the impacts of racial discrimination.[1]

5.4 The National Aboriginal Community Controlled Health Organisation (NACCHO) noted that, along with increased exposure through traditional practices, Aboriginal and Torres Strait Islander communities 'may face compounded risks [of PFAS contamination from consumer goods] due to limited access to safe alternatives, higher reliance on second-hand goods, and poor housing conditions that increase indoor contamination'.[2]

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1 crcCARE, *Submission 36* (47th Parliament), p. 10.

2 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 8.

5.5 According to NACCHO, traditional practices such as fishing, hunting and gathering bush foods 'are central to cultural identity and wellbeing' for many Aboriginal and Torres Strait Islander peoples. In this context, NACCHO described the PFAS contamination in Aboriginal and Torres Strait Islander communities, including Wreck Bay and Katherine, as a 'crisis', saying PFAS is 'not only an environmental and health issue, but also a stark example of systemic exclusion'.[3]

5.6 NACCHO highlighted the psychological toll of PFAS contamination on Country and sacred sites:

> The trauma of environmental harm especially when it affects land and water central to cultural identity has led to calls for culturally safe health interventions, long term monitoring, and justice for affected communities. … Culturally, the damage is deeply felt as traditional practices like fishing, gathering bush medicine, and teaching children on Country have been severely restricted, leading to a loss of cultural transmission and identity.[4]

5.7 NACCHO also observed that, while the Department of Defence (Defence) has polluted 'land and water central to cultural practices' for decades, community members have been excluded from decision-making processes and 'denied timely health interventions':

> This is a form of environmental racism—the disproportionate exposure of racialised communities to environmental hazards, often due to systemic neglect, lack of consultation, and unequal access to remediation and justice. … Racism also manifests in the slow pace of government response, inadequate compensation, and failure to recognise the cultural significance of the land and water that has been contaminated.[5]

Testimony from Wreck Bay

5.8 Aboriginal people from Wreck Bay described the devastating impacts that PFAS contamination from the Jervis Bay Range Facility has had—and continues to have—on their community, including:

- prohibitions on traditional and cultural practices;
- restrictions on eating bushfoods, fish and crustaceans;
- prohibition on the cultural and recreational use of waterways, as well as the use of plants and sediments for cultural purposes;
- a sense of profound loss and grief;
- a sense of being disconnected from their land;

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3 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 4.

4 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 7.

5 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 5.

- fear and uncertainty about the health impacts of PFAS, including on children;
- frustration around perceived poor consultation from the Defence; and
- a strong desire for self-determination in relation to the future of their lands and waters.[6]

5.9 Their testimony is presented in detail in the committee's interim report and briefly summarised below.

5.10 At the public hearing in Nowra, committee members heard that Wreck Bay people consider themselves part of the ecosystem. Wreck Bay Traditional Owner, Mr Clive Freeman, said that when the environment changes, 'we change': 'If it changes too quickly and we can't keep up, that's what constitutes the loss, because we can't keep up with the change'.[7]

5.11 Ms Annette Brown, Chairperson of the Wreck Bay Aboriginal Community Council (WBACC), explained that the people's cultural practices 'relate directly to land', including hunting, gathering, fishing and swimming. High levels of PFAS in critical areas, such as Mary Creek and Mary Beach (otherwise known as Bullock's Hoof) mean that parents can no longer 'take [their] kids on country'.[8]

5.12 Mrs Coral Ardler Yuke, who grew up in Wreck Bay when it was a Christian mission, described the deep loss she feels that her grandchildren and great-grandchildren 'have to live on this land that's been poisoned'. She asked how older members of the community can pass on cultural knowledge when the environment is contaminated.[9]

5.13 Mr Freeman pointed out that the precautionary message from government has had as big an impact as the PFAS contamination itself, with community forced to change many of its most important practices to minimise risk of exposure, even while governments remain unsure of the health impacts.[10]

5.14 Community members, including Mr Darren Brown, highlighted the deep archaeological and historical significance of the PFAS-affected areas. Mary Creek—which is directly impacted by contaminated run-off from Jervis Bay Range Facility—is the site of ancient axe grinding grooves which are over a

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6 Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, pp. 77–93.

7 Mr Clive Freeman, Private capacity, *Committee Hansard*, 21 January 2025, p. 8.

8 Ms Annette Brown, Chairperson, Wreck Bay Aboriginal Community Council, *Committee Hansard*, 21 January 2025, p. 7.

9 Mrs Coral Ardler Yuke, Private capacity, *Committee Hansard*, 21 January 2025, p. 3.

10 Mr Clive Freeman, Private capacity, *Committee Hansard*, 21 January 2025, p. 8.

thousand years old. Mary's Beach, at the bottom of the creek, is another sacred site where a number of significant cultural artefacts have been found.[11]

5.15 Community members questioned what the future would look like for their children, living under the shadow of the contamination. Mrs Ardler Yuke said:

> How are they going to sort out this problem that we have in our place for our kids? We want our kids to grow up and live the way we grew up: loving their place, enjoying our community, having pride in their place and being able to do the things that we did and that we can show them. But we're restricted in a lot of that stuff.[12]

5.16 Severely restricted in their ability to access their land and practice their culture, Wreck Bay people sought compensation for cultural loss, with WBACC launching a class action against the Commonwealth in 2021. In 2023, the Federal Court of Australia approved a $22 million settlement and, shortly after, approved the Settlement Distribution Scheme, which outlined how the funds would be distributed. $5 million was used to pay legal fees to Shine Lawyers, a significant portion went to WBACC, and the rest was distributed among community members, with most receiving a few thousand dollars.[13]

5.17 Community members generally felt that the compensation was deeply inadequate and that the Commonwealth had failed to recognise the profound loss suffered by the community. Many community members objected to the settlement, asking 'is that all our culture is worth?'. However, WBACC and Shine Lawyers explained that, under Australian law, there is no formal recognition of Aboriginal culture, and no way for the courts to value cultural loss. As such, they believed the settlement obtained was the best possible outcome under the circumstances.[14]

5.18 With the court case over, WBACC and Wreck Bay community members turned their attention towards improving the remediation program. One concern outlined by community members was poor communication and consultation from Defence and other agencies. Committee members also noted the history of infrequent community engagement and the inadequate and poorly designed warning signage at Mary Creek and Mary Beach.[15]

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11 Mr Darren Brown, Private capacity, *Committee Hansard*, 21 January 2025, p. 7.

12 Mrs Coral Ardler Yuke, Private capacity, *Committee Hansard*, 21 January 2025, p. 3.

13 Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, pp. 81–84.

14 Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, pp. 81–84.

15 Ms Annette Brown, Chairperson, Wreck Bay Aboriginal Community Council, *Committee Hansard*, 21 January 2025, p. 16; See also: *Interim report*, Appendix 2: Wreck Bay community visit, pp. 110–113.

5.19 In evidence provided to the committee, Defence described its efforts to improve communication and increase the role of Wreck Bay people in testing and remediation. However, community members were distrustful of government broadly, and Defence specifically, with some believing and pointing to evidence that suggested Defence and the Commonwealth Government had known about the dangers of PFAS for decades before they informed the community.[16]

5.20 Confusing messages from government about the potential health effects of PFAS have increased the sense of distrust among community members, who described feeling as if they have little control or input into how the contamination is managed. Ms Annette Brown said that the community does not 'want to be fed second-hand information' and wants to be 'at the table', monitoring the contamination, monitoring the health of children, and ensuring they have a role in designing solutions. She encouraged the Commonwealth to bring all the agencies involved in administering Jervis Bay Territory together at the table with Wreck Bay people to find solutions that genuinely work for the community.[17]

Committee's interim report proposals and recommendations

5.21 In its interim report, the committee outlined a number of proposals from Wreck Bay community members for reducing the negative impacts of PFAS contamination on their culture, lifestyle, and well-being. These included: more meaningful and genuine consultation with Aboriginal communities, empowering them in the process of managing their country; funding programs to train local community members to conduct monitoring and remediation activities; and consideration of novel responses to contamination that allow First Nations people to stay on Country while reducing the risk of further exposure.[18]

5.22 The committee recommended Defence and other agencies improve consultation and cooperation with the community at Wreck Bay. The committee also recommended that the Parliament considers referring an inquiry to the Joint Standing Committee on the National Capital and External Territories which examines governance, representation, and service provision in Jervis Bay Territory (including the Wreck Bay Aboriginal community settlement).[19]

5.23 As discussed in Chapter 6 of this report, Defence provided evidence that it is working to establish greater trust with the community, including by consulting

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16 Mr Clive Freeman, Private capacity, *Committee Hansard*, 21 January 2025, p. 6.

17 Ms Annette Brown, Chairperson, Wreck Bay Aboriginal Community Council, *Committee Hansard*, 21 January 2025, pp. 3 and 15.

18 Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, pp. 89–91.

19 Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, pp. 71 and 93.

on more appropriate signage, training local rangers to undertake testing and surveillance of the waterways, and meeting with the community more often.[20]

5.24 The government has yet to formally respond to the committee's interim report.

5.25 Further recommendations, and the committee's views about Wreck Bay, are included in the final chapters of this report.

Testimony from Katherine

5.26 Other Aboriginal communities heavily impacted by PFAS contamination include the communities around the Katherine River, in the Northern Territory, where PFAS contamination from RAAF Base Tindal has led to restrictions on drinking local water, eating wildlife, and using the land and waters.

5.27 According to Aboriginal Medical Services Alliance NT (AMSANT)—peak body for Aboriginal Community Controlled Health Services in the Northern Territory—and Katherine-based Wurli Wurjlinjang Health Service (AMSANT and Wurli Wurjlinjang), this contamination 'has created a set of challenges that extend beyond the immediate health risks'. These include concerns around 'food security, chronic disease risk, cultural continuity, and economic pressures'.[21]

5.28 AMSANT and Wurli Wurjlinjang highlighted the prohibitive cost of store-bought foods in Katherine and the importance of consuming traditional foods to health and chronic disease outcomes in Aboriginal communities, saying:

> … bushfoods remain a staple of Aboriginal communities, including in the Katherine region … By their disproportionate reliance on traditional bush foods in the affected areas around Tindal, Aboriginal communities are redirected to a greater consumption of cheaply available junk (calorie dense, high sugar, high salt and high fat) food, given the higher costs of a Healthy Food Basket in rural and remote areas.[22]

5.29 With a reliance on local crustaceans and fish, including barramundi, catfish and black bream, First Nations communities are uniquely impacted by the PFAS contamination of the natural waterways around Katherine. The health services noted concerns about food crops irrigated by contaminated water and observed:

> The risk to Aboriginal communities also exists in potential fishing from the Katherine River between Donkey Camp Weir and Daly River, and Tindal Creek. This was further confirmed by a Food Standards Australia and New Zealand [FSANZ] report released in 2018 which detailed the appropriate tolerable daily intakes of 12 fish samples from the Daly River. … Overall, the report indicated liver and flesh consumption over time based on the small sample is unlikely to present a public health or safety concern.

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[20] See Chapter 6.

[21] Aboriginal Medical Services Alliance Northern Territory and Wurli Wurlijang Aboriginal Health Corporation, *Submission 13* (48th Parliament), p. 3.

[22] Aboriginal Medical Services Alliance Northern Territory and Wurli Wurlijang Aboriginal Health Corporation, *Submission 13* (48th Parliament), pp. 2–8.

> However, FSANZ recommended because of the uncertainty of health concerns about PFAS that people in the affected area limit their fish consumption to a few serves a week and even more so in children and pregnant women.[23]

5.30 NACCHO noted that PFAS contamination 'threatens traditional food sources', including finfish and crustaceans, 'fruits and roots gathered from land near Defence sites, and hunted animals like kangaroos and goannas that may ingest PFAS through water or vegetation'. This poses 'serious health risks' and disrupts cultural practices which are central to 'community wellbeing and cultural continuity'.[24]

5.31 NACCHO explained that around 17 per cent of Aboriginal and Torres Strait Islander people already experience food insecurity, which can affect mental health, childhood development and learning, and increase the risk of diseases like type two diabetes and cardiovascular disease. These diseases account for 80 per cent of the mortality gap between Aboriginal and Torres Strait Islander people and other Australians.[25]

5.32 According to AMSANT and Wurli Wurjlinjang, initial consultations between Aboriginal stakeholders, Defence, and Northern Territory Health failed to 'feed into the development of health promotion materials and signage to prevent excess consumption of at-risk bushfoods'. As such, the health services reported anecdotal evidence of 'local and itinerant community members fishing and obtaining volumes of bush foods over-and-above' the recommended levels. They noted:

> The attempt to reduce consumption of PFAS exposed food sources among Aboriginal and Torres Strait Islander communities around the Katherine River is a complicated request to make when these communities already experience a lack of fresh and healthy food options.[26]

5.33 AMSANT and Wurli Wurjlinjang acknowledged that Defence has provided alternative water supplies, remediation works and treatment of the Katherine River. However, they submitted that 'it remains uncertain whether the short and long term effects of any existing PFAS are within traditional bush foods'. They

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23 Aboriginal Medical Services Alliance Northern Territory and Wurli Wurlijang Aboriginal Health Corporation, *Submission 13* (48th Parliament), pp. 4–5.

24 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 8.

25 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), pp. 7–8.

26 Aboriginal Medical Services Alliance Northern Territory and Wurli Wurlijang Aboriginal Health Corporation, *Submission 13* (48th Parliament), p. 5.

advocated for community-led solutions supported by the Northern Territory Government and Defence to address ongoing risks.[27]

2018 PFAS Health Study—views from Katherine focus groups

5.34 The PFAS Health Study, conducted by the National Centre for Epidemiology and Population Health at the Australian National University (ANU), included a series of focus group discussions in Oakey (Queensland), Williamtown (NSW), and Katherine (Northern Territory), held between January and August 2018. The ANU published a focus groups report in March 2019, which incorporates the views of 69 participants from Aboriginal communities in Katherine. Participants expressed many similar views to those outlined by Wreck Bay community members, including that they:

- were concerned about the potential health risks from exposure to PFAS, particularly for children;
- were worried about PFAS aggravating existing health conditions and possibly causing cancers;
- experienced 'psychological stress and anxiety' as a result of living in an area with PFAS contamination, along with 'uncertainty about health and financial implications'; and
- would like 'greater transparency and support in their interactions with government representatives'.[28]

5.35 Aboriginal focus groups in Katherine represented the three main Aboriginal groups in the area; the Dagoman, Jawoyn and Wardaman communities. Aboriginal focus group participants, who were primarily women, reported that there was 'a lot of sick people in the community' and a lot of people dying 'too young'. Some suggested a link between PFAS and cancer, or other poor health outcomes.[29]

5.36 PFAS blood testing had been provided via a free, voluntary blood testing program available through the Wurli-Wurlinjang Aboriginal Health Service. The health service reported 'a small but steady trickle' of people having blood tests. However, participants in the focus groups suggested the testing was inaccessible, as getting into town is difficult, and blood testing should be organised on-site, in communities.[30]

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27 Aboriginal Medical Services Alliance Northern Territory and Wurli Wurlijang Aboriginal Health Corporation, *Submission 13* (48th Parliament), p. 5.

28 National Centre for Epidemiology and Population Health, Australian National University College of Law, Governance and Policy, *PFAS Health Study: Reports* (accessed 28 August 2025).

29 National Centre for Epidemiology and Population Health, Australian National University, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, pp. 32–33.

30 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 33.

5.37 Researchers from the ANU's National Centre for Epidemiology and Population Health reported their view that Aboriginal communities in Katherine 'appeared confused and uncertain' about pathways to PFAS exposure and the effects of PFAS. However:

> The one item of information that most people were aware of, was that they should only eat one fish a day because the river and the fish in it were contaminated by PFAS. They understood that it may be detrimental to their health if they consumed greater quantities than this. Participants described PFAS as though it was an infection that people could catch from contact with river water or river food products.[31]

5.38 The researchers noted that this precautionary advice had 'considerable cultural and economic significance', as people had previously fished frequently in the river, and often consumed 'large quantities and varieties' of fish and other aquatic animals. Community members did not seem to understand that certain fish may be safer to eat than others and appeared to believe that PFAS was like an illness they 'could catch' by eating infected wildlife.[32]

5.39 Community members reported spending a lot more money on supermarket food to replace foods they were now advised to avoid or limit, such as fish and game. At that time, many community members also reported buying bottled water.[33]

5.40 The researchers noted that local people seemed unclear on whether their tap water was safe to drink and whether it was safe to use river water and native plants to make medicines. Researchers also noted a possible move away from traditional diets, with focus group participants reporting an increase in eating red meat from the supermarket.[34]

5.41 Participants in the ANU study expressed 'a strong attachment to, and concern for, their country', saying those who caused the PFAS contamination had 'damaged the country' and 'poisoned the river'. Even though the river was described as 'central to many of their activities', people felt uncertain about swimming in the river, including whether it was safe for children and whether they should open their eyes under the water.[35]

5.42 While the Departments of Defence and Health had delivered a number of information sessions, Aboriginal focus group participants reported that they did not feel comfortable attending these sessions. As a result, the researchers observed that Aboriginal community members 'did not appear to have the same

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31 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 33.

32 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 33.

33 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 34.

34 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, pp. 33–34.

35 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 34.

level of detailed and specific knowledge that many general community members had obtained' about PFAS.[36]

5.43 As was the case in Wreck Bay, the Katherine focus group participants were distrustful of Defence, questioning why it took so long for government agencies to inform the community about the risks.[37]

5.44 At the time of the Katherine focus groups (2018), many community members reported 'high levels of anxiety and stress'. Some reported feeling 'stuck' or trapped and unable to get away from the contamination. Others wanted to stay on their land and sought remediation or decontamination of that land to make it safe. Many wanted greater certainty, and 'clear information' about the health effects of PFAS, and 'greater transparency in government's response' and, similar to Wreck Bay, many participants 'wanted to feel as though government agencies were listening to them and treating them with respect'.[38]

5.45 Among other observations, the ANU study concluded that:

> … the contamination of the environment with the PFAS chemicals, and the subsequent prolonged and complex response from authorities, may have had a pronounced psychological impact on members of the community. Participants observed that they experienced substantial stress and anxiety related to the duration of the PFAS contamination, delay in notification, perceived lack of transparency and poor communication of risk, and uncertainty of potential health effects.[39]

Findings of the Defence Independent Review

5.46 The *Independent Review of land uses around key Defence bases impacted by PFAS contamination*, dated March 2024 (Defence Independent Review), was led by Mr Jim Varghese AM (the independent reviewer) and considered land use options around Defence bases with a view to assisting people and businesses who have been affected by PFAS contamination.[40] The report made numerous observations and recommendations relating to the Commonwealth's engagement with First Nations communities on PFAS.

5.47 The Independent reviewer noted that PFAS contamination in Australia 'has typically been managed through the lens of environmental contamination', while impacted communities generally view it 'through the lens of potential human health impacts'. Mr Varghese maintained that '[m]anaging PFAS

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36 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 34.

37 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 35; See also: National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 5.

38 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, pp. 35–36.

39 ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 37.

40 Defence, *PFAS Independent Review* (webpage) (accessed 19 September 2025).

contamination as a health issue would likely see quite different considerations about how communities are supported'.[41]

5.48 As part of the review, the independent reviewer met with Traditional Owner groups face-to-face to discuss responses to PFAS contamination around RAAF Base Williamtown (NSW), the Army Aviation Centre Oakey (Queensland) and RAAF Base Tindal. As was the case in 2018 with the ANU study, the independent reviewer observed that First Nations people had varying levels of understanding about PFAS exposure, with the community at Williamtown considerably better informed than the others. The reviewer speculated that enhanced understanding of PFAS in Williamtown was likely a result of the 'strong relationship' between the Traditional Owners and the local Defence Indigenous Liaison Officer.[42]

5.49 The independent reviewer reported First Nations communities were seeking 'culturally-appropriate and tailored advice about the environmental and health impacts of PFAS to Country that is significant to them'. Community groups near Katherine talked about the need to protect cultural heritage sites 'associated with songlines' near RAAF Base Tindal and told the reviewer they had offered 'to work with Defence to provide training in understanding and respecting culture'.[43]

5.50 The independent reviewer recommended that Defence conducts 'bespoke sampling of culturally significant flora and fauna', and collaborates with Traditional Owners 'to provide advice on potential impacts of PFAS contamination on cultural practices, and options for mitigating those impacts', also saying:

> Defence should conduct environmental PFAS sampling to provide Indigenous communities with an increased understanding of contamination in local soil, surface water, groundwater and biota; and work with state/territory authorities to provide culturally appropriate information (for example in relevant language) on how the results relate to cultural needs.[44]

5.51 Finally, the independent reviewer suggested that some PFAS-contaminated land is unlikely to be able to be remediated in a way that would enable unrestricted use of that land. The reviewer suggested there are 'opportunities for repurposing of PFAS-impacted land' and suggested that the government

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41 Jim Varghese AM, *Independent Review of land uses around key Defence bases impacted by PFAS contamination*, March 2024, p. 32 (accessed 18 September 2025).

42 Jim Varghese AM, *Independent Review of land uses around key Defence bases impacted by PFAS contamination*, March 2024, p. 36.

43 Jim Varghese AM, *Independent Review of land uses around key Defence bases impacted by PFAS contamination*, March 2024, p. 35.

44 Jim Varghese AM, *Independent Review of land uses around key Defence bases impacted by PFAS contamination*, March 2024, pp. 40–41.

explores 'suitable community and Indigenous environmental and cultural initiatives that are compatible with the contamination status of the land'.[45]

5.52 The independent reviewer noted that:

> Traditional Owners across the three impacted communities emphasised the importance of their connection to Country. They emphasised a desire for any future development around the bases to include Indigenous cultural and business opportunities that are compatible with the contamination status of the land, and that could benefit their communities.[46]

Other submitter views

5.53 A number of other submitters noted the disproportionate impact of PFAS contamination on First Nations people and communities. For instance, CSIRO submitted that impacted Aboriginal communities 'can feel a disconnection to Country, uncertainty around long-term health outcomes, access to culturally significant sites, waters, and foods'. Toxics Free Australia argued that 'the consumption of fish contaminated with PFAS levels harmful to human health represents an environmental injustice and violates the rights of First Nations people'.[47]

5.54 Environmental campaigner, Ms Tracey Anton, maintained that First Nations communities 'need to know government are taking contamination of the waterways seriously and [are] prepared to start prioritising the health of people and environment'.[48]

5.55 Professor Susan Wilson, from the School of Environmental and Rural Science, University of New England, described First Nations communities as 'critical stakeholders' in PFAS management, saying 'their involvement and knowledge transfer is essential'. Professor Wilson provided an example of a successful government partnership with local communities in Kakadu National Park:

> … to understand and manage risk of PFAS in aquatic bush foods in Kakadu National Park downstream of Jabiru township and Ranger Mine. Key to the program success was trust, transparency, open lines of communication and deep involvement of indigenous communities in all aspects of the program from inception to completion.[49]

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45 Jim Varghese AM, *Independent Review of land uses around key Defence bases impacted by PFAS contamination*, March 2024, p. 66.

46 Jim Varghese AM, *Independent Review of land uses around key Defence bases impacted by PFAS contamination*, March 2024, p. 62.

47 CSIRO, *Submission 22* (47th Parliament), p. 9; Toxics Free Australia, *Submission 72* (47th Parliament), [p. 3].

48 Tracey Anton, *Submission 128* (47th Parliament), p. 13.

49 Professor Susan Wilson, *Submission 84* (47th Parliament), p. 3.

5.56 The Environmental Defenders Office (EDO) noted that Australia's national PFAS policy framework, the PFAS National Environment Management Plan (NEMP), recommends that assessment and remediation of PFAS-contaminated sites be conducted with 'due regard … to sites of cultural or spiritual significance, in particular, the significance that Indigenous people attach to land'. However, corresponding state-based legislation does not always reflect this recommendation—for instance, it is absent from the *Contaminated Sites Act 2003* (WA).[50]

5.57 La Trobe University argued that current laboratory-based PFAS analysis is slow and costly, creating a barrier for communities to conduct their own monitoring and screening, at the local level. La Trobe suggested that governments invest in the development of 'fit-for-purpose', same-day, in-field screening technologies, which would enable communities, including Indigenous communities, to quickly identify PFAS hotspots and track environmental contamination levels.[51]

5.58 Dr Charlotte Kroløkke, a professor in cultural studies from the University of Southern Denmark, described PFAS pollution as a threat to cultural life, saying: 'It alters how communities live, work and relate to their environments. It erodes traditions, practices and relationships that are essential to cultural identity and to both individual and collective wellbeing.'[52]

5.59 Dr Kroløkke argued that PFAS, and 'pollution in general', has done specific and disproportionate damage to Indigenous communities and First Nations people:

> I'm saying that in part because of the relationship that Indigenous communities have with the land and country upon which they live. Contamination of land and country has severe effects on the communities that live upon this land and country where their ancestors have also lived and where they have a cultural history of performing traditions and being connected to land. I think not only do we have to be attentive to these issues, we also have a moral obligation to view, regardless of today's political sphere, the ways in which many of these pollutants are also implicated in past colonial practices and thus accordingly have a potential to do harm to First Nations people in a way that we need to be very attentive to.[53]

5.60 As such, it was Dr Kroløkke's view that governments need to recognise the cultural impacts and intergenerational effects of PFAS contamination when calculating the risk and harm. She concluded that:

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50 Environmental Defenders Office, *Submission 55*, p. 8. See also: Government of Western Australia, Western Australian Legislation, *Contaminated Sites Act 2003* (accessed 10 November 2025).

51 La Trobe University, *Submission 16*, p. 2.

52 Dr Charlotte Kroløkke, Professor, University of Southern Denmark, *Committee Hansard*, 10 June 2025, p. 47.

53 Dr Charlotte Kroløkke, Professor, University of Southern Denmark, *Committee Hansard*, 10 June 2025, p. 47.

> Addressing PFAS pollution therefore requires more than technical solutions; it demands dialogue with affected communities in a broader recognition of the social and cultural harm that it inflicts.[54]

Evidence from the Department of Defence

5.61 The Department of Defence acknowledged that First Nations people have concerns about the impact of PFAS contamination on 'areas of cultural significance and cultural practices'. Defence noted that its remediation program includes direct engagement with First Nations stakeholders, including in relation to the Jervis Bay Range Facility, RAAF Base Tindal, RAAF Base Townsville and the Townsville Airport, RAAF Base Darwin and Robertson Barracks.[55]

5.62 The committee notes that the Assistant Defence Minister, Matt Thistlethwaite MP, publicly apologised to the Jervis Bay community, including the people of Wreck Bay, at a community meeting in Nowra in February 2023, and committed to assisting the community preserve its cultural practices for future generations.[56]

5.63 Defence maintained that it continues to engage with First Nations stakeholders on PFAS contamination 'based on the individual requirements of affected Indigenous communities'. This has included:

- addressing 'impacts on food and water sources, which may affect Indigenous groups in different ways from the non-Indigenous community'; and
- consulting on 'cultural and heritage impacts of sampling, construction and remedial work, with Indigenous environmental consultants involved in some investigations'.[57]

5.64 In relation to Katherine, Defence explained that it recently (April 2025) met with the Kalano Aboriginal Community Board[58] and provided an update on PFAS remediation at RAAF Base Tindal. Defence also held 'a practical cultural activity with members of the Binjari community[59] to discuss local impacts of PFAS contamination in the Katherine River'. So far, Defence has invested

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54 Dr Charlotte Kroløkke, Professor, University of Southern Denmark, *Committee Hansard*, 10 June 2025, pp. 47–48.

55 Department of Defence, *Submission 66* (47th Parliament), [pp. 3 and 8–11].

56 Jessica Clifford, 'Federal government apologises to Jervis Bay community for PFAS contamination', *ABC News online*, 28 February 2023 (accessed 18 September 2025).

57 Department of Defence, response to written questions from Senator Thorpe (update on Defence actions) (received 12 December 2024), p. 9.

58 See: *Kalana Community Association website* (accessed 11 November 2025).

59 See: Northern Territory Government, *Bushtel: Binjari Minor* (accessed 11 November 2025).

approximately $99.9 million on PFAS investigations and management for RAAF Base Tindal.[60]

5.65 PFAS management at RAAF Base Tindal has primarily focused on minimising the amount of PFAS that leaves the base and impacts the surrounding areas. According to the Defence, most of the remediation actions outlined in the PFAS management area plan for RAAF Base Tindal 'are complete', including soil remediation works which were completed in November 2024. Groundwater treatment commenced in 2019. Defence has treated over 3 billion litres of PFAS-contaminated groundwater to-date, with groundwater treatment continuing at two on-base water treatment plants.[61]

5.66 Despite this investment, Northern Territory Government warnings—which were first issued in 2018—remain in place. This precautionary advice limits locals' consumption of fish, shellfish and crustaceans from the Katherine River, Tindal Creek, Rapid Creek and Ludmilla Creek. It also advises to avoid eating bushfoods from near the Katherine River and Tindal Creek, including wildlife, native fruit, native vegetables and native plants.[62]

5.67 The PFAS Independent review made a number of recommendations relating to engagement with First Nations communities affected by PFAS contamination. For instance, Recommendation 4 suggested Defence and state and territory authorities 'take early action to improve the availability of culturally appropriate and tailored advice on impacts of PFAS contamination for Indigenous communities who access and use land surrounding RAAF Base Williamtown, Swartz Barracks and RAAF Base Tindal'. In its response, the Government agreed with this recommendation, and said:

> In consultation with States and Territories, the Government will work with local residents and Indigenous communities to increase understanding of contamination in local soil, surface water, groundwater and biota. This includes tailored and culturally appropriate information materials, including in traditional language, where appropriate. The Government will apply the same approach for other relevant Commonwealth sites, if PFAS contamination is migrating from the site and is affecting other properties.[63]

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60 Attachment A: *Defence Investigation and Management Program—Site summaries table 21 August 2025*, p. 4, provided in Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025).

61 Department of Defence, *RAAF Base Tindal*, last reviewed 2 June 2025 (accessed 22 October 2025).

62 Northern Territory Government, *Fish and bush food containing PFAS chemicals*, advice developed in 2018 (accessed 22 October 2025).

63 Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [p. 7] (accessed 10 November 2025).

5.68 Recommendation 7—which was also agreed—related to the need for plain English resources. At the committee's September hearing, Ms Celia Perkins, Deputy Secretary, Security and Estate, Department of Defence, noted that a strong criticism received by Defence is that the technical and scientific reports it publishes as part of its PFAS management program are not accessible to the 'layperson'. Ms Perkins echoed the Government response to the Independent review, which stated:

> Defence will develop and publish advice for RAAF Base Williamtown, Swartz Barracks and RAAF Base Tindal about the prospects of remediation in the areas surrounding these bases. This advice will include a clear, plain English explanation of how residual risks could be managed, including the impacts to ongoing land and water uses.[64]

5.69 In its submission, Defence maintained that it is 'committed to supporting First Nations communities impacted by PFAS contamination on and around Defence bases' and is 'seeking to improve engagement with First Nations communities'.[65]

5.70 Defence was asked what steps it takes to inform Traditional Owners of areas where PFAS contamination may adversely impact 'their totems' [plants, animals, which represent a person's relationship to their Nation, Clan or family group]. Assistant Secretary of PFAS Investigations and Management, Ms Kathleen Leane said that Defence has recently reached out to Traditional Owners in Darwin—the Larrakia nation—and also around Robertson Barracks and RAAF Base Tindal:

> We've met with the Kalano Aboriginal community board, and we've held a practical cultural activity with members of the Binjari community to discuss the local impacts on the Katherine River—to understand, for example, locally caught fish and how that might affect their cultural practices.[66]

5.71 Defence was asked why it has not chosen to provide alternative drinking water—such as water tanks—in Wreck Bay, despite repeated requests from the community, and evidence that community members were spending substantial amounts on purchasing bottled drinking water. Committee Chair, Senator Lidia Thorpe, noted that during the committee's visit she observed the tap water in Wreck Bay, which is brown and stains people's bathtubs. Ms Perkins stated that Defence has not provided 'water assistance' to Wreck Bay because water testing

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64 Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [p. 8] (accessed 10 November 2025); Ms Celia Perkins, Deputy Secretary, Security and Estate, Department of Defence, *Committee Hansard*, 5 September 2025, p. 6.

65 Department of Defence, *Submission 66* (47th Parliament), [p. 3].

66 Ms Kathleen Leane, Assistant Secretary, PFAS Investigations and Management, Department of Defence, *Committee Hansard*, 5 September 2025, p. 19.

demonstrates that the drinking water in Wreck Bay is 'below the safe national drinking water standards'.[67]

5.72 However, First Assistant Secretary of the Territories Division at the Department of Infrastructure, Ms Kim Forbes also explained that the Commonwealth is taking action to provide better drinking water to Wreck Bay through construction of an 11.2-kilometre water pipeline which will supply the Wreck Bay community with Shoalhaven City Council water. The pipeline is under construction and expected to be completed in early 2026.[68]

Update on Wreck Bay PFAS management and remediation program

5.73 The committee's interim report outlined concerns around Defence's consultation with WBACC and community members, recommending that Defence and the Department of Infrastructure work with WBACC, and other relevant stakeholders, to improve signage, messaging and information provided to the community. The committee was especially concerned to see that signage at the most contaminated locations in Wreck Bay still said the area was 'being investigated' for PFAS contamination, rather than indicating confirmed contamination.[69]

5.74 In January 2025, Defence acknowledged that people were still swimming at locations including Mary Beach. However, Defence insisted that PFAS levels at the creek discharge points into both Mary Beach and Summercloud Bay 'are below the recreational use guideline'. At that time, Defence noted that it was the responsibility of Department of Infrastructure to install signage.[70]

5.75 However, more recent evidence provided by Defence indicates that it has taken on responsibility for updating this signage. Defence confirmed that it is working with the Bherwerre Rangers 'to install interim precautionary signage at key locations around Wreck Bay by the end of July 2025'. It is also working with WBACC and key stakeholders 'to design new permanent signage with improved messaging'. Defence stated that Bherwerre Rangers 'engaged the community to create the designs, including hosting an artwork session at the

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67 Ms Celia Perkins, Deputy Secretary, Security and Estate, Department of Defence, *Committee Hansard*, 5 September 2025, p. 20.

68 Ms Kim Forbes, First Assistant Secretary, Territories Division, Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts, *Committee Hansard*, 5 September 2025, p. 20 and p. 24.

69 Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, p. 71.

70 Department of Defence, response to written questions from Senator Thorpe (received 17 February 2025), [p. 4].

Jervis Bay Public School on 17 June 2025'. The community will be presented with options before the design is finalised.[71]

5.76 Following the committee's visit to Wreck Bay in January 2025, Defence increased its engagement with the Aboriginal community.[72] Defence reported it had agreed on a training program for Wreck Bay's Bherwerre Rangers, enabling them to undertake independent environmental sampling in the Wreck Bay area. The training was scheduled to commence in February 2025 and Defence anticipated 10–15 rangers would participate.[73]

5.77 On 26 June 2025, Defence reported it released a Wreck Bay Community Survey 'to understand and update information regarding land and water uses, biota consumption or cultural use of the environment'. According to Defence, the survey will be used to 'identify where the community would prefer additional sampling and analysis of waters, sediment or biota to support their understanding of the presence of PFAS and their use of affected land and waters'.[74]

5.78 On notice, Defence confirmed it has 'been engaging with the Wreck Bay community on a number of matters', for instance:

- Defence representatives met with Wreck Bay Aboriginal Community Council board members on 30 July 2025 to provide an update on remediation works, monitoring results and other initiatives including a community survey, updates to precautionary signage and a community led PFAS sampling program.
- Defence representatives met with Wreck Bay Rangers on 7 May 2025 to provide training and equipment to facilitate independent community-led sampling for PFAS at off-base locations in areas of community interest. Ongoing support to undertake sampling and interpret data is available to the community.
- The most recent whole-of-community engagement took place on 13 February 2025, with Defence holding a community barbeque.[75]

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71 Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025), [p. 3].

72 Attachment A: *Defence Investigation and Management Program—Site summaries table 21 August 2025*, p. 1, provided in Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025).

73 Department of Defence, response to written questions from Senator Thorpe (received 17 February 2025), [p. 7].

74 Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025), [p. 3].

75 Attachment A: *Defence Investigation and Management Program—Site summaries table 21 August 2025*, p. 1, provided in Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025).

5.79 At the committee's September hearing, Ms Perkins suggested Defence has learned a number of lessons through its engagement in Wreck Bay, including that it needs to 'have a more consistent and regular presence' in the community. Ms Perkins added:

> Since February 2025, we've held a number of engagements with the community at Wreck Bay, including a community barbecue to discuss remediation, training for Wreck Bay Aboriginal Community Council rangers in May to support independent PFAS sampling in the area, a Defence presentation on the progress of remediation at a July board meeting, and monthly walk-overs with Wreck Bay Aboriginal Community Council representatives for the Jervis Bay Range Facility remediation site works.[76]

Better supporting communities

5.80 Inquiry participants made a number of suggestions for better supporting First Nations communities in dealing with the challenges of PFAS contamination.

5.81 The researchers who undertook the PFAS Health Study ultimately argued for '[b]etter engagement with Aboriginal communities, through community visits, among other activities, is needed to improve their knowledge and understanding of the PFAS contamination and what this means for them and their relationship with country'.[77]

5.82 AMSANT and Wurli Wurjlinjang recommended:

- 'practical support from Government in the form of sponsored transportation to uncontaminated river systems for fishing';
- subsidies or a price cap to enable Aboriginal communities to buy fresh, uncontaminated fish at affordable prices;
- direct involvement of local First Nations people in the remediation and long-term monitoring of PFAS;
- direct involvement of local health services, such as Wurli Wurjlinjang, in the codesign of signs and educational material; and that
- '[f]urther education and remediation efforts on the effects of PFAS on Katherine Aboriginal communities should be cognizant of traditional food disruptions and be sensitive to the downstream impacts that may not be easily recognised beyond what has already been publicised'.[78]

5.83 NACCHO argued there is an 'urgent need for adequately resourced, culturally informed, community-led responses to PFAS contamination that address both

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[76] Ms Celia Perkins, Deputy Secretary, Security and Estate, Department of Defence, *Committee Hansard*, 5 September 2025, pp. 2 and 6.

[77] ANU, *Research Report—PFAS Health Study: Focus Groups Study*, February 2019, p. 38.

[78] Aboriginal Medical Services Alliance Northern Territory and Wurli Wurlijang Aboriginal Health Corporation, *Submission 13* (48th Parliament), p. 6.

the immediate health risks and the broader legacy of environmental injustice'. Partnering with Aboriginal community-controlled organisations is essential to 'ensure responses are inclusive, culturally informed, and grounded in principles of equity, self-determination, and community leadership'. NACCHO suggested Aboriginal community-controlled health organisations should 'lead community health assessments, support culturally safe screening and monitoring, and advocate for long-term health and environmental justice'.[79]

5.84 NACCHO recommended that PFAS interventions be aligned with the National Agreement on Closing the Gap (National Agreement) and its four Priority Reform Areas, which include:

(1) creating formal partnerships to enable shared decision-making;
(2) building the Aboriginal community-controlled sector;
(3) transforming mainstream institutions to 'identify and eliminate racism, [and] embed and practice cultural safety'; and
(4) promoting Indigenous data sovereignty through shared access to regional data.[80]

5.85 NACCHO argued governments should provide 'dedicated and sustained funding' to support community-led responses to address 'health, environmental, social, and cultural impacts' and incorporate measures to address 'health outcomes, site remediation, and food security while ensuring environmental justice and safe access to land and water'.[81]

La Trobe University proposal

5.86 In line with the recommendations of Aboriginal community-controlled health organisations, La Trobe University recommended long-term health monitoring programs. It also proposed the establishment of a 'national PFAS Field Screening and Validation Network', which could be co-designed by its Indigenous Research Centres working with First Nations communities. Such a network would develop Indigenous-led field-deployable PFAS detection technologies to enable 'faster environmental and health monitoring'.[82]

5.87 La Trobe suggested that government conducts a 'dedicated, competitive' funding round to establish the proposed network, 'requiring Indigenous leadership, co-design and regional deployment', and that:

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79 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 4–6.

80 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), pp. 4–5.

81 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 3.

82 La Trobe University, *Submission 16* (48th Parliament), p. 1.

(a) The administering body would require rigorous validation, accredited confirmatory pathways, Indigenous data governance, and public reporting against National Environment Management Plan (NEMP)-aligned metrics.
(b) Specific programs would be required to upskill Indigenous researchers to lead the work with the competitive funding rounds.[83]

5.88 La Trobe suggested that short and long-term health monitoring and health support for impacted communities could be established 'in parallel' with the proposed PFAS Field Screening Network. This could be delivered through La Trobe University's Gabra Biik, Wurruwila Wutja Indigenous Research Centre, led by Professor Julie Andrews, and its Biomedical and Environmental Sensor Technology (BEST) Research Centre, led by Dr Saimon Moraes Silva, in partnership with local Aboriginal Community Controlled Health Organisations (ACCHOs), and:

> … would feature opt-in, regular check-ups; exposure/health registries governed by Indigenous Data Sovereignty; culturally appropriate mental-health supports; and funded follow-up, feedback and referral pathways. [And] [c]ulturally appropriate mental health and healing services, acknowledging stress, grief and disruption from contamination of Country …[84]

5.89 The committee's views and recommendations are included in the final chapters of this report.

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83 La Trobe University, *Submission 16* (48th Parliament), pp. 1–2.

84 La Trobe University, *Submission 16* (48th Parliament), pp. 1–2.

Chapter 6
Remediation of PFAS affected sites

Introduction

6.1 As discussed in the committee's interim report, remediation of PFAS-contaminated sites usually comprises removing PFAS contaminants from sites and reducing PFAS leaching into the surrounding environment. In addition to addressing the source of contamination, remediation is intended to remove or mitigate further contamination wherever it has spread, including soil, groundwater and surface water. Remediation also encompasses the storage or destruction of resultant waste.

6.2 PFAS contaminated waste cannot simply be moved to landfill, as this would merely relocate the problem to a new location, resulting in leaching of PFAS into the environment at a different locality.[1] To address this, several entities have developed remediation techniques and technologies designed to remove, safely contain, dilute or destroy PFAS.

6.3 The first part of this chapter summarises the technologies and processes currently used by organisations conducting remediation, as well as remediation technologies that have been created or developed by submitters.

6.4 The second part of this chapter outlines the practices that are being used for remediation programs led by Commonwealth and state agencies, including the Department of Defence (Defence) and Airservices Australia (Airservices), which are undertaking PFAS investigation and remediation projects across Australia. This chapter builds on the programs discussed in the interim report using additional information and evidence provided by some of these Commonwealth, state and territory agencies, and presents the views of inquiry participants.

6.5 In January 2025, the committee held a hearing for community members impacted by PFAS contamination originating from Defence bases in the Jervis Bay Territory. The committee has since received further evidence from Defence in relation to the remediation project at Jervis Bay. This chapter provides an update on Defence's engagement with the Wreck Bay Aboriginal community.

PFAS remediation technologies and projects

6.6 In its interim report, the committee discussed a range of strategies and techniques used for remediation of PFAS contamination. Since then, the

[1] SciDev, *Submission 41* (47th Parliament), p. 16.

committee has received further evidence in relation to methods for destruction, removal and containment of PFAS from contaminated sites.

6.7 The CSIRO submitted that 'PFAS destruction is very expensive and not widely available yet'; therefore:

> A combination of non-destructive PFAS removal with subsequent PFAS destruction in the concentrated waste stream is often the most sustainable and cost-efficient approach to dealing with PFAS.[2]

6.8 The CSIRO noted that 'best practices are still in development for most remedial technologies, especially destructive ones'. This is why, in some cases, there is a 'stark contrast in remedial guidance and legislation across jurisdictions'. As an example, CSIRO noted that the incineration of materials containing PFAS—which is used in Australia for a small percentage of materials which contain the highest proportion of PFAS contamination—is 'preferred' in Germany, but 'currently prohibited for the [United States] Department of Defense'.[3]

6.9 As well as describing and promoting a number of technologies, inquiry participants emphasised the substantial difficulties faced by Australian entities developing novel remediation technologies—particularly when it comes to getting support for testing and research. These difficulties are outlined at the end of the chapter.

Water remediation technologies

6.10 Veolia, a company specialising in water, waste and energy management, operates several PFAS treatment and management technologies across Australia, including 'mobile water treatment assets for treating PFAS-impacted run-off from contaminated areas'. These assets are deployed 'on construction projects, fire training schools and in emergency response situations, for example in the case of foam release at aircraft hangers'.[4]

6.11 Veolia described its water remediation projects in Australia, which include:

- Installation of a mobile PFAS water treatment plant on a contaminated former fire training ground, treating PFAS impacted water in a nearby dam for compliant discharge into the environment.
- Management and treatment of PFAS impacted water from the flushing of fire trucks during a changeover from AFFF to non-fluorine containing fire fighting foams, with treatment residuals appropriately managed offsite.

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2 CSIRO, *Submission 22* (47th Parliament), p. 12.

3 CSIRO, *Submission 22* (47th Parliament), p. 12.

4 Veolia, *Submission 58* (47th Parliament), pp. 1–2.

- Collection, management and treatment of neat AFFF concentrate from former fire training facilities.[5]

6.12 The 3M Company (3M)—who initially developed and manufactured PFAS—submitted that granular activated carbon is 'effective in removing a wide range of PFAS and is particularly effective in removing longer-chain PFAS such as PFOS and PFOA' from water. The resulting PFAS residues then need to be thermally destroyed.[6]

6.13 One option for those concerned about PFAS in their drinking water supply is home water filtration systems. However, Head of School of Civil Engineering at the University of Sydney, Professor Stuart Khan explained that in-home water filtration systems are 'highly variable'. While household activated carbon filters are commonly available, and 'can be at least partially effective', there is no practical or affordable means of monitoring the performance of PFAS removal for these products.[7]

Thermal destruction of PFAS

6.14 In Australia, Enviropacific—which specialises in environmentally focused engineering and applied science solutions—is the operator of the SOLVE thermal desorption facility, located in Altona, a suburb in Melbourne.

6.15 SOLVE uses a two-part process of volatilisation[8] and thermal destruction to remove and destroy PFAS from heavily contaminated soil where:

> … heat is applied to the contaminated soil to volatilise the contaminants, capturing them as a vapour for further destruction, while allowing the recovery of the soil matrix for beneficial purposes.[9]

6.16 The committee visited the SOLVE thermal destruction plant and was provided with a presentation and a tour. The committee noted that thermal destruction is highly effective at neutralising PFAS. However, it is only available at two Victorian sites, requiring transportation of contaminated materials from around the country to these facilities in Victoria. The technology also requires a significant amount of gas to run and is thus costly and energy intensive. A

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5 Veolia, *Submission 58* (47th Parliament), p. 10.

6 3M Company, *Submission 71* (47th Parliament), pp. 3–4.

7 Professor Stuart Khan, Head of School of Civil Engineering at the University of Sydney, responses to written questions on notice from Senator Thorpe (received 26 February 2025), [p. 2].

8 'Volatilisation' refers to the process of converting a solid or liquid into a gas or vapor, which can be described as the evaporation of lighter volatile fractions of binders during high temperature heating. This process is influenced by the properties of the chemical and the soil, as well as climatic factors, and can be defined as the act of passing into the atmosphere as a gas. (Definition from Taylor and Francis).

9 Enviropacific, *Submission 142* (47th Parliament), [pp. 4–5]. See also: Veolia, *Submission 58* (47th Parliament), pp. 1–2.

detailed report on the facility and destruction methods is included in Appendix 2 of this report.

6.17 The SOLVE facility is used by a number of government and non-government organisations for their respective remediation programs. Enviropacific stated that it has thermally destroyed PFAS in over 200 000 tonnes of contaminated 'soils, concentrate, washwaters, filter media, concrete and biosolids'.[10]

6.18 Enviropacific submitted that the main benefit of thermal destruction 'is an immediate reduction in legacy risks associated with PFAS, enabling soil to be beneficially used in construction, landfill rehabilitation, and topsoil'.[11]

6.19 Enviropacific also uses other technologies to remediate PFAS contamination, like chemical stabilisation, engineered repositories or a 'cap and contain' approach, as well as 'soil washing'.[12]

Hemp cultivation to remediate PFAS contaminated land

6.20 Hemp Farms Australia is Australia's largest family-owned breeder of low-THC industrial hemp genetics.

6.21 Mr Lauchlan Grout, Co-Founder and Chief Executive Officer of Hemp Farms Australia, stated that industrial hemp represents 'an unparalleled scientifically proven method for remediating soils with contaminated PFAS'. According to Mr Grout, Australian-bred hemp varieties 'have demonstrated the remarkable ability to bioaccumulate up to and above 80 per cent of PFAS contaminants from soil'.[13]

6.22 Mr Grout added that Hemp Farms Australia has partnered with a Belgian bioengineering specialist that has developed 'a soil enzyme additive which, when combined with [the] hemp varieties, can enhance the rate of PFAS uptake by approximately 40 times compared to traditional methods'.[14]

6.23 The final part of the process involves placing the resulting biomass (the organic material produced from the harvested hemp) in a mobile pyrolysis machine and

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10 Enviropacific, *Submission 142* (47th Parliament), [pp. 1 and 4].

11 Enviropacific, *Submission 142* (47th Parliament), [pp. 4–5].

12 Enviropacific, *Submission 142* (47th Parliament), [pp. 4–5]. Soil washing is a remediation process which focusses on the aggregation of contaminants into fines (clays/silts) to produce recoverable materials such as sand and gravels. This allows the secondary treatment of the consolidated and concentrated PFAS materials, with beneficial reuse of the majority cleaner products. Enviropacific, *Treating PFAS across all waste streams*, February 2024 (accessed 13 August 2025).

13 Mr Lauchlan Grout, Co-Founder and Chief Executive Officer, Hemp Farms Australia, *Committee Hansard*, 4 June 2025, pp. 47 and 50.

14 Mr Lauchlan Grout, Co-Founder and Chief Executive Officer, Hemp Farms Australia, *Committee Hansard*, 4 June 2025, pp. 47 and 50.

heating the biomass to 800 degrees Celsius. Mr Grout stated that this leaves behind a '100 per cent carbon product', with no PFAS residue.[15]

6.24 Mr Grout noted that this technology could be used to remediate soils at airports and former fire stations and would be particularly useful in remote locations. Despite promising research, Mr Grout said 'Australia has yet to fully explore and leverage' industrial hemp for PFAS remediation.[16]

Biochar

6.25 Mr Robert Tonks—a Queensland engineer with almost 20 years of research and development in pyrolysis technology and biochar production—emphasised the difficulties faced by purveyors of emerging technologies, including 'zero pathways for field trial access, no dedicated funding for pre-commercial technology validation, and regulatory frameworks that favour established multinationals over Australian innovation'.[17]

6.26 Mr Tonks has developed a 'biological PFAS remediation technology combining pyrolysis-produced biochar with proprietary microbial solutions'. Mr Tonks believed this technology has 'the potential to destroy PFAS contamination in-situ while improving soil health'.[18]

Immobilising PFAS in concrete

6.27 Mr Robert Lancaster, the Senior Business Development Manager at Fire and Test Australasia (FTA)—a certified Aboriginal-owned special hazards company based in Victoria—described FTA's solution to PFAS remediation at the Melbourne public hearing. FTA is the sole 'global Indigenous distributor' of Ambiolock, which is an 'Australian designed, developed and patented PFAS mitigation technology'. Mr Lancaster stated that, 'unlike many remediation methods that manage PFAS effects, Ambiolock targets the source, mechanically immobilising PFAS compounds and preventing their migration through soil and water'. He claimed Ambiolock had 'improved its effectiveness from a 60 per cent to a 99 per cent effectiveness in encapsulating PFAS in concrete and other substrates for reuse and repurposing'. FTA further argued that, by immobilising

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15 Mr Lauchlan Grout, Co-Founder and Chief Executive Officer, Hemp Farms Australia, *Committee Hansard*, 4 June 2025, pp. 47 and 50.

16 Mr Lauchlan Grout, Co-Founder and Chief Executive Officer, Hemp Farms Australia, *Committee Hansard*, 4 June 2025, p. 43.

17 Robert Tonks, *Submission 140* (47th Parliament), [pp. 1–2]. Pyrolysis is the thermal decomposition of organic materials in an oxygen-free environment to break them down into their simpler molecular compounds. Biochar is a stable, carbon-rich charcoal produced from biomass like wood, manure, or waste by heating it to high temperatures in a low-oxygen environment through a process called pyrolysis.

18 Robert Tonks, *Submission 140* (47th Parliament), [pp. 1–2].

PFAS at the source, Ambiolock would 'reduce future remediation needs and associated costs'.[19]

6.28 Mr Lancaster outlined three different solutions for PFAS contamination in concrete:

- The first is a substance that is mixed into new concrete 'to stop that concrete substrate from becoming a contaminated waste product later on'.
- The second is a treatment for concrete rubble from impacted sites, such as airports, chemical plants, firefighting grounds, etc. This rubble is crushed into an aggregate, a substance is added, then the new concrete mix can be used to construct new runways, or other hard landscaping.
- The third solution, Ambioseal, is applied at sites that 'can't shut down, like a firefighting training ground where you need a live fire station in the suburb'. FTA cleans the concrete, then applies 'a two-coat penetrating system':

> The first coat goes down and migrates into the slab in excess of 150 millimetres. It actually locks it down and stops the transfer of all the moisture. So there's nothing going in and nothing coming out. Then we've got a second-stage coating which migrates into the slab up to 50 millimetres. It's not a surface coating; it becomes a part of the substrate. It grows in amongst all the voids inside your concrete. As I think everybody would be aware, concrete is like a hard sponge. It is porous. So, every time it rains, it spreads the love. That's something that we can do.[20]

6.29 In addition, Mr Lancaster maintained that FTA can 'sectionalise' remediation, meaning contaminated sites do not need to 'all shut down at once' while remediation is undertaken.[21]

6.30 According to FTA, its products have been used on numerous projects around Australia, including fire training grounds and truck wash bays, and 'have demonstrated more than 99% reduction in PFAS leaching using the AmbioSeal™ two-stage concrete treatment process'. Despite having demonstrated effectiveness, Mr Lancaster submitted that FTA faces 'barriers to swift implementation due to regulatory inertia and consultant-driven delays, often focusing only on soil and groundwater impacts while overlooking concrete remediation within the source areas'.[22]

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19 Mr Robert Lancaster, Senior Business Development Manager, Fire and Test Australasia, *Committee Hansard*, 4 June 2025, pp. 43–44.

20 Mr Robert Lancaster, Senior Business Development Manager, Fire and Test Australasia, *Committee Hansard*, 4 June 2025, pp. 46–47.

21 Mr Robert Lancaster, Senior Business Development Manager, Fire and Test Australasia, *Committee Hansard*, 4 June 2025, pp. 46–47.

22 Fire and Test Australasia, *Submission 126*, [p. 1].

Hazardous waste storage facility

6.31 Tellus owns and operates a non-destructive hazardous waste facility at Sandy Ridge in remote Western Australia. The facility 'is licensed and equipped to dispose safely of almost all forms of hazardous waste'. Tellus stated that the 'geological characteristics' of the site makes the facility 'one of the safest places on earth to permanently dispose of hazardous waste, whether chemical or radioactive':

> Unlike a conventional landfill, which is open, with an artificial liner that degrades over time, and collects leachate which can pollute groundwater, the Sandy Ridge geological repository uses the natural barriers of the environment to contain waste, supported by an additional engineered barrier—an air dome—which prevents the build-up of leachate during disposal.[23]

6.32 Tellus argued that its operation could play a much larger role in remediation, as the scale of the facility at Sandy Ridge 'means remediation and clean-up projects can be completed at far greater scale and speed than other current solutions'.[24]

6.33 Tellus stated that it has disposed of 'some PFAS material, including material that originated from government agencies'. However, the organisation emphasised that 'it has been constrained in disposing of higher volumes by current concentration limits in applicable legislation', as current regulation 'prevents acceptance of higher concentrations of PFAS contaminants due to the interpretation of the Stockholm Convention in the current National Environmental Management Plan'.[25]

6.34 Tellus acknowledged arguments that 'landfill disposal is inappropriate'. Nevertheless, Tellus believed that this is due to 'current guidance and practice about destruction of PFAS materials, for example through thermal destruction'.[26]

6.35 Tellus acknowledged that thermal destruction is an 'effective method of destroying PFAS', however, raised concerns about thermal destruction continuing 'to be a valid method of PFAS management in Australia, including in the population-dense Melbourne metropolitan region'. Tellus also cited the United States Environmental Protection Agency's guidance, provided in December 2020, which noted:

> …the use of storage, deep well injection, permitted hazardous waste landfills and solid waste landfills provide a more certain method of safely

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23 Tellus, *Submission 83* (47th Parliament), p. 2.

24 Tellus, *Submission 83* (47th Parliament), pp. 2–3.

25 Tellus, *Submission 83* (47th Parliament), pp. 2–3.

26 Tellus, *Submission 83* (47th Parliament), pp. 2–3.

> dealing with PFAS compared with hazardous waste combustors and other thermal treatment.[27]

6.36 Therefore, Tellus encouraged government to amend the PFAS National Environmental Management Plan 3.0 (NEMP 3.0) to provide 'for geological repositories as a preferable form of waste disposal to take account of their unique attributes for disposing of PFAS in an environmentally responsible way'.[28]

Technology choices, funding, and development pathways

6.37 Several submitters recognised that treatment technologies may be site-specific, and certain sites may require multiple treatment technologies.

6.38 SciDev Limited (SciDev), an Australian company specialising in water treatment solutions including remediating PFAS contamination, submitted that:

> … the process for selection and regulatory approval of appropriate treatment technologies must be flexible and allow for a wide range of treatment technologies that can be combined based on site-specific conditions.[29]

6.39 Mr Steve Becker, Technical Director of Water Technologies at SciDev, noted that the optimum remediation solution may involve a 'combination of technologies to effectively address complex situations'.[30]

6.40 Similarly, crcCare submitted that a 'combination of technologies' is required to achieve optimal remediation outcomes'.[31]

6.41 However, submitters expressed varying views on the extent to which a range of technologies have reached commercial maturity and the developmental and regulatory hurdles facing smaller businesses developing remediation technologies.

6.42 On the one hand, SciDev argued that the remediation industry in Australia has 'long understood the problems of PFAS, and there are numerous fully commercialised solutions available that can be tailored to site-specific conditions'.[32]

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27 Tellus, *Submission 83* (47th Parliament), p. 5.

28 Tellus, *Submission 83* (47th Parliament), p. 6.

29 SciDev Limited, *Submission 41* (47th Parliament), p. 15.

30 Mr Steve Becker, Technical Director, Water Technologies, SciDev Limited, *Committee Hansard*, 4 June 2025, p. 45.

31 crcCare, *Submission 36* (47th Parliament), p. 22.

32 Mr Steve Becker, Technical Director, Water Technologies, SciDev Limited, *Committee Hansard*, 4 June 2025, p. 45.

6.43 By contrast, Mr Tonks argued that the lack of funding for pre-commercial innovation and absence of field trial pathways makes it difficult to develop and validate local technological solutions which are unable to compete with multinational corporations.[33]

6.44 Further, Mr Tonks argued that even with funding and validation, the 'regulatory frameworks favour 'established players' and Australian innovators 'face the same lengthy, expensive approval processes as multinational chemical companies'.[34]

6.45 Similarly, Pacific Biotechnologies, an Australian company developing technologies for wastewater treatment, identified a need to support research and development and 'pilot programs' to demonstrate the efficacy of solutions.[35]

6.46 Enviropacific also pointed to 'the need for dedicated funding to support both the research and delivery of various PFAS treatment technologies'.[36]

6.47 Mr Grout from Hemp Farms Australia stated that further support is needed for research into Australian hemp varieties, to 'develop a robust method for safely destroying contaminated biomass'. He urged the government 'to integrate industrial hemp cropping and associated biotechnologies into its PFAS remediation policies'. Such an integrated approach would, he argued, 'ensure immediate and lasting environmental benefits, stimulate regional economic growth and position Australia at the forefront of a sustainable global industry'.[37]

6.48 Dr Matthew Askeland and Mr Andrew Mitchell—environmental consultants with a combined forty years of experience—recommended the development of a national PFAS technology innovation program. They argued that such a program would 'foster the development and commercialisation and/or improvement of technologies to manage PFAS'. It was their view that such a program 'should encompass both funding and clear pathways to regulatory and market acceptance' of new remediation technologies.[38]

6.49 Commenting on Australia's investment in PFAS remediation technologies, Mr James Comley from Airservices said there is 'a huge body of research on novel techniques and novel technology', including microbial products, and plasma-

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33 Robert Tonks, *Submission 140* (47th Parliament), [p. 2].

34 Robert Tonks, *Submission 140* (47th Parliament), [p. 2].

35 Pacific Biotechnologies, *Submission 93* (47th Parliament), [p. 4]; see also Veolia, *Submission 58* (47th Parliament),p. 6.

36 Enviropacific, *Submission 142* (47th Parliament), [pp. 4–5].

37 Mr Lauchlan Grout, Co-Founder and Chief Executive Officer, Hemp Farms Australia, *Committee Hansard*, 4 June 2025, p. 47.

38 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 6.

based products. However, most of those technologies are still in the research and development phase.[39]

PFAS remediation programs

6.50 The following sections cover a range of remediation programs operated by Commonwealth and state agencies, including Defence, Airservices, and the Australian Government's PFAS Airports Investigation Program, administered by the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts (the Department of Infrastructure). This section also provides an update on the PFAS management and remediation program at Wreck Bay.

Defence PFAS Investigation and Management Program

6.51 Over 10 years, from the 2015–16 budget to 2025–26, Defence has had an allocation totalling $817 million for investigation and remediation.[40]

6.52 Since 2015, Defence has delivered the PFAS Investigation and Management Program (the Defence Program) to manage risks associated with PFAS contamination on and around Defence sites, which was caused by the historic use of materials containing PFAS, most notably firefighting foams.[41]

6.53 The use of PFAS-containing foams at Defence sites across the country means high levels of PFAS remain present in the environment surrounding many Defence bases. Since 2004, Defence has worked with a variety of Commonwealth, state and territory agencies and local communities in managing PFAS contamination around Defence sites.[42]

6.54 The Defence Program includes investigation, management, remediation and ongoing monitoring of PFAS contamination at 28 Defence sites across the country. This includes joint-user airports, where both Defence and civil aviation operations occur, such as at Darwin and Townsville airports.[43]

6.55 Defence works collaboratively with the Department of Infrastructure and Airservices. This involves pooling information, experience and knowledge, including providing data analyses of historical work and previous sampling 'to

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39 Mr James Comley, PFAS Technical Lead, Airservices Australia, *Committee Hansard*, 5 September 2025, p. 5.

40 Department of Defence, *Submission 66* (47th Parliament), [p. 4]; Department of Defence, response to questions on notice, public hearing 21 January 2025 (received 11 February 2025), [p. 7].

41 Department of Defence, *Submission 66* (47th Parliament), [p. 2].

42 Department of Defence, response to written questions from Senator Thorpe—questions to Defence, (received 17 February 2025), [p. 4].

43 Department of Infrastructure, response to written questions from Senator Thorpe—questions to Infrastructure, (received 28 March 2025), [p. 2].

avoid duplication of effort and to ensure all PFAS sources and impacts on airport are investigated'. In addition to sharing knowledge, the agencies consider and use findings from other investigations across the program.[44]

6.56 Investigations have determined that 'PFAS is mostly concentrated in areas where legacy firefighting foams (in use from the 1970s until Defence commenced transitioning away from them in 2004) were previously used, stored or disposed', which has led to these locations being designated as 'source areas'. PFAS in these locations can be found in soil and groundwater. In addition to these concentrated locations, Defence has acknowledged instances of PFAS being distributed from source areas, via surface water transport, including drainage lines and creeks, as well as groundwater flow, contaminating surrounding waterways and properties.[45]

Site investigations and PFAS Management Area Plans

6.57 Defence argued that it is a world leader in PFAS investigation and remediation through its largescale investigation and remediation program.[46] However, the Defence program highlighted the difficulties of removing PFAS from the environment, as well as the size and complexity of the task.

6.58 According to Defence, the first stage of its program involved 'site investigations, and human health and ecological risk assessments, conducted in line with the *National Environment Protection (Assessment of Site Contamination) Measure 1999* and PFAS National Environmental Management Plan'.[47]

6.59 Investigations for each base 'identified the areas where PFAS contamination is concentrated, known as source areas, and where pathways from the source areas may result in PFAS exposure for people, plants or animals'.[48]

6.60 Defence used this information to develop PFAS Management Area Plans for each site, which set out the actions Defence is taking to manage and remediate PFAS contamination. The investigation stage began in 2016 and is now complete at all 28 bases included in the program. These sites were selected 'using an assessment and prioritisation process based on how legacy firefighting foam was used or stored'.[49]

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44 Department of Infrastructure, response to written questions from Senator Thorpe—questions to Infrastructure, (received 28 March 2025), [p. 2].

45 Department of Defence, *Submission 66* (47th Parliament), [p. 2].

46 Ms Celia Perkins, Acting Associate Secretary, Department of Defence, *Committee Hansard*, 21 January 2025, p. 40.

47 Department of Defence, *Defence approach to PFAS management*, no date (accessed 20 June 2025).

48 Department of Defence, *Defence approach to PFAS management*.

49 Department of Defence, *Defence approach to PFAS management*.

6.61 Management and remediation activities at some sites started before the completion of investigations. In many cases, this has included providing an alternative drinking water supply to households where water was potentially contaminated.[50]

6.62 Defence holds information sessions for communities affected by PFAS contamination from Defence sites, with these sessions intended to provide information on the progress of remediation and outcomes of ongoing monitoring, while providing opportunities for community members to 'learn more from the PFAS Investigation and Management Program team'.[51]

6.63 PFAS mass flux studies are used by Defence to measure levels of PFAS and 'groundwater and surface water flow rates'. These studies involve sampling and analysis of PFAS in groundwater and surface water and 'hydrological modelling' using samples 'collected over a 12-month period to measure seasonal changes within the environment'.[52]

6.64 A mass flux study at Holsworthy Barracks began in September 2024 with Defence anticipating that the report 'will be finalised around November 2025, allowing for an independent technical review of the study'.[53]

6.65 In September 2025, Deputy Secretary, Security and Estate, Ms Celia Perkins told the committee that Defence had now 'completed agreed remediation actions to the extent reasonably practicable' at two sites—Singleton Military Area, in New South Wales (NSW); and HMAS *Cerberus*, in Victoria.[54]

6.66 While Defence's investigation and remediation program may be one of the most advanced in the world, impacted community members have previously expressed anger and disillusionment towards Defence and the Commonwealth for the slow pace of the program, limited scope of remediation, confusing and unsatisfactory communication and community engagement, and ongoing impacts on their land, its economic value and their lifestyles.[55]

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50 Department of Defence, *Defence approach to PFAS management*.

51 Department of Defence, *PFAS Investigation and Management Program*, no date (accessed 20 June 2025).

52 Infrastructure, Transport, Regional Development, Communications and the Arts, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 28 March 2025), [p. 2].

53 Department of Defence, response to questions on notice, public hearing 21 January 2025 (received 11 February 2025), [p. 2].

54 Ms Celia Perkins, Deputy Secretary, Security and Estate, Department of Defence, *Committee Hansard*, 5 September 2025, p. 2.

55 See, for instance: the Joint Standing Committee on Foreign Affairs, Defence and Trade (JSCFADT), *Inquiry into PFAS remediation in and around Defence bases: final report*, March 2022, pp. 7–14.

6.67 Defence's engagement is covered in more detail in Chapter 5.

RAAF Base Darwin and RAAF Base Tindal

6.68 Defence stated that it 'undertakes significant data collection as part of its ongoing investigation and monitoring programs' in and around sites such as RAAF Base Darwin and RAAF Base Tindal (located near Katherine). These datasets are made available through the Defence PFAS website, which includes information on surface water, groundwater, soil and biota.[56]

6.69 Defence has commenced remediation of source locations at RAAF Base Tindal and RAAF Base Darwin with the removal of 'concentrated source material from site' for destruction and disposal. Defence has determined that removing the most highly contaminated material 'will reduce the overall load of PFAS entering the environment in those locations'. However, additional remediation 'to stabilise lower level PFAS concentrations on these sites will likely further reduce contaminant load'. Defence stated that the result of remediation works 'will require multi-year monitoring to determine contaminant trends both on and off site'.[57]

Jervis Bay Range Facility

6.70 Forecasted expenditure for future works at the Jervis Bay Defence sites—including the Royal Australian Navy School of Survivability and Ship Safety, which is the primary site of PFAS contamination in Wreck Bay—is approximately $80 million. This figure includes currently contracted remediation works, ongoing monitoring and water treatment plant operating costs through to 2035. Defence noted that the forecasted cost is subject to change due to ongoing investigations as well as external factors such as the cost of materials and labour.[58]

6.71 Remediation works commenced at the Royal Australian Navy School of Survivability and Ship Safety facility and the headwaters of Mary Creek in early 2025. This work included 'capturing contaminated surface water and groundwater; and diverting clean surface water to reduce flow over PFAS-impacted soils'; and excavating and disposing of PFAS contaminated soils. The

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[56] Northern Territory Department of Lands, Planning and Environment, *Submission 68* (47th Parliament), p. 5.

[57] Northern Territory Department of Lands, Planning and Environment, *Submission 68* (47th Parliament), p. 5.

[58] Department of Defence, response to written questions from Senator Whish-Wilson—questions to Defence (received 11 February 2025), [p. 11].

temporary groundwater treatment plant has treated over 21 million litres of water and construction on a permanent plant is expected to start in 2025.[59]

6.72 Defence reported that it met with the Jervis Bay Territory Authority, the Department of Climate Change, Energy, the Environment and Water (Department of the Environment), the NSW Environment Protection Authority (EPA) and Australian Capital Territory Government and provided an update on works on and around Jervis Bay Range Facility in August 2025.[60]

6.73 To date, Defence has invested approximately $17.8 million on PFAS investigations and management for Jervis Bay Range Facility.[61]

Settlement of class actions

6.74 Defence has settled five class actions and paid out around 400 other legal claims. The majority of class actions involved compensation to landowners for 'economic loss, including the diminution in value to their properties'.[62] In contrast, the Wreck Bay class action settlement was paid in recognition of cultural loss and cultural impacts. Along with class actions, Defence has paid out a number of non-litigated claims. With some exceptions, the majority of the PFAS related claims received by Defence to date 'have claimed property value diminution and inconvenience, distress and vexation'. These 'are assessed on a case-by-case basis, in accordance with the *Attorney-General's Legal Services Directions 2017* (Cth)'.[63]

6.75 According to the Assistant Secretary of PFAS Investigations and Management, Ms Kathleen Leane:

> Wreck Bay was $22 million, settled on 19 June 2023. There were three class actions at Williamtown, Katherine and Oakey; that was $212.5 million on 5 June 2020. The class actions relating to RAAF bases Pearce, Darwin, Townsville, Edinburgh, Richmond and Wagga and to Bandiana military

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59 Attachment A: *Defence Investigation and Management Program—Site summaries table 21 August 2025*, p. 1, provided in Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025).

60 Attachment A: *Defence Investigation and Management Program—Site summaries table 21 August 2025*, p. 1, provided in Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025).

61 Attachment A: *Defence Investigation and Management Program—Site summaries table 21 August 2025*, p. 1, provided in Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025).

62 Shine Lawyers, *What is the Katherine PFAS Contamination Class Action about?*, February 2020 (accessed 27 October 2025).

63 Department of Defence, *Submission 66* (47th Parliament), [p. 4]; Department of Defence, response to questions on notice, public hearing 21 January 2025 (received 11 February 2025), [p. 7].

> training area were $132.7 million, which was settled on 25 August 2023. Those numbers are the settled amounts; they don't include our legal fees …[64]

6.76 On notice, Defence confirmed that it has paid the following sums in relation to settled, litigated and non-litigated PFAS claims:

- Total settlement value for class actions is $367,200,000.
- Total settlement value for other litigated claims is $6,865,500.
- Total settlement value for non-litigated claims is $34,766,950.[65]

6.77 Along with claim payouts, 'Defence has paid $78 million (rounded) in PFAS related legal costs'. This includes 'external legal advice, representation and disbursements for litigated claims including class actions and non-litigated claims'.[66]

Airservices National PFAS Management Program

6.78 As discussed in the interim report, the Airservices National PFAS Management Program (Airservices' Program) targets PFAS within Airservices lease areas on airports. Airservices' Program includes site investigations, monitoring, management actions and, where appropriate, remediation.[67]

6.79 As at 30 June 2023, Airservices' PFAS-related activity had cost approximately $129 million, with $77.8 million spent in 2022.[68]

6.80 In its 2024–25 Corporate Plan, Airservices stated that the costs and liabilities associated with PFAS contamination and its remediation is a key risk to the organisation, saying:

> We are currently funding these activities through our operating budget; however, we are actively working with our stakeholders to devise a more suitable funding model.
>
> We recognise that the full cost of remediation is beyond the capacity of our current funding model. Consequently, it is likely that we will need support from the Commonwealth Government and the airports.[69]

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64 Ms Kathleen Leane, Assistant Secretary, PFAS Investigations and Management, Department of Defence, *Committee Hansard*, 5 September 2025, p. 9.

65 Department of Defence, response to question on notice, public hearing 5 September—PFAS litigation payouts (received 24 September 2025), [p. 1].

66 Department of Defence, response to written questions from Senator Thorpe—revised response (received 24 October 2025), [p. 1].

67 Department of Infrastructure, Transport, Regional Development, Communications and the Arts, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 28 March 2025), [p. 1].

68 Airservices Australia, 'Contingent liabilities', *Annual Report 2022–23*, September 2023 (accessed 10 November 2025).

69 Airservices Australia, 'Key risks', *2024–25 Corporate Plan*, 2024, p. 34 (accessed 10 November 2025).

6.81 Airservices has already sought support from the Commonwealth, with at least $20 million of public monies allocated for remediation at Launceston Airport, in Tasmania, and around $25 million being sought for remediation at Rockhampton Airport in Queensland.[70]

6.82 While some airports, like Launceston Airport, have reflected positively on the Airservices program, other airports around Australia raised concerns regarding the pace and depth of the program.

Australian Airports Association

6.83 The industry body for Australian airports, the Australian Airports Association (AAA), outlined concerns that airport operators had with Airservices' Program; most notably stating that the program 'is too little, too late'.[71]

6.84 AAA called on Airservices to expedite action 'to effectively address the ongoing risks and impacts of legacy contamination', adding that Airservices must strive to achieve a nationally consistent approach to the management of PFAS and ensure that all airport sites are involved in a coordinated remediation effort.[72]

6.85 AAA noted that the current funding model 'focuses exclusively on federally leased airports, leaving significant gaps in addressing contamination at other affected sites'. AAA therefore argued that a nationally consistent framework was 'essential to provide clarity and certainty for airport operators, local governments, and communities'.[73]

6.86 AAA suggested Airservices' approach should also include 'collaboration with state-based agencies to align remediation efforts and regulatory standards, ensuring that all affected sites receive the attention and resources they need'.[74]

Polluter pays principle

6.87 AAA emphasised that the 'polluter pays' principle is 'a widely accepted principle underpinning environmental legislation, which implies that those who generate pollution and waste should bear the cost of its containment, avoidance or abatement'.[75] According to AAA, these costs extend to the costs of 'identification, assessment, remediation and management of land affected by the relevant pollution'. AAA highlighted that the polluter pays principle is an

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70 House of Representatives, 'Public Works Committee starts three new inquiries', *About the House*, 8 August 2025 (accessed 10 November 2025).

71 Australian Airports Association, *Submission 39* (47th Parliament), p. 6

72 Australian Airports Association, *Submission 39* (47th Parliament), pp. 5–6.

73 Australian Airports Association, *Submission 39* (47th Parliament), pp. 6–7.

74 Australian Airports Association, *Submission 39* (47th Parliament), pp. 6–7.

75 Australian Airports Association, *Submission 39* (47th Parliament), p. 7.

important part of the Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination.[76]

6.88 The submission from AAA ultimately asserted that:

> … even though the existing regulatory framework contains mechanisms to hold the polluter to account, the polluter pays principle has not been effectively implemented through the Commonwealth's current regulatory approach to managing contamination at federally leased airports sites.[77]

6.89 AAA believed that a broader scope would ensure that the financial burden of addressing PFAS contamination 'is borne by the polluters under the "polluter pays" principle', arguing that federally leased airports 'should not be required to shoulder these costs for contamination they did not cause'.[78]

6.90 The United Firefighters Union of Australia made a similar argument, suggesting the Australian Government establish a PFAS remediation grant program to fund remediation of the most heavily contaminated sites, and consider 'at least partial funding of the remediation grant program through the pursuit of litigation against manufacturers and suppliers of firefighting foams containing PFAS'.[79]

6.91 The PFAS independent review also suggested that Commonwealth legal action against manufacturers of PFAS-containing products could provide an opportunity to recover some of the costs of remediation.[80]

6.92 In May 2025, the NSW EPA ordered 3M Australia to address PFAS contamination at Brogans Creek Quarry, where the company tested firefighting foams between 1980 and 2000.[81]

6.93 Asked about potential litigation, the Department of the Environment submitted that it 'is not considering, researching, or planning any legal action against 3M, or any other chemical manufacturer, in relation to PFAS'.[82] However, at the committee's September hearing, Ms Perkins said Defence monitors overseas cases, and has briefed ministers about those, and she believes litigation 'will be

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76 Australian Airports Association, *Submission 39* (47th Parliament), p. 7.

77 Australian Airports Association, *Submission 39* (47th Parliament), p. 7.

78 Australian Airports Association, *Submission 39* (47th Parliament), p. 6.

79 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 6.

80 Jim Varghese AM, *Independent Review of land uses around key Defence bases impacted by PFAS contamination*, March 2024, p. 34.

81 NSW EPA, *3M Australia issued Clean-up Notice for legacy PFAS at quarry*, 30 May 2025 (accessed 10 November 2025).

82 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 21 July 2025), [p. 4].

part of the ongoing conversation with the government about how we respond to the PFAS issue'.[83]

North Queensland Airports Group

6.94 North Queensland Airports Group is the owner and operator of both Cairns and Mackay airports. The Group outlined a brief history of its experience with the Airservices program.[84]

6.95 North Queensland Airports Group submitted that the 'initial testing reports confirmed PFAS contamination of soil and groundwater at Cairns Airport in 2008'. However, it was not until 2019 that Airservices 'conducted formal Preliminary Site Investigations and targeted sampling at Cairns and Mackay airports'.[85]

6.96 According to North Queensland Airport Group, the results for Mackay Airport indicated PFAS contamination so high that it 'caused Queensland Health to erect signage at nearby Shellgrit Creek' which warned the public 'not to eat fish from Shellgrit Creek due to elevated levels of PFAS'.[86]

6.97 After the results were released in 2019, Airservices advised North Queensland Airports Group that a Detailed Site Investigation would follow for both Cairns and Mackay airports. It was not until five years later, in late 2024, that North Queensland Airports Group received *draft* versions of the Detailed Site Investigation reports from Airservices. North Queensland Airports Group noted that the 'reports are not expected to be finalised until mid-2025'.[87]

6.98 Like AAA, North Queensland Airports Group submitted that the process has been 'drawn-out' and 'highly frustrating'. The airport operator expressed its desire for 'prompt, effective action and communication from Airservices', adding that Airservices 'must act to expedite its investigations and reporting and take responsibility for remediation at affected sites under the "polluter pays" principle' and ensure 'PFAS management [is] nationally consistent'.[88]

Capital Airport Group

6.99 Capital Airport Group is the airport lessee company of Canberra Airport's civilian operations. It outlined similar frustrations, stating that Airservices has 'continuously attempted to shift accountability and liability for PFAS

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83 Ms Celia Perkins, Deputy Secretary, Security and Estate, Department of Defence, *Committee Hansard*, 5 September 2025, p. 23.

84 North Queensland Airports Group, *Submission 29* (47th Parliament), [p. 1].

85 North Queensland Airports Group, *Submission 29* (47th Parliament), [p. 1].

86 North Queensland Airports Group, *Submission 29* (47th Parliament), [p. 1].

87 North Queensland Airports Group, *Submission 29* (47th Parliament), [p. 1].

88 North Queensland Airports Group, *Submission 29* (47th Parliament), [pp. 1–2].

contamination and remediation at Canberra Airport'. Capital Airport Group emphasised that Airservices was the agency 'responsible for procuring and using PFAS containing firefighting foams'.[89]

6.100 Capital Airport Group explained that, 'as a result of the failure of Airservices to remediate PFAS pollution, [Capital Airport Group] has had no option but to apply for Environmental Remediation Orders (ERO)'.[90]

6.101 The airport lessee remains 'very concerned about Airservices' willingness to comply with all requirements of the ERO'. Capital Airport Group stated that it is 'in continual discussions with Airservices, the Department [of Infrastructure], and the AEO [Airport Environmental Officers] on the level of remediation required and how this can be achieved'.[91]

6.102 Capital Airport Group noted there has been a 'frequent turnover of AEOs responsible for the management of environmental matters at Canberra Airport', with 'four separate AEOs appointed for Canberra Airport' in 12 months. Capital Airport Group considered this turnover to be 'a further risk to the ERO not being implemented effectively and compliance by Airservices being achieved'.[92]

Evidence from Airservices

6.103 Airservices noted that it is 'a tenant at each of the airports' involved, not a landowner. As such, Airservices is 'dependent' on airport lessors, and Commonwealth and state and territory agencies to provide approvals before it can commence any investigations or work:

> Securing agreement from these complex groups, who in some instances have different objectives, often adds to the timelines within which Airservices can act.[93]

6.104 Airservices also argued that the 'intensity' and pace of investigations differs between airports based on the results of initial investigations, due to Airservices' risk-based approach.[94]

Australian Government PFAS Airports Investigation Program

6.105 The Department of Infrastructure administers the Australian Government's PFAS Airports Investigation Program at civilian airports 'where the

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89 Capital Airport Group, *Submission 43* (47th Parliament), pp. 1–2.

90 Capital Airport Group, Submission 43 (47th Parliament), pp. 1–2.

91 Capital Airport Group, *Submission 43* (47th Parliament), p. 2.

92 Capital Airport Group, *Submission 43* (47th Parliament), p. 2.

93 Airservices Australia, response to written questions from Senator Thorpe (received 5 September 2025), [p. 3].

94 Airservices Australia, response to written questions from Senator Thorpe (received 5 September 2025), [p. 3].

Commonwealth historically provided firefighting services using PFAS-containing foams'. The program is designed to identify the nature and extent of PFAS contamination 'through independently audited whole of airport testing and assessment' and to 'develop robust management plans to address any identified risks, including those to human health and the environment'.[95]

6.106 AAA argued that the Department of Infrastructure's PFAS Airports Investigation Program 'focuses exclusively on federally leased airports, leaving significant gaps in addressing contamination at other affected sites'.[96] However, the committee notes that there are 37 airports in scope for the program but only 21 federally-leased airports (the total will be 22 once the new Western Sydney Airport is operational).

6.107 As part of the PFAS Airports Investigation Program, a Memorandum of Understanding (MOU) has been entered into between the Commonwealth and some operators of federally leased airports for the investigation and management of PFAS at airport-lessee companies' sites. AAA noted that the Commonwealth 'has agreed to fund the roles and responsibilities set out in the MOU'. However, 'memorandums of understanding are generally non-binding in nature and in this instance, the MOUs do not deal with the question of liability for PFAS contamination'.[97]

6.108 The committee submitted questions on notice to the Department of Infrastructure requesting an update on the program, which is expected to be completed by 30 June 2027.[98]

6.109 The department provided an update as at 1 July 2025. The update indicated that for the 37 airports that are in scope for the program:

- detailed site investigations and/or mass flux fieldworks are underway at 10 airports;
- preliminary site investigations are underway at five airports;
- investigations are commencing at nine airports;
- five airports have been invited to participate, but have not yet provided a response;
- six airports will not be participating in the program or are included in another airport's program; and

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95 Department of Infrastructure, Transport, Regional Development, Communications and the Arts, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 28 March 2025), [pp. 1–2].

96 Australian Airports Association, *Submission 39* (47th Parliament), p. 6.

97 Australian Airports Association, *Submission 39* (47th Parliament), p. 6.

98 Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts, *Submission 2* (47th Parliament), p. 5.

- the participation of another two airports is yet to be confirmed.[99]

6.110 In September 2025, the department confirmed it is on track for airports under tranche 1 to finalise their investigations and that a further 11 airports have agreed to participate in the program, including some that are not federally leased. According to Ms Tori Wright, Assistant Secretary, Airport Environment, Department of Infrastructure, as of 31 August 2025, $89.1 million (68 per cent) of the program budget has either been committed or spent.[100]

6.111 Once the investigations are finalised and management plans are developed:

> … those airports, once management plans are in place, will need to consider what action—for example, remedial action or ongoing monitoring—might be required. It becomes a matter for the airport to implement those management plans and any actions that might be assigned to other parties—for example, tenants on airports—would then flow from that work.[101]

Case study: Launceston Airport

6.112 Launceston Airport is the second busiest airport in Tasmania, linking the northern areas of the state to the mainland. The airport is leased by the Commonwealth Government to Asia Pacific Airports (Launceston) (APAL) which maintains airport operations. In conjunction with APAL, Airservices facilitates operations through air traffic control and provides firefighting services. Launceston Airport used the same standard firefighting foams that were utilised by other Australian airports and stopped using foams that contained PFAS in 2010.[102]

6.113 In 2009, Airservices provided to APAL a contamination assessment report for its Fire Training Ground (now the Former Fire Training Ground) at Launceston Airport which identified contamination from Aqueous Film Forming Foams (AFFF). APAL noted that, in 2010, 'Airservices wrote a letter to APAL, stating that Airservices had become aware of potential contamination issues arising from the use of AFFF at airports, with active ingredients which can include PFOS and PFOA'. The letter also stated that Airservices had 'ceased the use of

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99 Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts, response to written questions from Senator Thorpe (received 1 August 2025), [pp. 1–2].

100 Ms Tori Wright, Assistant Secretary, Airport Environment, Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts, *Committee Hansard*, 5 September 2025, p. 18.

101 Ms Tori Wright, Assistant Secretary, Airport Environment, Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts, *Committee Hansard*, 5 September 2025, p. 18.

102 Launceston Airport, *Submission 127* (47th Parliament), [p. 2]; Launceston Airport, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 2 April 2025), [p. 3].

AFFF in training' and were undertaking 'extensive investigations and working to understand the potential environmental issues'.[103]

6.114 APAL established roundtable discussions to coordinate a response to the contamination. Stakeholders who attended the roundtable included:

- APAL;
- Airservices;
- EPA Tasmania;
- Tasmanian Government Department of Natural Resources and Environment;
- Tasmanian Government Department of Health;
- Commonwealth Department of Infrastructure, Transport, Regional Development, Communications and the Arts;
- the Airport Environment Officer; and
- the Australian Government PFAS Taskforce (which operated as a discrete entity from 2017 to 2022 to support whole-of-government coordination and oversight of Australian Government responses to PFAS contamination).[104]

6.115 APAL considered this 'an effective and representative group that was well positioned to work together and advocate on behalf of diverse stakeholders'. APAL stated that it was 'pleased with the process' which ultimately resulted in 'industry-leading remediation works taking place at Launceston Airport'.[105]

6.116 However, one submitter expressed concern that they, as property owners near the airport, felt 'locked out of any direct communication', despite having 'asked on several occasions to be included in the "round-table" meetings'.[106]

6.117 Asked to comment on these concerns, APAL said the airport is 'open to including new voices and representatives as appropriate' to ensure that 'decision-making is as informed as possible'.[107]

6.118 In early 2024, remediation works for Launceston Airport received approval through the Parliamentary Standing Committee on Public Works with a cost estimate 'exceeding $20 [million]'.[108]

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[103] Launceston Airport, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 2 April 2025), [p. 3].

[104] Launceston Airport, *Submission 127* (47th Parliament), [p. 2]; Australian Government, *PFAS Taskforce website* (accessed 13 August 2025).

[105] Launceston Airport, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 2 April 2025), [p. 4].

[106] Kate Tucker and David Hughes, *Submission 132* (47th Parliament), [p. 1].

[107] Launceston Airport, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 2 April 2025), [p. 4].

[108] Airservices Australia, *Submission 69* (47th Parliament), p. 8.

6.119 The works aimed to remediate an estimated 90 per cent of PFAS contamination at the Former Fire Training Ground. APAL stated that the 'remediation approach involves the excavation of PFAS-contaminated soil, mixing in stabilising agents (such as activated carbon) where appropriate, and then reinstating the stabilised soil'. However, where excavated soil exceeds a 'chosen level' of PFAS contamination, the soil is not stabilised or reinstated. This heavily contaminated soil is instead 'taken off-airport to a thermal destruction facility', specifically the SOLVE facility in Melbourne.[109]

6.120 When soil has been stabilised, Airservices submitted that 'PFAS contaminated soil in this area ceases to be an ongoing potential source of contamination to the surrounding area', because stabilisation prevents PFAS from leaching out of the soil and contaminating surface waters or groundwater.[110]

6.121 APAL agreed that Airservices' plan to immobilise PFAS contamination and reinstate most of the soil is a 'reliable, reasonable, and practicable approach to managing this type of contamination'. It added that the 90 per cent removal target 'only applies to the Former Fire Training Ground, where long-term exposure to PFAS has caused significant contamination'.[111]

6.122 The remediation works commenced in October 2024 and were expected to take approximately 6 months to complete.[112] At the committee's September 2025 hearing, Airservices confirmed that the remediation work at Launceston Airport were completed on 30 June 2025. With 27 000 cubic metres of soil remediated, Mr Comley explained that some had been 'treated, re-instated and stabilised', and some had been disposed of 'off-airport'.[113]

6.123 Nearby landowners, Ms Kate Tucker and Mr David Hughes—whose land is 'utilised for agriculture (livestock and crops), recreational, and industrial purposes (quarrying of basalt)'—were concerned that PFAS contamination has already spread from the airport. A waterway, Kelly's Creek, which runs through their property from the Airport was recorded as having 'combined PFHxS + POS levels in several water samples as high as 24.5 [nanograms per litre (ng/L)]' by Airservices in 2023.[114]

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109 Airservices Australia, *Submission 69* (47th Parliament), p. 8.

110 Airservices Australia, *Submission 69* (47th Parliament), p. 8.

111 Launceston Airport, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 2 April 2025), [p. 2].

112 Airservices Australia, *Submission 69* (47th Parliament), p. 8.

113 Mr James Comley, PFAS Technical Lead, Airservices Australia, *Committee Hansard*, 5 September 2025, p. 12.

114 Kate Tucker and David Hughes, *Submission 132* (47th Parliament), [p. 1].

6.124 Ms Tucker and Mr Hughes described the impact of PFAS on their land as 'devasting' and said, 'the lack of communication from all levels of government (local, state and federal) has been incredibly frustrating'. Ms Tucker and Mr Hughes were disappointed when Airservices argued they are not responsible for the area which represents the main source of contamination on their land—the Former Wastewater Treatment Ponds on Launceston Airport. In fact, enquiries in late 2023 and early 2024—'with [Environmental Protection Authority (EPA)] Tasmania, Airservices, Launceston Airport Group and the [Department of Infrastructure]'—left Ms Tucker and Mr Hughes 'uninformed as to who is responsible for this area and moreover who is responsible for stopping the contamination coming onto our land'.[115]

Remediation standards and associated risks and costs

6.125 crcCare submitted that remediation works on specific sites 'have been inconsistent in their effectiveness, with some efforts focused solely on immediate contamination cleanup rather than long-term environmental protection'. Accordingly, crcCARE recommended government entities adopt 'a holistic approach to site assessments that consider long-term environmental impacts' and that entities ensure 'ongoing monitoring and maintenance after remediation is complete'.[116]

6.126 Australia's national peak body for soil science, Soil Science Australia, submitted that management strategies for PFAS should incorporate both immediate and long-term action plans. This could involve 'encouraging the development and application of new technologies for the removal of PFAS from contaminated sites' as well as 'engaging local communities in the development and implementation of monitoring programs'. Soil Science Australia also argued that 'instituting regular monitoring and transparent reporting of PFAS levels in the environment' would both foster trust between government entities and affected communities and ensure accountability.[117]

6.127 Drawing on its experience with remediation projects, SciDev argued that differing remediation standards across Australia reduce public confidence. Therefore, SciDev emphasised the need to establish a common national framework for remediation and 'national standards for reporting'.[118]

6.128 SciDev also recommended establishing a national peak body 'to deal with PFAS management issues and concerns'. Such a body could be based on the Interstate

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115 Kate Tucker and David Hughes, *Submission 132* (47th Parliament), [p. 1].

116 crcCare, *Submission 36* (47th Parliament), p. 22.

117 Soil Science Australia, *Submission 111* (47th Parliament), [p. 2].

118 Mr Steve Becker, Technical Director, Water Technologies, SciDev Limited, *Committee Hansard*, 4 June 2025, p. 45.

Technology and Regulatory Council in the United States and the Network for Industrially Co-ordinated Sustainable Land Management in Europe.[119]

6.129 Several submitters raised the issue of relative risk, and the costs associated with stricter remediation standards.

6.130 Dr Askeland and Mr Mitchell argued that remediation needs to 'match the level of risk' by considering 'how many grams of PFAS are removed per dollar spent or per unit of CO2 emitted'.[120]

6.131 SciDev also noted that meeting stricter remediation standards requires more sophisticated solutions.[121]

6.132 Airservices stated that stricter remediation standards may be 'neither proportionate nor risk-based and, in the context of an operational airfield, … not achievable without significant disruption to civil aviation'. Airservices explained that if 'a more conservative remediation standard equal to that in the PFAS NEMP for the protection of ecological health from indirect exposure were adopted, this would result in a threefold increase in management and remediation costs'.[122]

6.133 Airservices also pointed out that:

> … regardless of the level to which remediation is performed, measurable concentrations of PFAS will remain. It is simply impossible to remove all PFAS that is now ubiquitously distributed throughout the developed world. Indeed, there is a growing body of scientific evidence that suggests that PFAS concentrations in rainfall globally exceed some of the more conservative standards being proposed and used by regulators in Australia. The PFAS problem is truly ubiquitous.[123]

6.134 Noting the widespread occurrence of PFAS in the environment, Airservices believed that 'any potential solution should include a cross-industry approach and be nationally consistent'. It further added that responses 'must be driven by an understanding of the health and ecological impacts and be risk-based, giving due consideration to cost-benefit analysis of remediation works versus natural attenuation where appropriate'.[124]

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119 Mr Steve Becker, Technical Director, Water Technologies, SciDev Limited, *Committee Hansard*, 4 June 2025, p. 45.

120 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 6.

121 Mr Steve Becker, Technical Director, Water Technologies, SciDev Limited, *Committee Hansard*, 4 June 2025, p. 45.

122 Airservices Australia, *Submission 69* (47th Parliament), p. 15.

123 Airservices Australia, *Submission 69* (47th Parliament), p. 15.

124 Airservices Australia, *Submission 69* (47th Parliament), p. 17.

6.135 The committee's views and recommendations are outlined in Chapters 11 and 12 of this report.

Chapter 7
PFAS in water supplies

Introduction

7.1 This chapter builds on evidence explored in the committee's interim report on per and polyfluoroalkyl substances (PFAS) contamination of water supplies—particularly in drinking water.[1]

7.2 It looks at the guidance for, and regulation of, PFAS in drinking water and recycled water, the extent of PFAS in water supplies, water treatment options, and an update on the Blue Mountains case study considered in the interim report.

7.3 The chapter concludes with an outline of views and suggestions from inquiry participants.

Australia's drinking water

7.4 The committee heard that Australia's drinking water is, by and large, of high quality and the risks from PFAS contamination are very low.[2] However, given that, 'for most people, ingesting food and drinking water contaminated with PFAS is the primary source of exposure', there are community concerns.[3]

Australian Drinking Water Guidelines

7.5 As discussed in the interim report, the then Department of Health and Aged Care (now Department of Health, Disabilities and Ageing) requested that the National Health and Medical Research Council (NHMRC) undertake an independent review of the Australian guideline values for PFAS in the Australian Drinking Water Guidelines (ADWG or the Guidelines), issued under the National Water Quality Management Strategy.[4]

7.6 On 25 June 2025, the NHMRC released updated ADWG with a significant decrease in what are considered safe levels of PFAS in drinking water. The changes to the values are outlined in Table 7.1.

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1 Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, Chapter 4.

2 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), pp. 3–4.

3 Cancer Council Australia, *Submission 62* (47th Parliament), p. 3.

4 National Health and Medical Research Council (NHMRC), *Submission 57* (47th Parliament), p. 2.

7.7 The new values in the guidelines largely reflect those that were proposed in the draft ADWG in 2024, with the exception of perfluorooctane sulfonate (PFOS) (see later paragraphs 7.12 to 7.14).[5]

Table 7.1 Updated PFAS Guideline Recommendations—Version 4.0

PFAS	Previous ADWG Values (2018)	Updated ADWG Values (2025)
PFOA	Based on human health considerations, the concentration of perfluorooctanoic acid (PFOA) in drinking water should not exceed 560 ng/L.	Based on human health considerations, the concentration of PFOA in drinking water should not exceed 200 ng/L.
PFOS	Based on human health considerations, the sum of the concentrations of PFOS and perfluorohexane sulfonate (PFHxS) in drinking water should not exceed 70 ng/L.	Based on human health considerations, the concentration of PFOS in drinking water should not exceed 8 ng/L.
PFHxS		Based on human health considerations, the concentration of PFHxS in drinking water should not exceed 30 ng/L.
PFBS	No health-based guideline value.	Based on human health considerations, the concentration of PFBS (perfluorobutanesulfonic acid) in drinking water should not exceed 1000 ng/L.
GenX Chemicals	No health-based guideline value.	No health-based guideline value can be derived at this time.

Source: NHMRC, Australian Drinking Water Guidelines 6 2011 Version 4.0, 25 June 2025, (accessed 11 July 2025); NHMRC, Submission 57, p. 3.

7.8 The NHRMC's independent review of the 2018 recommended levels of PFAS in drinking water found the existing levels to be 'adequate'. Still, in 2024 the NHMRC decided to lower the threshold for what constitutes 'safe' PFAS levels.[6]

7.9 When asked about this change from 2018 levels, Executive Director of the Research Quality Branch at the NHMRC, Mr Alan Singh explained that the

5 NHMRC, *Submission 57* (47th Parliament), p. 3.

6 Mr Alan Singh, Executive Director, Research Quality Branch, and Dr Kristal Jackson, Director, Environmental Health Section, NHMRC, *Committee Hansard*, 22 January 2025, pp. 38–39 and 41.

review's objective was only to provide evidence—not recommendations—to the Water Quality Advisory Committee, with the committee itself using the evidence and its expert judgement to determine the values.[7]

7.10 In making its decision, the Water Quality Advisory Committee considered the strengths and weaknesses of the underpinning studies, the relevancy of international advice to the Australian context, and consumer values and preferences. Mr Singh remarked:

> … the Water Quality Advisory Committee have considered the findings of that report and have determined what they consider the most high-certainty and most conservative precautionary values that we could use for our drinking water guidelines for the public consultation draft.[8]

7.11 Other submitters suggested that the substantial tightening of guideline values for PFAS were due to community concerns that PFAS 'compounds are carcinogenic'[9] or, at the very least, that the 'NHMRC feels that the revised value has been carefully developed to protect human health'.[10]

7.12 In relation to PFOS, the NHMRC initially proposed a guideline level of 4 ng/L (nanograms per litre) but eventually settled on 8ng/L.[11]

7.13 The NHMRC advised that the draft guideline value for PFOS of 4 ng/L was 'based on a benchmark dose selected by the United States Environmental Protection Agency (US EPA) as the best available model on which to derive a reference dose for PFOS for bone marrow effects'.[12] However, Mr Singh acknowledged that the NHMRC used a 'different approach' to the United States when determining its final guideline value. The Australian approach 'is used by

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7 The review was requested and funded by the Department of Health, Disability and Ageing and conducted under the NHMRC's standards for guideline development. Mr Alan Singh, Executive Director, Research Quality Branch, and Dr Kristal Jackson, Director, Environmental Health Section, NHMRC, *Committee Hansard*, 22 January 2025, pp. 38–39 and 41; Department of Health, Disability and Ageing, response questions taken on notice, public hearing 10 June 2025 (received 18 July 2025), [p. 5].

8 Mr Singh and Dr Kristal Jackson, Director, Environmental Health Section, NHMRC, *Committee Hansard*, 22 January 2025, pp. 38 and 41.

9 Dr Matt Landos, Director, Future Fisheries Veterinary Service Pty Ltd, *Committee Hansard*, 12 March 2025, p. 3.

10 Professor Oliver Jones, *Submission 147* (47th Parliament), p. 5.

11 NHMRC, *Submission 57* (47th Parliament), p. 3.

12 Department of Health, Disability and Ageing, response questions taken on notice, public hearing 10 June 2025 (received 22 July 2025), [p. 1].

quite a few other organisations around the world, including the World Health Organisation, for example'.[13]

7.14 On notice, the NHMRC expanded on this point, saying:

> NHMRC guidelines typically use the relevant factors from the GRADE evidence-to decision framework and the WHO-INTEGRATE framework to guide the evidence-to decision process in guideline development. These frameworks are widely accepted in the guideline development community, including NHMRC, as best practice models.
>
> … In line with best practice, NHMRC adopts the evidence-to-decision process that was fit for purpose and considered the factors relevant to the topic and guideline purpose.[14]

7.15 The GRADE and WHO-INTEGRATE frameworks are widely used but have been criticised for not clearly articulating considerations that are relevant to government decision-making, such as 'essentiality' or 'environmental justice'. To address this, Dr Nicholas Chartres and colleagues at the Program on Reproductive Health and the Environment, University of California, San Francisco (UCSF), developed the Navigation Guide Evidence-to-Decision Framework for Environmental Health (UCSF EtD) to provide 'a structured and transparent framework incorporating a range of scientific information and factors for decision-making'.[15]

7.16 Asked if the NHMRC considers the UCSF EtD to be 'best practice for prioritising health in assessing and regulating chemicals', the NHMRC submitted:

> While both NHMRC and UCSF EtD frameworks share similar criteria that are considered during decision-making … the UCSF framework appears to place greater emphasis on social and ethical dimensions, including environmental justice, human rights, and sociocultural feasibility, as core decision-making criteria alongside heath evidence.
>
> NHMRC and the Water Quality Advisory Committee consider potential impacts of different guideline values during the EtD process, but ultimately the decision about the PFAS guideline values were based on what was

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13 Mr Alan Singh, Executive Director, Research Quality Branch, NHMRC, *Committee Hansard*, 5 September 2025, p. 8.

14 Department of Health, Disability and Ageing (responses to questions to NHMRC), response to written questions from Senator Thorpe (received 23 September 2025), [p. 1].

15 Nicholas Chartres, Max T. Aung, Susan L. Norris, Courtney Cooper, Lisa A. Bero, Roger Chou, Devon C. Payne-Sturges, Wendy E. Wagner, Jessica W. Reyes, Lisa M. Askie, Daniel A. Axelrad, Deysi Flores Vigo, Jill E. Johnston, Juleen Lam, Keeve E. Nachman, Eva Rehfuess, Rachel Rothschild, Patrice Sutton, Lauren Zeise, Tracey J. Woodruff, 'Development of the Navigation Guide Evidence-to-Decision Framework for Environmental Health: Version 1.0', *Environmental Science & Technology, 59:9*, February 2025, 4230–4244 (accessed 2 October 2025).

considered the best available health evidence. This aligns with NHMRC Standards for Guidelines.[16]

7.17 During the NHMRC's consultation on the draft guidelines, 'some stakeholders' questioned the proposed PFOS value of 4 ng/L. In response, and on the advice of the Water Quality Advisory Committee Chemical Subgroup, the NHMRC 'commissioned a critical appraisal of the different benchmark models considered by the US EPA'. The Committee considered the findings of this review and 'recommended the Gamma model as more robust', leading it to propose a final guideline value of 8 ng/L.[17]

7.18 Despite the departure from the original proposal, Professor Oliver Jones submitted that a safety recommendation of 8ng/L for PFOS still represents a 'nearly tenfold reduction from the [2018] guideline'.[18]

7.19 Mr Singh said that the NHMRC 'may also review additional PFAS in future' but that there was 'limited toxicological information available for most PFAS' and therefore further research was needed to understand the health impacts of other forms of PFAS.[19]

Alignment with international standards

7.20 As discussed in the interim report, the proposed PFAS levels in the 2024 draft ADWG faced criticism for falling short of the stricter limits established by international jurisdictions, particularly the United States, which stated in 2024 that there was 'no safe level' of PFOS and PFOA in drinking water.[20]

7.21 Some witnesses thought the NHMRC should have had more discussion and coordination with the US EPA when revising the ADWG. For example, Dr Chartres stated that it was of 'huge concern that the NHMRC didn't communicate with the US EPA on this'.[21]

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16 Department of Health, Disability and Ageing (responses to questions to NHMRC), response to written questions from Senator Thorpe (received 23 September 2025), [p. 3].

17 Department of Health, Disability and Ageing, response questions taken on notice, public hearing 10 June 2025 (received 22 July 2025), [p. 1].

18 Professor Oliver Jones, *Submission 147* (47th Parliament), p. 5.

19 Mr Alan Singh, Executive Director of the Research Quality Branch, NHMRC, *Committee Hansard*, 22 January 2025, p. 38.

20 See, for example: Toxics Free Australia, *Submission 72* (47th Parliament), p. 5; Climate Action Merribek, *Submission 13* (47th Parliament), p. 8; STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 11; Mr Jon Dee, STOP PFAS, *Committee Hansard*, 22 January 2025, p. 4. See also: United States Environmental Protection Agency, *Biden-Harris Administration Finalizes First-Ever National Drinking Water Standard to Protect 100M People from PFAS Pollution*, 10 April 2024 (accessed 27 October 2025).

21 Dr Nicholas Chartres, Senior Research Fellow, School of Pharmacy, University of Sydney, *Committee Hansard*, 22 January 2025, p. 9. See also Dr Ian Wright, Associate Professor, School of

7.22 Mr Singh explained that the NHMRC did not follow the US EPA's findings because they were 'largely based' on human epidemiological studies which they did not think were 'sufficient to derive a guideline value' from.[22]

7.23 Mr Singh also stated that automatically adopting guidelines from other jurisdictions would ignore water quality considerations in a local context:

> This is important because other countries, such as the United States, do issue public health advice within their own legislative frameworks, which don't apply to Australia. They can also use risk assessment approaches and policies that may differ from Australia's, and these approaches can result in different estimations of risks and differences in the basis for setting target values. Hence, it's not unusual for guideline values to vary from country to country due to these different methodologies and calculations and the choice of endpoints used.[23]

7.24 Dr Stuart Khan, Professor and Head of the School of Civil Engineering at the University of Sydney, argued that the US EPA's PFAS limits would not be practical to implement:

> So what the US EPA have done is do all the research, collect all the data and throw it out. They say, 'There's no safe level.' So they have this maximum contaminant level goal, which is a purely aspirational statement … to say there should be no PFAS in your water, but they don't use it. It's not implementable. So, what they do is say: 'Here's what we think is measurable. Here's what we think is achievable.' That's how they come up with the four nanograms per litre for the PFAS chemicals.[24]

7.25 Dr Khan contended that Australia's approach has been the same as the World Health Organization, and the rest of the world, and has relied on health-based data and toxicological data to set the Guideline, 'with significant safety factors built into that':

> … unlike the US EPA, which have effectively plucked a number out of the air to say, 'This is what we think is … a measurable value, because we've set the maximum contaminant level goal at zero,' as they do for all genotoxic chemicals.[25]

Science, Western Sydney University, *Committee Hansard*, 22 January 2025, p. 2; Mr Dee, STOP PFAS, *Committee Hansard,* 22 January 2025, p. 4.

22 Mr Alan Singh, Executive Director of the Research Quality Branch, NHMRC, *Committee Hansard*, 22 January 2025, p. 41.

23 Mr Singh, NHMRC, *Committee Hansard*, 22 January 2025, p. 38.

24 Dr Stuart Khan, School of Civil Engineering, University of Sydney, *Committee Hansard*, 22 January 2025, p. 11. See also the evidence from Dr Khan, paragraphs 2.53 and 2.54 in Chapter 2, for further discussion of the concept of 'no safe level'.

25 Dr Khan, University of Sydney, *Committee Hansard*, 22 January 2025, p. 11.

Lack of consistent national approach

7.26 Another issue identified in the committee's interim report was the lack of national consistency in the regulation of PFAS in drinking water across various Australian jurisdictions.[26]

7.27 Cancer Council Australia stated that, when it comes to water quality management, instead of 'national policies or frameworks for monitoring and testing, reporting and clean-up', Australia has 'multiple authorities making reference to different guidelines and standards, each variant deemed relevant in the particular circumstances'. The Council argued this structure makes a consistent approach to water quality management 'impractical'.[27]

7.28 Mr Steve Becker from SciDev Limited agreed, indicating 'state-by-state standards, in our experience, have the potential to erode public confidence in the individual standards because of the differences from one state to the next'.[28]

Regulating PFAS individually or as a class for drinking water

7.29 The revised ADWG continue to specify safe levels of individual PFAS, whereas some other international jurisdictions have a total or sum value for PFAS in drinking water.[29] The NHMRC considered developing a single PFAS value but concluded 'there wasn't enough evidence to do that and also [it] required further review'. Further, the NHMRC argued 'there seems to be a lack of consensus about, particularly, the operational values that might be helpful in terms of testing for all the PFAS'.[30]

7.30 However, some submitters warned that current regulation of individual PFAS variants is too prescriptive, and they should be regulated as a group or class of chemicals. For example, Dr Chartres stated:

> The NHMRC made a statement when they released these water value guidelines saying that they know little about the other PFAS variants that we're all currently being exposed to and that, as they find out more data on whether those PFAS are causing cancer, they will let us know and they will reduce the values. That's just not good enough. What we need to be doing

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[26] Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, p. 40.

[27] Cancer Council Australia, responses to written questions on notice from Senator Thorpe, 30 June 2024, [p. 2].

[28] Mr Steve Becker, Technical Director, Water Technologies, SciDev Limited, *Committee Hansard*, 4 June 2025, p. 45. See also: Mrs Tracey Anton, Private capacity, *Committee Hansard*, 4 June 2025, p. 15.

[29] Dr Kristal Jackson, Director, Environmental Health Section, NHMRC, *Committee Hansard*, 22 January 2025, p. 40; European Chemicals Agency, *Per- and polyfluoroalkyl substances (PFAS)* (accessed 16 July 2025).

[30] Dr Jackson, NHMRC, *Committee Hansard*, 22 January 2025, p. 40.

> is taking a precautionary approach here. We know enough about this class of chemicals.[31]

7.31 By contrast, Dr Oliver Jones countered that there are thousands of individual PFAS compounds which 'vary greatly in their chemical, physical, and toxicological properties and [they] should not be grouped together for regulatory purposes'. Dr Jones recommended they be regulated according to their chemical properties or an informed risk assessment.[32]

Flow on effects of the ADWG to other regulations

7.32 There were concerns that the revised ADWG could have flow-on health and economic impacts on other regulations, given the Guidelines are sometimes used to regulate other water sources such as recycled water (discussed later in this chapter) or are considered when making other regulations such as the Tolerable Daily Intakes for food.[33]

7.33 The Australian Academy of Science remarked that the stricter revised Guidelines, which cost more to comply with, may be overly prescriptive when used for these other applications.[34]

Increased compliance costs from more stringent ADWG

7.34 Submitters and witnesses told the committee that the new, more stringent ADWG would likely incur higher compliance costs—both because treatment infrastructure will need to be developed or upgraded and, at the very least, more sensitive water testing and monitoring will be required.

7.35 Water utilities observed there would likely be increased compliance costs because of the more stringent ADWG. The Queensland Water Directorate (qldwater) noted 'there is a very large cost associated with meeting the lower Guidelines values'. It questioned whether the additional protection was justified against the potential additional costs.[35]

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31 Dr Chartres, University of Sydney, *Committee Hansard,* 22 January 2025, p. 15. See also: Emeritus Professor Sarah Dunlop, Head, Plastics and Human Health, Minderoo Foundation, *Committee Hansard,* 12 March 2025, p. 29; Dr Linda Birnbaum, documents provided in support of appearance at public hearing in Canberra, on 10 June 2025 (received 6 June 2025), p. 085003–6.

32 Professor Oliver Jones, information provided ahead of public hearing appearance, 10 June 2025 (received 9 June 2025), pp. 370 and 388.

33 Food Standards Australia and New Zealand, response to written questions from Senator Thorpe (received 11 July 2025), [p. 1].

34 Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), p. 4. See also: Professor Oliver Jones, *Submission 147* (47th Parliament), p. 5.

35 Queensland Water Directorate (qldwater), *Submission 90* (47th Parliament), [pp. 3–4].

7.36 Not all water treatment facilities can remove PFAS.[36] Dr Khan observed that this will mean 'significantly greater' costs in Australia as 'we have very little existing capacity to upgrade or operate drinking water or wastewater treatment plants with the GAC, or granular activated carbon'.[37]

7.37 The Water Services Association of Australia (WSAA) outlined that new guidelines would require 'a limited number of utilities' to implement treatments to meet safe levels of PFAS, with smaller utilities in regional and remote Australia likely to bear the highest costs.[38]

7.38 Professor Oliver Jones concurred:

> This cost would be higher for remote communities with smaller treatment plants than for large cities already using (or close to using) advanced water treatment at a large scale.[39]

7.39 The WSAA thought the costs were 'likely to be significant' given advanced water treatment infrastructure can be 'capital and energy intensive' for utilities already under pressure.[40] The WSAA cited costs of $100–$200 million for a new water treatment plan and $300–$400 million for a new desalination plant.[41]

7.40 WaterNSW agreed infrastructure would likely need to be improved:

> Most of the implications would, I imagine, come in the source of treatment upgrades that might be needed in those systems, but it could also go as far as some of some of the investigation work that we're doing in the Blue Mountains system, where we're trying to understand what the source of that is, to see if remediation is a viable option for that system, to try and correct what has happened up there.[42]

7.41 Water utilities, such as Gippsland Water, highlighted the injustice of water utilities and their customers bearing PFAS contamination costs on behalf of polluters, stating:

> It should be recognised that Gippsland communities and our customers are already disproportionately affected by the past practices of industries for the

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36 See, for example: Mr Christopher Wood, General Manager, Operations, Central Gippsland Region Water Corporation, *Committee Hansard,* 4 June 2025, p. 38.

37 Dr Khan, *Committee Hansard,* 22 January 2025, pp. 2–3. See also: TasWater, additional evidence relating to Launceston public hearing on 12 March 2025 (received 13 March 2025) [p. 1].

38 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 4. See also: Dr Ian Wright, *Submission 102* (47th Parliament), p. 10.

39 Professor Oliver Jones, *Submission 147* (47th Parliament), p. 5.

40 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 8.

41 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 4. See also: qldwater, *Submission 90* (47th Parliament), [pp. 4 and 11].

42 Mrs Fiona Smith, Executive Manager, Strategy and Performance, WaterNSW, *Committee Hansard,* 22 January 2025, p. 29.

> greater benefit of Victoria and the Eastern Seaboard of Australia. It is untenable and contrary to the principle of equity for this burden to be placed on our customer base indirectly through our tariffs and charges.[43]

Testing and monitoring

7.42 Testing and monitoring is conducted on treated drinking water but may also be completed on raw water sources, wastewater, recycled water and biosolids, in accordance with strict collection and analysis protocols and standards.[44]

7.43 The impact of the revised ADWG on testing regimes is still being assessed. However, the WSAA warned that more sensitive testing methods would likely be required and testing costs could increase by 30 to 100 per cent,[45] with costs likely passed on to consumers.[46]

7.44 Private laboratories routinely test for up to 28 different PFAS compounds, with more specialised services in some capital cities.[47] However, this represents only a small proportion of PFAS variants. The NHMRC advised 'the technical capability of Australian commercial laboratories offering analytical services for PFAS has increased over time. However, routine analysis of around 15 000 types of PFAS is not considered to be technically feasible at this time'.[48]

7.45 qldwater likewise raised questions about the technical feasibility of testing for PFAS under the revised Guidelines given 'testing proficiency at the detection limits required is not yet widespread' and testing at the limits of detection has cost implications.[49] It estimated the cost of testing at around $1200 per sample site.[50]

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43 Gippsland Water, response to questions on notice, public hearing 4 June 2025 and written questions from Senator Thorpe (received 23 June 2025), [p. 9].

44 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 5; NHMRC, Natural Resource Management Ministerial Council, *Australian Drinking Water Guidelines 6 2011,* Version 4.0, updated June 2025, p. 14. Note: Biosolids are discussed further in Chapter 9.

45 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 8.

46 Water Services Association of Australia, *Submission 56* (47th Parliament), pp. 2–4; Professor Oliver Jones, *Submission 147* (47th Parliament), p. 5.

47 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 9.

48 NHMRC, response to written questions from Senator Thorpe (received 6 December 2024), [p. 3]. See also: Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 9.

49 qldwater, *Submission 90* (47th Parliament), [p. 5].

50 qldwater, *Submission 90* (47th Parliament), [p. [5].

7.46 The NHMRC explained that, when developing the revised ADWG, it tried 'to be guided by the evidence on the impacts on human health', rather than taking into account compliance and implementation costs.[51]

PFAS in water supplies

7.47 The committee's interim report discussed the status of PFAS testing of water supplies, as well as the prevalence and extent of PFAS in drinking water.[52]

7.48 The water sector pointed out that, while they are not the source of PFAS contamination, they are required to respond to contamination from upstream activities. The sector takes a risk-based approach to monitoring and developing mitigation strategies, identifying potential contamination sources, and treating contaminated water.[53]

7.49 Water supplies most at risk of PFAS contamination are those on or adjacent to sites where firefighting foams containing PFAS have been used—typically Defence bases, airports, fire stations and training sites.[54] For example, testing of water around the Williamtown Defence base detected high levels of PFAS contamination.[55] Some water supplies may be at risk from one-off contamination events like fires, spills, or accidents.[56]

Testing for PFAS in water supplies

7.50 Water testing requirements for PFAS are set by state and territory authorities, with testing typically undertaken by state, territory and local governments and water operators.[57]

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51 Mr Singh, NHMRC, *Committee Hansard*, 22 January 2025, p. 38.

52 See: Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, pp. 45–48.

53 Water Services Association of Australia, *Submission 56* (47th Parliament), pp. 2–4 and 6; Veolia, *Submission 58* (47th Parliament), pp. 2 and 4.

54 NHMRC, response to written questions from Senator Thorpe (received 6 December 2024), [p. 1]; Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 8; Cancer Council Australia, *Submission 62* (47th Parliament), p. 6.

55 Friends of the Earth, *Submission 46*, p. 3; Friends of the Earth Australia, *PFAS Chemicals in Australian Drinking Water—A Summary*, 3 May 2024 (accessed 9 July 2025).

56 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 8.

57 NHMRC, *Submission 57* (47th Parliament), p. 2; Water Services Association of Australia, *Submission 56* (47th Parliament), p. 5; Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from Senator Thorpe (received 4 December 2024), [pp. 4 and 8].

7.51 Historically, testing has only been completed where there is a suspected PFAS source.[58] Witnesses discussed the pitfalls of this approach, particularly given contamination may have been a 'one-off' event and there may be no record of accidents involving PFAS firefighting foams or stockpiles.[59]

7.52 Now, some water utilities routinely monitor for PFAS.[60] For example, SA Water reportedly started routine testing for PFAS in 2024.[61]

7.53 Regular or ad hoc monitoring may also be carried out for a range of other environmental, industry, research or community purposes.[62] For example, Airservices Australia commissioned a national program of tap water testing at all Airservices facilities following detections at Avalon Airport and advised 'elevated PFAS concentrations above the relevant Australian Drinking Water Guidelines were not identified at any other facilities' [other than Avalon]. This testing is ongoing and has incorporated the updated ADWG.[63]

7.54 Dr Bradley Clarke, Associate Professor in Analytical Chemistry and Environmental Science, University of Melbourne, opined that the last major study of PFAS in drinking water in Australia was conducted in 2011, which he described as unacceptable. Dr Clarke said that he and his team are conducting a 'citizen-science campaign where we're getting samples from around Australia, we're analysing them in our lab, and we are generating fundamental data on the levels of PFAS in Australia'. Dr Clarke recommended establishing an Australian 'environmental specimen bank' to:

> … systematically archive samples from known pollution sources such as wastewater, biosolids and landfill leachate, as well as environmental media like biota, soil and water; and invest in regulatory science to support

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58 Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from Senator Thorpe (received 4 December 2024), [p. 8]; NHMRC, Natural Resource Management Ministerial Council, *Australian Drinking Water Guidelines 6 2011*, p. 877.

59 Friends of the Earth, *Submission 46* (47th Parliament), p. 3.

60 Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from Senator Thorpe (received 4 December 2024), [p. 8]; Cancer Council Australia, *Submission 62* (47th Parliament), p. 4; NHMRC, Natural Resource Management Ministerial Council, *Australian Drinking Water Guidelines 6 2011,* p. 877.

61 Mr Anthony Amis, Land Use Researcher, Friends of the Earth Australia, *Committee Hansard,* 4 June 2025, pp. 11–12.

62 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 5. See also: Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from Senator Thorpe (received 4 December 2024), [pp. 3 and 8]. See, for example: Tasmanian Government, *Submission 73* (47th Parliament), [p. 2].

63 Airservices, right of reply to the United Firefighters Union of Australia Aviation Branch (received 22 July 2025), p. 5.

> agencies and research to develop modern, scalable risk-assessment tools that match the pace and complexity of today's chemical landscape.[64]

Range of PFAS variants tested for in water supplies

7.55 The range of PFAS variants tested for is limited, with the 'regulated collection of drinking water quality data by water utilities … limited to the three PFAS health-based guideline values currently listed in the Australian Drinking Water Guidelines'.[65]

7.56 The NHMRC acknowledged that other PFAS data may be collected.[66] Water utilities confirmed they test for PFAS not specified in ADWG.[67]

7.57 Friends of the Earth indicated 'many other PFAS chemicals have been detected in water supplies', including perfluorohexanoic acid (PFHxA), perfluoropentanoic acid (PFPeA), perfluoroheptanoic acid, (PFHpA), and 6:2-fluorotelomersulfonic acid (6:2 FTS). It stated 'no guidelines are proposed for these chemicals at the present time'.[68]

Transparency of test results

7.58 The WSAA submitted that 'water utilities across the country have been publishing and updating data on PFAS monitoring in raw water and drinking water on their websites'.[69]

7.59 Other evidence confirmed that testing for PFAS is conducted and published by many of the larger capital city water utilities. However, the extent of testing across Australia is less clear, with publication dependent on state and territory requirements.[70]

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64 Dr Bradley Clarke, Associate Professor in Analytical Chemistry and Environmental Science, University of Melbourne, *Committee Hansard*, 4 June 2025, pp. 58–60.

65 NHMRC, response to written questions from Senator Thorpe (received 6 December 2024), [pp. 2 and 3]. Emphasis in the original.

66 NHMRC, response to written questions from Senator Thorpe (received 6 December 2024), [pp. 2 and 3]; Mr Singh and Dr Jackson, NHMRC, *Committee Hansard,* 22 January 2025, p. 40.

67 See, for example: Icon Water, *PFAS and drinking water* (accessed 10 July 2025); qldwater, *Submission 90,* [p. 10]; Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 9.

68 Friends of the Earth, *Submission 46* (47th Parliament), p. 5.

69 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 5.

70 Mr Lovell, Water Services Association of Australia, *Committee Hansard,* 22 January 2025, pp. 22–23; Dr Ian Wright, *Submission 102* (47th Parliament), pp. 1–2; Cancer Council Australia, *Submission 62* (47th Parliament), p. 4; Concerned Waterways Alliance, *Submission 30* (47th Parliament), p. 4.

7.60 As discussed in the committee's interim report, Friends of the Earth Australia collate and publish the Australian PFAS Chemicals Map, but there is no official, centralised data for Australian water quality—including PFAS levels.[71]

7.61 The Concerned Waterways Alliance remarked, 'public transparency is … limited, leaving affected communities with insufficient information on exposure risks'.[72]

7.62 Dr Ian Wright from Western Sydney University agreed, advising 'in my experience, it is often very difficult or impossible for people to acquire information on PFAS content in many Australian drinking water supplies'. He elaborated, saying 'information … appears to be collected and reported in an uncoordinated and haphazard manner. The approach varies from water supplier to water supplier'. Dr Wright argued that that data is essential for communities so people can take appropriate action.[73]

7.63 The Department of Climate Change, Energy, the Environment and Water (the Department of Environment) advised that it is considering a national database or map of locations of significant environmental PFAS contamination. At present data is held across a diverse range of stakeholders including states and territories, the private sector and Australian Government agencies, including: Department of Defence; Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts; Airservices Australia; the Department of Environment; Department of Finance; and Department of Industry, Science and Resources.[74]

7.64 The Department of Environment noted that development of a national PFAS contamination resource would require a range of agreements and infrastructure, including 'an agreed lead agency and website host; data governance; IT design and build; and access and sharing arrangements between Commonwealth and State government agencies'.[75]

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71 NHMRC, response to written question from Senator Thorpe (received 9 December 2024), [p. 1]; Professor Oliver Jones, *Submission 147* (47th Parliament), p. 4.

72 Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 4]. See also: Cancer Council Australia, *Submission 62* (47th Parliament), p. 4. See also: Robert Bilott, response to written questions from Senator Thorpe (received 27 June 2025), [p. 2].

73 Dr Ian Wright, *Submission 102* (47th Parliament), pp. 1–2.

74 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 21 July 2025), p. 2.

75 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 21 July 2025), p. 2.

Drinking water in Australia is generally compliant with the new guidelines

7.65 The WSAA highlighted that Australia's historical manufacturing, industrial, and land use activities mean that our drinking water is of high quality with relatively little PFAS contamination:

> Currently, for the vast majority of Australian communities, testing has shown that the risks from PFAS are very low and drinking water complies with the current and/or draft guideline levels. While water utilities will need to remain vigilant and continue testing, most are unlikely to need treatment interventions at this point.[76]

7.66 Testing and studies of PFAS in Australian water systems have given mixed results. In numerous cases, PFAS levels are below ADWG levels. However, in other instances, levels are above—sometimes well above—those specified in the new Guidelines.[77]

7.67 For example, TasWater highlighted that it had conducted sampling of 70 raw water sites in 2024 for 28 PFAS compounds at half the levels of the new Guidelines—no PFAS was detected. TasWater confirmed that it tests quarterly for sites where PFAS may be present but below ADWG, or annually where there is little chance of PFAS being detected.[78] Other utilities follow different testing regimes, depending on their risk assessment.[79]

7.68 In November 2024, the NHMRC highlighted that most water supplies are below the now current Guidelines, 'but that the existence of other water supplies with higher PFAS levels cannot yet be ruled out'.[80]

7.69 Mr Anthony Amis from Friends of the Earth summarised PFAS testing results from around the country, telling the committee:

> … [SA Water] didn't find any in the major reservoirs, but I think the smaller towns where this issue mainly comes up still haven't been tested at all. Tasmania came up clear. In Victoria, the detections are sporadic. The higher

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76 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), pp. 3–4.

77 See, for example: Concerned Waterways Alliance, *Submission 30* (47th Parliament), [pp. 1–2]; Friends of the Earth, *Submission 46* (47th Parliament), p. 3; Tasmanian Government, *Submission 73* (47th Parliament), [p. 2]; Dr Ian Wright, *Submission 102* (47th Parliament), pp. 6 and 8; Icon Water, *Submission 120* (47th Parliament), p. 4; Mr Amis, Friends of the Earth Australia, *Committee Hansard,* 4 June 2025, p. 8; Mr Lovell, Water Services Association of Australia, *Committee Hansard,* 22 January 2025, p. 27.

78 Mr Hawke, TasWater, *Committee Hansard,* 12 March 2025, pp. 16–19.

79 See, for example: Mr Wood, Central Gippsland Region Water Corporation, *Committee Hansard,* 4 June 2025, p. 38.

80 NHMRC, response to written question from Senator Thorpe (received 9 December 2024), [p. 1]. See also: NHMRC, *Updated Australian Drinking Water Guidelines*, 25 June 2025 (accessed 8 July 2025).

> levels seem to have appeared in Queensland, with New South Wales on the next rung down, and then Victoria.[81]

Testing of water supplies has been limited

7.70 Despite this, testing has been limited and in numerous cases water utilities and operators have done no testing for PFAS in water supplies. The extent of potential PFAS contamination is unknown.[82] The NHMRC advised, in these cases, 'water providers and regulators aim to manage unknown potential risks to health from drinking water (such as the presence of unknown PFAS) by using preventative risk management approaches as outlined in the risk management framework of the Australian Drinking Water Guidelines'.[83]

7.71 Some submitters were distrustful of regulators and water utilities, especially after being told water supplies were safe before there had been any PFAS testing. Mr Jon Dee from the STOP PFAS community group elaborated:

> … these entities should not have been assuring our communities that our tap water was safe because there was no PFAS testing undertaken before June 2024. So it's our view that they had no idea about it. They can't tell us what were the levels of PFAS chemicals that we were exposed to …[84]

7.72 A national overview of PFAS detections in drinking water has not been published since April 2011.[85] More recent data compiled by Friends of the Earth suggested that PFAS levels exceeded the previous Guidelines for certain PFAS in drinking water supplies across certain chronically impacted communities, impacting over 34 000 people.[86] The group reported that short-term breaches to the revised Guideline levels have occurred in raw water across a number of communities, impacting over one million people.[87]

PFAS Water treatment options

7.73 The WSAA acknowledged that, because of 'widespread historical use and due to their nature', PFAS compounds are 'ubiquitous, persistent, bioaccumulative,

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81 Data from Western Australia were not available. Mr Amis, Friends of the Earth Australia, *Committee Hansard,* 4 June 2025, pp. 11–12.

82 qldwater, *Submission 90* (47th Parliament), [p. 4]; Dr Ian Wright, *Submission 102* (47th Parliament), p. 3.

83 NHMRC, response to written question from Senator Thorpe (received 13 December 2024), [p. 1].

84 Mr Dee, STOP PFAS, *Committee Hansard,* 22 January 2025, pp. 3–4.

85 Dr Bradley Clarke, Associate Professor, Analytical Chemistry and Environmental Science, University of Melbourne, *Committee Hansard*, 4 June 2025, p. 60; Friends of the Earth Australia, *PFAS Chemicals in Australian Drinking Water—A Summary*, 3 May 2024. See also: Carrie Fellner, '"There's no safe level": Carcinogens found in tap water across Australia', *The Sydney Morning Herald,* 11 June 2024.

86 Friends of the Earth, *Submission 46* (47th Parliament), pp. 3–4.

87 Friends of the Earth, *Submission 46* (47th Parliament), p. 4.

and resistant to degradation, which makes them particularly challenging to manage in the water sector'.[88]

7.74 The committee's interim report outlined several treatment technologies for remediating PFAS found in water supplies, and their current limitations.[89]

7.75 A range of solutions are in use. These include sorption technologies which capture PFAS from the water, such as granular activated carbon and ion exchange resin; as well as filtration technologies, like nanofiltration and reverse osmosis membranes.[90]

7.76 Representatives from the water industry highlighted that treatments vary in effectiveness at removing PFAS from water supplies depending on contamination levels, the type of PFAS, and other site-specific issues. For example, the WSAA indicated that treatment facilities using reverse osmosis and advanced oxidation demonstrated greater than 99 per cent removal of PFOS, while other processes resulted in variable or even increased PFAS concentrations.[91]

7.77 TasWater use activated carbon and nanofiltration at various sites, with nanofiltration being 'one of the more effective technologies'.[92]

7.78 Veolia acknowledged that addressing contaminants close to their origin is 'generally more efficient and cost effective than relying on end-of-line treatment processes'.[93] It further explained that a range of treatment options currently exist, and relevant expertise is available in Australia.[94]

7.79 Australia is trialling new PFAS treatment options to improve the quality of drinking water, such as foam fractionation and new absorbents. Submitters

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88 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 3.

89 See: Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report,* March 2025, pp. 48–49.

90 Interstate Technology and Regulatory Council (US), *PFAS Technical and Regulatory Guidance Document and Fact Sheets: 12 Treatment technologies*, PFAS–1, September 2023. See also: Mr Becker, SciDev Limited, *Committee Hansard,* 4 June 2025, p. 45.

91 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 7. See also: Robert Bilott, response to written questions from Senator Thorpe (received 27 June 2025), [p. 1]; *PFAS Technical and Regulatory Guidance Document and Fact Sheets: 12 Treatment technologies.*

92 Mr Graham Hawke, Chief Scientist, TasWater, *Committee Hansard,* 12 March 2025, p. 18. See also: Veolia, *Submission 58* (47th Parliament), p. 5; Mr Shaun Cumming, Managing Director, Barwon Water, *Committee Hansard,* 4 June 2025, p. 40.

93 Veolia, *Submission 58* (47th Parliament), p. 3.

94 Veolia, *Submission 58* (47th Parliament), pp. 3 and 5–6.

recognised 'there is no one-size-fits-all solution' and treatment may involve the use of several integrated technologies.[95]

7.80 Water utilities and others are collaborating on the research and development of other solutions—including internationally—to remove and treat PFAS in water supplies.[96]

7.81 For example, Australia has contributed innovations like foam fractionation technology, which uses air and turbulence to create bubbles and strip out PFAS, and found it 'demonstrated significant potential in removing PFAS from water'.[97]

7.82 Some processes produce industrial waste and biosolids which can concentrate PFAS. The sector is working on preventing further PFAS contamination via biosolids, as discussed further in Chapter 9.[98]

Case study update—Katoomba, Blue Mountains, New South Wales

7.83 As discussed in Chapter 4 of the committee's interim report, in June 2024, elevated levels of PFAS were found at Cascade Water Filtration Plant in Katoomba. Until then, the Blue Mountains had not been considered a PFAS hotspot.

7.84 Water NSW commenced an investigation in July 2024, announcing in August it had shut off upstream feeder supplies Medlow Dam and Greaves Creek Dam.[99]

7.85 On 16 May 2025, WaterNSW announced it had completed its initial investigation into the source of PFAS in the Adams Creek and Medlow catchments. The investigation included sampling, independent specialist

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95 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 10; Veolia, *Submission 58* (47th Parliament), p. 5. See also: Mr Becker, SciDev Limited, *Committee Hansard,* 4 June 2025, p. 45.

96 Water Services Association of Australia, *Submission 56* (47th Parliament), pp. 8–10; Veolia, *Submission 58* (47th Parliament), p. 5. See also: Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from Senator Thorpe (received 4 December 2024), [p. 5].

97 Water Services Association of Australia, *Submission 56* (47th Parliament), pp. 8–10; Veolia, *Submission 58* (47th Parliament), p. 5. See also: Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from Senator Thorpe (received 4 December 2024), [p. 5].

98 See, for example: Icon Water, *Submission 120* (47th Parliament), pp. 4–5; Mr Cumming, *Committee Hansard,* 4 June 2025, pp. 40–41; Mr Becker, SciDev Limited, *Committee Hansard,* 4 June 2025, p. 51; Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 3]; Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 2; Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 9.

99 Senate Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report,* March 2025, pp. 51–52.

advice, evaluation of drainage pathways to assess how contaminants may move through the catchment, and analysis of fire service and Transport for NSW records relating to historic activities in the area.[100] The investigation identified three potential sources of contamination:

- two separate fuel tanker accidents on the Great Western Highway near the Medlow Bath township in 1992 and 2002; and
- the Medlow Bath Rural Fire Service station.[101]

7.86 Secondary PFAS contamination was also likely to have occurred from soil, sediment and concrete.[102]

7.87 Sampling and testing showed PFAS concentrations consistent with the use of legacy firefighting foam, and suggested contamination moving downstream from the Medlow/Greaves catchment 'via rainfall and surface runoff, and previous water transfers between dams'.[103]

7.88 The water operator confirmed that Medlow Dam and Greaves Creek Dam would remain disconnected from the Blue Mountains water supply system and would only be reconnected 'once WaterNSW is confident appropriate permanent mitigation measures are in place'.[104]

7.89 The NSW Environment Protection Authority recommended a more detailed site investigation in line with the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (Cth) (NEPM). WaterNSW confirmed this investigation will help inform potential remediation options.[105]

7.90 Submitters noted that governments are increasingly focused on regulation of the key risk of PFAS in water systems, with water infrastructure operators and other

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100 WaterNSW, *First stage of WaterNSW investigation into Blue Mountains PFAS completed*, 16 May 2025 (accessed 15 July 2025).

101 The Rural Fire Service is conducting its own investigation into PFAS at the Medlow Bath Rural Fire Service station. Jacobs Group (Australia), *WaterNSW: Lake Medlow and Lake Greaves, Blue Mountains: Catchment assessment: Technical memorandum 02*, 31 January 2025, pp. 7 and 53 (accessed 15 July 2025); WaterNSW, *First stage of WaterNSW investigation into Blue Mountains PFAS completed*, 16 May 2025.

102 *WaterNSW: Lake Medlow and Lake Greaves, Blue Mountains: Catchment assessment: Technical memorandum 02*, pp. 5–6 and [p. 53].

103 WaterNSW, *First stage of WaterNSW investigation into Blue Mountains PFAS completed*, 16 May 2025; Jacobs Group (Australia), *WaterNSW: Lake Medlow and Lake Greaves, Blue Mountains: Catchment assessment: Technical memorandum 02*, pp. 11–12.

104 WaterNSW, *First stage of WaterNSW investigation into Blue Mountains PFAS completed*, 16 May 2025.

105 WaterNSW, *First stage of WaterNSW investigation into Blue Mountains PFAS completed*, 16 May 2025.

partners 'currently navigating a critical transition phase in its approach to PFAS management'.[106]

Recycled water

7.91 While the *Australian Guidelines for Water Recycling* (Recycled Water Guidelines) provide overall guidance, the WSAA indicated that there are no national guidelines for PFAS in recycled water. The Concerned Waterways Alliance also highlighted the lack of guidelines, writing 'no threshold levels exist for recycled water, which is a major gap in the regulatory framework'.[107]

7.92 Submitters confirmed the Recycled Water Guidelines are used for some recycled water purposes (e.g. purified recycled drinking water), along with the PFAS National Environmental Management Plan (NEMP) and *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.[108]

7.93 The Department of Environment advised the Recycled Water Guidelines are being updated as a priority and confirmed that work on PFAS in drinking water and freshwater, estuarine and marine water 'will be crucial in the work to include PFAS into renewed recycled water guidelines'.[109] However, further work needs to be done to manage the risks in non-drinking recycled water applications.[110]

7.94 Friends of the Earth reported that widespread testing of recycled water in Victoria in 2023 found '21 different PFAS chemicals were detected'.[111] The EPA reported that 'none of the PFAS concentrations detected exceeded human health guidelines'.[112]

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106 qldwater, *Submission 90* (47th Parliament), [p. 2]; Tasmanian Government, *Submission 73* (47th Parliament), [pp. 1–2]; Water Services Association of Australia, *Submission 56* (47th Parliament), p. 10; Mrs Smith, WaterNSW, *Committee Hansard,* 22 January 2025, p. 23; EPA Tasmania, response to written questions from Senator Thorpe (received 1 April 2025), p. 2.

107 Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 4].

108 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 7; EPA Tasmania, response to written questions from Senator Thorpe (received 1 April 2025), p. 3; Mr Cumming, Barwon Water, *Committee Hansard,* 4 June 2025, p. 41; Barwon Water, response to questions on notice, public hearing 4 June 2025 (received 23 June 2025), [p. 2].

109 Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from Senator Thorpe (received 4 December 2024), [p. 3].

110 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 5.

111 Friends of the Earth, *Submission 46* (47th Parliament), p. 5.

112 EPA Victoria, *Emerging Contaminants in Recycled Water*, 5 June 2023 (accessed 9 July 2025).

Views of inquiry participants

7.95 Water utilities, community advocates, regulators and researchers put forward a range of regulatory, monitoring, reporting, funding and research recommendations to address contamination of water supplies by PFAS and the potential flow-on health and environmental impacts.

Improve national regulation, leadership and collaboration

7.96 Submitters and witnesses called for a range of regulatory changes aimed at improving national consistency, providing clear leadership, and improving collaboration to improve Australia's water supplies.

National regulation

7.97 A number of submitters recommended enforceable national regulations for PFAS in drinking water and other water supplies to overcome the current regulatory uncertainties and inconsistencies.[113] Mrs Tracey Anton expressed frustration with the current system, saying 'we've got to stop this delineation of state and federal, because it's not helping. There's no continuity'.[114]

7.98 A range of solutions were proposed. Dr Khan argued that this can be achieved through an act to regulate safe water:

> … the Commonwealth government should seek to take a much more active role in setting drinking water quality and risk management requirements. It's time for an Australian safe drinking water act. Such an act would enable the Commonwealth to mandate consistent application of best practices for managing drinking water quality, as defined by the Australian drinking water guidelines nationally.[115]

7.99 Professor Jones supported legally binding regulation of PFAS, implemented through a national Council of Ministers for the Environment, with consideration of potential unintended effects before implementation.[116]

7.100 Consistent and enforceable national regulation for PFAS in recycled water was also recommended, to help inform risk management and treatment processes.[117]

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[113] See, for example: Water Services Association of Australia, *Submission 56* (47th Parliament), p. 2; qldwater, *Submission 90* (47th Parliament), [p. 2]; Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 6]; Australian Academy of Science, *Submission 63* (47th Parliament), [p. 2]; Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), pp. 1 and 4; Environmental Defenders Office, *Submission 55* (47th Parliament), p. 8.

[114] Mrs Anton, Private capacity, *Committee Hansard,* 4 June 2025, p. 15.

[115] Dr Khan, University of Sydney, *Committee Hansard,* 22 January 2025, p. 3.

[116] Professor Oliver Jones, *Submission 147* (47th Parliament), p. 5.

[117] Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 7; Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 4]; Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), p. 4.

7.101 However, Cancer Council Australia thought there was no need for standalone legislation for PFAS, pointing out it:

> … is of the view that Commonwealth legislation to protect the environment in various contexts has been designed to address, where necessary, carcinogenic hazards. Cancer Council acknowledges that general legislation deemed limited in providing a framework to respond to PFAS monitoring and management may be amended or revised to ensure Australian's exposure to PFAS remains below the allowable limits.[118]

7.102 Other submitters, such as STOP PFAS thought that the Guidelines need to be more stringent, and follow the levels set by the US.[119]

Source control

7.103 There was widespread support for improved source control measures to totally or significantly reduce the use of PFAS, including in consumer goods. Water utilities were particularly in favour of source control, given they bear the burden of water treatment. For example, the WSAA wrote:

> Effective source control is widely recognised as the best strategy for PFAS management and requires clear, strict, and enforceable regulations and monitoring for PFAS in consumer products. Global evidence demonstrates that implementing robust source control measures significantly reduces exposure and associated risks.[120]

7.104 Water utilities and their peak body argued that source control would be more sustainable, and improve outcomes for consumers:

> The improvement of source control measures would alleviate the operational burden on water utilities, reduce treatment costs, and lessen the financial impact on customers and communities. This further enables the broader objectives of the water sector to deliver sustainable, safe, clean, and affordable water drinking supplies and wastewater services.[121]

7.105 Similar concerns about the importance of source control raised by the waste and wastewater industries are covered in Chapter 9.

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[118] Cancer Council Australia, response to written questions from Senator Thorpe (received 30 June 2025) [p. 3].

[119] Mr Dee, STOP PFAS, *Committee Hansard,* 22 January 2025, p. 4; STOP PFAS Blue Mountains, *Submission 76,* p. 17.

[120] Water Services Association of Australia, *Submission 56* (47th Parliament), pp. 3–4.

[121] Water Services Association of Australia, *Submission 56* (47th Parliament), p. 4; Icon Water, *Submission 120* (47th Parliament), p. 2.

National leadership, coordination and collaboration

7.106 Inquiry participants recognised the need for stakeholders responsible for reducing PFAS contamination and ensuring safe water supplies to work together in coordinated and collaborative ways.[122]

7.107 The WSAA submitted that consistent application of the national guidelines and a shared understanding of PFAS contamination risks will only occur where there is coordination between regulators and frameworks are enforced.[123]

7.108 There were various calls for:

- strengthened leadership, coordination and collaboration, including through a revised National Water Initiative;[124]
- a nationally coordinated approach to pollutants and contaminants (including PFAS);[125]
- a taskforce comprised of regulatory agencies and relevant peak industry bodies;[126] and
- a national peak body to deal with PFAS management issues.[127]

7.109 The WSAA thought improved coordination and collaboration could be achieved through the Australian Government's new national environment protection agency—Environment Protection Australia. It envisaged the agency could 'significantly enhance coordination on PFAS source control, regulatory consistency, and strategic oversight' and help ensure that the water sector is actively engaged in shaping solutions to PFAS and other contaminants.[128] The WSAA envisaged an expanded role for the new agency:

> … Environment Protection Australia could play a key role in this effort, aligning the objectives of both the NEMP and [Industrial Chemicals Environmental Management Standard (IChEMS)] processes and addressing

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122 See, for example: Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 9; Dr Ian Wright, *Submission 102* (47th Parliament), p. 10.

123 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 5.

124 Dr Ian Wright, *Submission 102* (47th Parliament), p. 10.

125 Dr Khan, University of Sydney, *Committee Hansard*, 22 January 2025, p. 3; Water Services Association of Australia, *Submission 56* (47th Parliament), p. 3.

126 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 3.

127 Mr Becker, SciDev Limited, *Committee Hansard*, 4 June 2025, p. 45; Mr Dee, STOP PFAS, *Committee Hansard*, 22 January 2025, p. 4.

128 Environment Protection Australia is being established as part of the Australian Government's Nature Positive law reforms. See: Department of Climate Change, Energy, the Environment and Water, *Environment Protection Australia*, 25 March 2025 (accessed 15 July 2025); Department of Climate Change, Energy, the Environment and Water, *EPBC Act reform*, 28 February 2025 (accessed 15 July 2025). See also: Water Services Association of Australia, *Submission 56* (47th Parliament), p. 3.

> regulatory gaps. By moving beyond a sole focus on 'end-of-pipe' controls, the taskforce could explore more comprehensive, long-term solutions. It is vital that all stakeholders work together towards the shared goal of reducing PFAS contamination and safeguarding public health and the environment.[129]

7.110 The National Academy of Science identified the need for a dedicated, national environmental data agency which could 'collect, collate, analyse and report environmental data'.[130]

7.111 The WSAA anticipated that data collection and analysis of PFAS contamination would be supported by Environment Protection Australia and the recently established Environment Information Australia, which is responsible for national environmental data and information.[131]

Improve water quality monitoring data and publication

7.112 It was widely acknowledged that data about PFAS contamination in Australia's water supplies is patchy and inconsistent. Dr Wright remarked:

> There are enormous gaps in our knowledge about PFAS in Australian waterways. All water resources—surface water, groundwater and drinking water—need to be monitored. At the moment, it's like a great national secret if there is information or it's, 'Don't go there, because we don't want to know the result'.[132]

7.113 Despite the Department of Environment's consideration of a national resource for significant PFAS contamination, this may not entirely meet the needs of stakeholders. There were calls for 'the development of a national approach to monitoring and disseminating information regarding PFAS in drinking water', with reporting to be underpinned by consistent methodologies, data standards and data sharing arrangements.[133]

7.114 There were widespread calls for nationally consistent, mandatory requirements for monitoring PFAS in water supplies, particularly in drinking water, water

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129 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 3.

130 Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), p. 2.

131 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 11; Department of Climate Change, Energy, the Environment and Water, *EPBC Act reform*, 28 February 2025.

132 Dr Wright, Western Sydney University, *Committee Hansard*, 22 January 2025, p. 2; Dr Ian Wright, *Submission 102* (47th Parliament), p. 10.

133 Cancer Council Australia, *Submission 62* (47th Parliament), p. 9; Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), pp. 1–2; Mr Becker, SciDev Limited, *Committee Hansard,* 4 June 2025, p. 45.

used for agricultural industries, and rivers of high conservation value.[134] For human consumption Dr Wright was of the view:

> All public drinking water supplies across Australia need to be regularly monitored for PFAS. This requires leadership, similar to the approach taken by the US EPA. The US EPA has developed a clear national plan for monitoring of PFAS in all public drinking water systems. The Commonwealth Government in Australia should consider following the Federal US EPA's approach …[135]

7.115 Submitters and witnesses, including Dr Wright, acknowledged the impacts of this lack of data:

> Currently the best source of information for people, if they're frustrated by the lack of information provided by their water supplier, is often the media or a non-government organisation like Friends of the Earth, which has an excellent map and is recording in a centralised way.[136]

7.116 Mr Amis explained that Friends of the Earth developed the Australian PFAS Chemicals Map because no government agency was doing that work.[137]

7.117 There was support for the central publication of authoritative monitoring and testing data about PFAS in water supplies to help address community concerns, improve decision making and inform research on health and environmental impacts.[138] Professor Jones recommended:

> A public PFAS exposure map should be created based on official government data collected from across Australia using published and consistent methodology standards. Reference to environmental quality standards should be incorporated, and the underlying data made freely available for use by others. This would provide a clear, accurate, and comprehensive picture of PFAS concentrations in the Australian environment, enabling the identification of areas with higher exposure risk.[139]

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134 Cancer Council Australia, *Submission 62* (47th Parliament), p. 9.

135 Dr Ian Wright, *Submission 102* (47th Parliament), pp. 6 and 10; Dr Wright, Western Sydney University, *Committee Hansard*, 22 January 2025, p. 2. See also: Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 4].

136 Dr Wright, Western Sydney University, *Committee Hansard*, 22 January 2025, p. 2. See also: Dr Ian Wright, *Submission 102* (47th Parliament), pp. 2–3; Professor Oliver Jones, *Submission 147* (47th Parliament), p. 4.

137 Mr Amis, Friends of the Earth Australia, *Committee Hansard,* 4 June 2025, p. 14.

138 See for example: Dr Ian Wright, *Submission 102,* p. 10; Concerned Waterways Alliance, *Submission 30* (47th Parliament), [pp. 1 and 6]; Cancer Council Australia, *Submission 62* (47th Parliament), p. 4; Mr Amis, Friends of the Earth Australia, *Committee Hansard,* 4 June 2025, p. 14; Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), pp. 1–2.

139 Professor Oliver Jones, *Submission 147* (47th Parliament), p. 4.

7.118 The Australian Academy of Science remarked that such a map 'would provide a clear, accurate, and nationally coordinated picture of PFAS concentrations in the Australian environment. This would be of value to lawmakers, policymakers, regulators and the general public'.[140]

Increase government investment and support

7.119 Water utilities highlighted the increasing costs associated with managing PFAS in drinking and wastewater—inclusive of both capital and operating costs for treatment—particularly considering the more stringent Water Guidelines.[141] The WSAA explained:

> Given the substantial costs of PFAS management, there is an increasing need for additional government support and investment. The water sector is actively exploring opportunities to partner and collaborate with governments and other sectors to address PFAS risks. Expecting water utility customers alone to shoulder this financial burden is neither equitable nor sustainable.[142]

7.120 Other submitters highlighted that smaller regional and remote water suppliers and communities would need government assistance:

> It is well-known that they often lack the finance, technology and expertise that is available in capital city water agencies … For the small regional water suppliers, the additional burden of tighter PFAS guidelines is likely to be another overwhelming problem when they are already struggling to deliver the best water quality they can with limited resources and often already contaminated source water. All three levels of Government need to work together to address this problem and help provide clean and safe drinking water to all Australians, not just to people in big cities.[143]

More research into the impacts of PFAS on water systems

7.121 There were calls for more research into technology and processes to remediate PFAS in water supplies, with Mr Adam Lovell from the WSAA suggesting:

> … set aside significant funding for the tremendous research that's already happening—but boost it—in terms of what you heard from the previous panel: removal and, most importantly, destruction of PFAS. Once you remove it, through [granular activated carbon] and reverse osmosis membranes, you've still got a contaminated product. That destruction aspect is really important and needs further investment. Our services are fully funded by our customers via their water bills, so we need to keep our costs

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[140] Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), p. 2.

[141] See, for example: qldwater, *Submission 90* (47th Parliament), [pp. 2 and 13]; Veolia, *Submission 58* (47th Parliament), p. 6.

[142] Water Services Association of Australia, *Submission 56* (47th Parliament), p. 8.

[143] Dr Ian Wright, *Submission 102* (47th Parliament), p. 10; Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), pp. 2 and 4.

> efficient to demonstrate to our customers that they're achieving a good, efficient service.[144]

7.122 The committee's views and recommendations are provided in Chapters 11 and 12 of this report.

[144] Mr Lovell, Water Services Association of Australia, *Committee Hansard,* 22 January 2025, p. 20. See also: Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 6].

Chapter 8
PFAS in consumer goods

Introduction

8.1 PFAS are widely found in consumer goods. Since the 1940s, thousands of PFAS chemicals have been used worldwide in commercial products and applications, including consumer goods sold and imported into Australia.[1]

8.2 PFAS chemicals have a range of properties that are useful in a commercial context, such as fire-retardance, temperature and stain-resistance, and oil and water-repellence.[2]

8.3 PFAS are present in a range of common household items, personal care products, cleaning products, outdoor wear, cookware, grease-resistant food packaging, stain-resistant furniture, plastics and paint.[3]

8.4 While the presence of PFAS in some products is well-known (for example, firefighting foam and non-stick cookware), the extent of PFAS in other consumer products—such as compostable packaging, lipstick and dental floss—is less understood.[4]

8.5 As the use of PFAS predates frameworks of organised chemical management and regulation, it is unknown how many PFAS are now in global circulation. The most recent estimate by the Organisation for Economic Cooperation and Development (OECD) in 2018 suggests that approximately 4730 PFAS have been used commercially.[5]

8.6 This chapter will highlight some of the most common uses of PFAS in consumer goods, and the various pathways between human exposure to the PFAS in consumer goods. It will also consider some of the issues associated with PFAS in the context of a circular economy model—as this relates to both food packaging and imported goods.

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1 Ms Kate Lynch, Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water, *Committee Hansard*, 13 November 2024, p. 14.

2 Australian Academy of Science, *Submission 63* (47th Parliament), p. 1; Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 5; WWF-Australia, *Submission 54* (47th Parliament), p. 2.

3 CSIRO, *Submission 22* (47th Parliament), p. 8.

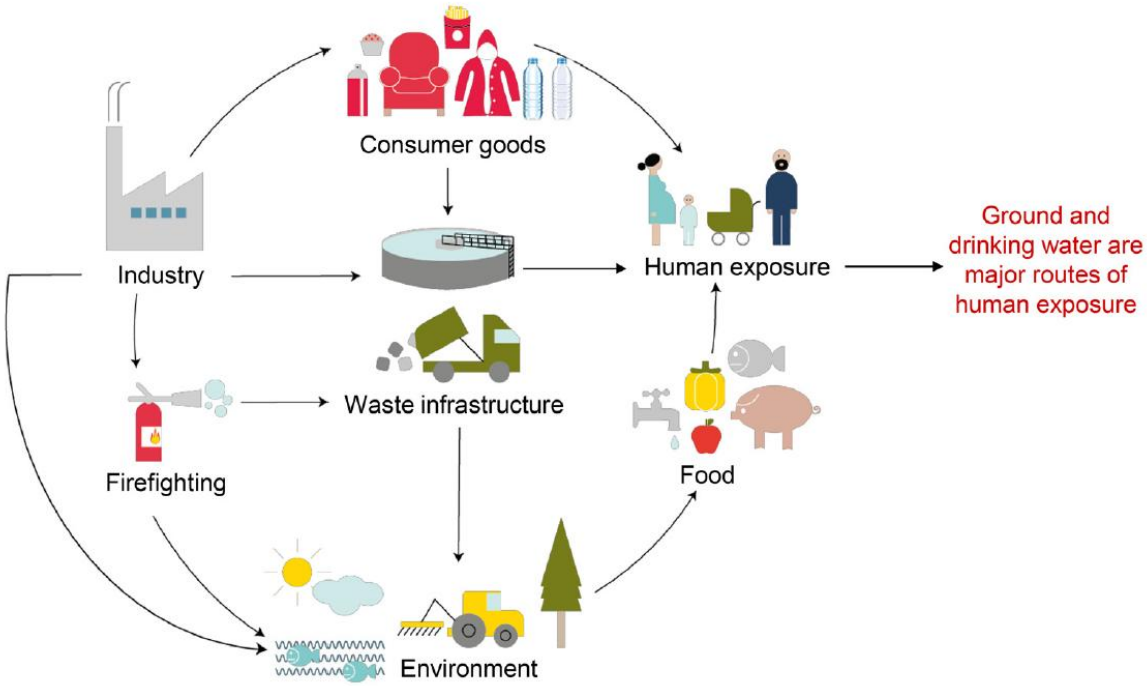
4 Toxics Free Australia, *Submission 72* (47th Parliament), p. 3.

5 OECD Global Forum on the Environment dedicated to Per- and Polyfluoroalkyl Substances (PFAS), *12–13 February 2024—hybrid event: Background document: OECD work on PFAS*, p. 1 (accessed 21 August 2025).

Exposure pathways for PFAS

8.7 The mechanism for exposure to PFAS is explained in Figure 8.1, below.

Figure 8.1 Summary of human PFAS exposure pathways



Source: Society of Environmental Toxicology and Chemistry, Selection of academic journal articles on the environmental and human health impacts of PFAS (received 21 October 2024). Figure adapted from European Environment Agency–Emerging chemical risks in Europe–'PFAS' (2019).

Note: Human exposure to PFAS may occur through multiple pathways including food, consumer products, food packaging, cleaning products, personal care products, household dust, and contact with a variety of other contaminated media. While dietary intake resulting from the ingestion of contaminated drinking water and/or foods grown in contaminated groundwater rank among the key exposure routes for the general population, emerging evidence indicates that plastic containers, such as those used for storage of food, drinks, personal care products, pharmaceuticals, and cleaning and industrial products, may represent a major new PFAS exposure source.

Exposure pathways for PFAS from consumer goods

8.8 The Department of Health, Disability and Ageing (Department of Health) argued that ingestion of PFAS through food and drinking water is thought to be the primary source of exposure.[6] By contrast, the 'inhalation of dust contaminated with PFAS and dermal (skin) contact with PFAS' are considered 'minor exposure pathways'.[7]

8.9 Nevertheless, Australians may be exposed to PFAS through a variety of consumer goods and everyday items. PFAS exposure from consumer goods is

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6 Australian Government Department of Health, Disability and Ageing, *enHealth guidance statement – Per- and polyfluoroalkyl Substances (PFAS)*, 2024, p. 3 (accessed 10 July 2025).

7 Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100* (47th Parliament), p. 4.

generally thought to occur through three pathways: skin absorption, inhalation, and ingestion. These exposure pathways are explored in the following sections.

Skin absorption of PFAS

8.10 There are multiple ways that PFAS can be absorbed through the skin (dermal absorption). CSIRO noted that contact with PFAS-containing personal care (for instance, sunscreen, shampoo, period products and dental floss) or cleaning products may lead to absorption of PFAS through the skin.[8]

8.11 Several submitters, including Ms Louise Keats, Toxics Free Australia, and Dr Mariann Lloyd-Smith, cited research conducted at the School of Geography, Earth & Environmental Sciences at the University of Birmingham, completed in May 2024. The study analysed 17 different PFAS compounds in order to investigate the rate of dermal uptake of the chemicals. The results suggest that 'human skin took in "substantial" amounts of 15 PFAS, including 13.5 per cent of PFOA, one of the most toxic PFAS. With a longer application, skin absorbed a further 38 per cent of the PFOA dose'.[9]

8.12 The issue of skin absorption through clothing was highlighted by the Circular Textile Working Group Australia (CTWG WA)—a network representing over 80 members from Western Australia's textile industry. PFAS is commonly used in textiles for its water-repellent, stain-resistant and crease-proof properties. In fact, CTWG WA highlighted that, 'the textile sector is estimated to be the biggest contributor to PFAS pollution in Europe'. The CTWG WA therefore stated that clothing and textiles should be part of the conversation about PFAS in consumer goods [10]

8.13 While 'knowledge on human dermal uptake' of PFAS is still developing,[11] some submitters stressed the importance of addressing the presence of PFAS in consumer products, specifically in personal care and children's products.[12]

8.14 The Department of Health submitted that three out of the nine studies funded under the Australian Government's PFAS Targeted Call for Research Scheme 'include consideration and investigation of exposure pathways including dermal exposure, which can include exposure from consumer products'. Results

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8 CSIRO, *Submission 22* (47th Parliament), p. 7.

9 Dr Mariann Lloyd-Smith, *Submission 3* (47th Parliament), p. 7.

10 Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), p. 1.

11 Oddný Ragnarsdóttir, Mohamed Abou-Elwafa Abdallah, Stuart Harrad, 'Dermal bioavailability of perfluoroalkyl substances using in vitro 3D human skin equivalent models', *Environment International*, vol. 188, 2024, pp. 1–4 (accessed 3 July 2025).

12 Toxics Free Australia, *Submission 72* (47th Parliament), p. 5.

of these studies are expected by the end of 2025 and 'will be considered when developing and revising relevant health advice'.[13]

Inhalation of PFAS

8.15 Inhalation of dust contaminated with PFAS and dermal contact with PFAS—including showering and bathing in contaminated recreational water—are considered minor exposure pathways.[14]

8.16 CSIRO noted that PFAS-containing dust can be inhaled from carpets, fabrics, upholstery cleaning products, plastics and paints.[15] Environmental consultants, Dr Matthew Askeland and Mr Andrew Mitchell, drew the committee's attention to the issue of airborne PFAS:

> PFAS exposure through dust, aerosols, and volatilised forms is often overlooked. PFAS can bind to dust particles, travel through the air, or volatilise under certain conditions. This contributes to direct human exposure and broader environmental spread. For example, PFAS-contaminated dust settling on roof catchments can impact rainwater collection systems.[16]

8.17 Dr Askeland and Mr Mitchell argued that addressing these risks will require 'baseline data on PFAS in indoor and outdoor air, a better understanding of volatilisation and aerosolization conditions and assessments of health risks from inhalation or dermal contact'. They suggested that '[i]dentifying and controlling these airborne pathways would broaden our capacity to reduce PFAS exposure'.[17]

Ingestion of PFAS

8.18 PFAS ingestion can occur through the application of cosmetic products such as lipstick, as well as through food packaging, which is explored in more detail below. [18]

8.19 The use of PFAS in make-up was highlighted by Professor Bradley Clarke, Associate Professor of Analytical Chemistry and Environmental Science, University of Melbourne. Professor Clarke noted that PFAS is used in make-up

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13 Department of Health, Disability and Ageing, responses to written questions from Senator Thorpe—science and regulations (received 28 July 2025), p. 2; Department of Health, Disability and Ageing, response to written question from Senator Thorpe—dermal exposure (received 22 July 2025), p. 1.

14 Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100* (47th Parliament), p. 4.

15 CSIRO, *Submission 22* (47th Parliament), p. 7.

16 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 7.

17 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 7.

18 Toxics Free Australia, *Submission 72* (47th Parliament), p. 3.

for its oil- and water-repellent properties. As most cosmetic products come in relatively small volumes, PFAS can be a significant proportion of the product. Professor Clarke also pointed to other countries, such as New Zealand, that have banned the use of PFAS in make-up, due to the high possibility of ingestion or absorption.[19]

8.20 The Department of Health noted that the import and use of PFAS chemicals is subject to a ban in Australia from 1 July 2025—including its use in articles (products). The department noted that some product types, including cosmetics, are already subject to laws requiring labelling of ingredients such as PFAS.[20]

PFAS in food packaging

8.21 PFAS chemicals are found in much food packaging. As Australian states and territories have begun to phase out non-compostable, single-use food packaging, fibre-based packaging has been seen as a more environmentally friendly alternative. However, compostable fibre-based packaging often contains intentionally added PFAS, as the chemicals serve as a barrier to heat, grease and water.[21]

8.22 Common examples include 'paper/board/fibre-based straws, cups, bowls and food packaging—including for "fast" highly processed foods (for example, pizza boxes, microwave popcorn bags, burger wrapping paper)'.[22]

8.23 Studies on PFAS migration from packaging to food have shown that PFAS can leach into food from contact packaging, specifically paper and cardboard food packaging.[23]

8.24 However, Mr Stephen Bouwhuis from the Department of Health, noted that Food Standards Australia and New Zealand has considered the leaching of PFAS into food from contact packaging and formed the view that 'the level within the packaging and the food wasn't significant enough to cause a health concern'.[24] Specifically, 2016 testing of PFAS in 'a range of foods in the Australian diet' found:

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19 Professor Bradley Clarke, Associate Professor, Analytical Chemistry and Environmental Science, University of Melbourne, *Committee Hansard*, 4 June 2025, pp. 60–61.

20 Department of Health, Disability and Ageing, response to written questions from Senator Thorpe—chemicals regulation (received 11 August 2025), p. 1.

21 World Wide Fund for Nature—Australia (WWF—Australia) and the Australian Marine Conservation Society, *Submission 54* (47th Parliament), pp. 4–5.

22 Minderoo Foundation, *Submission 35* (47th Parliament), p. 4.

23 Food Packaging Forum, FCCmigex Database, 19 May 2022 (accessed 3 July 2025).

24 Mr Stephen Bouwhuis, Assistant Secretary, Department of Health, Disability and Ageing, *Committee Hansard*, 10 June 2025, p. 42.

> There were no detections for PFOA and only two detections for PFOS out of 50 foods tested. The concentrations of PFOS were at very low levels (≤1 part per billion) and similar to those reported internationally for the same foods.[25]

8.25 Another issue with PFAS in food contact packaging emerges when such materials are recycled. The joint submission from the World Wide Fund for Nature–Australia (WWF-Australia) and the Australian Marine Conservation Society (AMCS) highlighted that in a circular economy, when packaging is routinely recycled, PFAS added to fibre-based recyclable or compostable packaging has the potential to contaminate recovery systems, and migrate into products made from recycled materials and contaminate home-grown or other food products, some of which might even be labelled as organic. They argued that this only increases the presence of PFAS in Australian consumer goods and makes human exposure more likely.[26]

Australian Packaging Covenant Organisation action plan

8.26 In 2021, a joint study by Planet Ark and the Australian Packaging Covenant Organisation (APCO) found that a significant proportion of fibre-based, food contact packaging samples in Australia contained PFAS. The 2021 study found 45.9 per cent of samples had 'fluorine concentrations above 100 ppm'. The threshold of 100 ppm was considered 'a reliable indicator that PFAS had been intentionally added to the packaging material' and was 'consistent with levels set in overseas programs'.[27]

8.27 As a result of this study, APCO worked with members to create an action plan to phase out all PFAS in food contact packaging by 2023. The plan outlined a 'voluntary, industry-led approach to phase out per- and polyfluoroalkyl substances (PFAS) in fibre-based food contact packaging in Australia'.[28]

8.28 The action plan, implemented by all APCO members, led to a reduction in packaging products exceeding the threshold of 100 ppm of fluorine from 45.9 per cent in 2021 to around 9.6 per cent in 2024.[29]

8.29 While APCO's findings indicated that PFAS-free food packaging options are available and could be adopted by industry, some submitters criticised the lack of transparency surrounding the results. For instance, Dr Mariann Lloyd-Smith said the APCO action plan is a 'voluntary approach with little oversight and

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25 Food Standards Australia New Zealand, *Submission 70*, p. 3.

26 Food Packaging Forum, FCCmigex Database, 19 May 2022.

27 Note: High total fluorine indicates high concentrations of PFAS. APCO, *Submission 67*, [p. 4].

28 Australian Packaging Covenant Organisation (APCO), *Action Plan to Phase Out PFAS in Fibre-Based Food Contact Packaging*, November 2023, p. 4.

29 APCO, *Submission 67* (47th Parliament), [p. 3].

does not represent an appropriate response to a serious pathway to PFAS exposure'.[30]

Regulation of PFAS in food packaging

8.30 In September 2024, the Department of Climate Change, Energy, the Environment and Water (Department of Environment) released a consultation paper on packaging regulation. The consultation paper 'identified PFAS as a chemical of concern targeted for elimination from packaging'.[31]

8.31 The consultation built upon the APCO action plan.[32] The consultation outcomes were released in February 2025. Acting Division Head, Circular Economy Division at the Department of Environment, Ms Rachel Burgess explained that 'the department is now considering the information provided through that public consultation' and is working with industry to determine methods for identifying PFAS in packaging items.[33]

8.32 WWF—Australia and the ACMS submitted that the Commonwealth should consider implementing a ban on any PFAS that is intentionally added to food packaging materials and goods. They also recommended that 'all products designed for organic disposal be certified as PFAS free'.[34]

8.33 APCO and the Minderoo Foundation echoed this call, arguing for a phasing out of PFAS in all food contact applications.[35] This would not only reduce human exposure to PFAS but also aid organic waste processors. Currently, consumers might place alternative food packaging that contains PFAS into green bins, or into organic waste collectors such as FOGO (Food Organics and Garden Organics) bin collections. Banning PFAS in all food contact packaging ensures that the chemicals are not ending up in landfill and leaching PFAS into the environment.[36]

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30 Dr Mariann Lloyd-Smith, *Submission 3* (47th Parliament), p. 7.

31 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 16.

32 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 16.

33 Ms Rachel Burgess, Acting Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water, *Committee Hansard*, 5 September 2025, p. 16; see also Department of Climate Change, Energy, the Environment and Water, *Reforming packaging regulation, last updated: 21 February 2025* (accessed 19 August 2025).

34 WWF—Australia and the AMCS, *Submission 54* (47th Parliament), p. 2.

35 APCO, *Submission 67* (47th Parliament).

36 Minderoo Foundation, *Submission 115* (47th Parliament), p. 7.

8.34 Ms Burgess noted that while the responsibility for the 'use and disposal' of packaging 'largely falls to states and territories', regulating the importation of packaging is a Commonwealth responsibility. The department also acknowledged that Australia imports most of its packaging.[37]

Imported goods

8.35 The presence of PFAS in imported goods presents a complex challenge for Australian regulators. Many importers, suppliers and retailers are not aware of the presence of PFAS in the goods they import. Being able to accurately identify goods containing PFAS and then trace them through the economy is also complicated, as current technologies only allow for the identification of a small number of PFAS variants.[38]

8.36 Further, jurisdictions such as the European Union and the United States have enacted stricter regulations regarding the levels of PFAS permissible in consumer goods. As such, the Australian Bedding Stewardship Council was concerned that Australia risks becoming a 'dumping ground' for products containing PFAS chemicals, as foreign manufacturers try to offload goods that may be non-compliant in other countries, posing clear environmental and health risks.[39]

8.37 This issue was also raised in the context of the textiles industry, where the presence of PFAS is magnified by 'the dominance of low-cost, direct-to-consumer fast fashion platforms such as Shein, Temu and AliExpress', many of which are known to sell products containing PFAS. As many consumers purchase these products online, CTWG WA argued there is a need for 'strong regulatory oversight of direct-to-consumer e-commerce imports'.[40]

8.38 CTWG WA noted the importance of transitioning to a 'circular textiles economy' to improve Australia's environmental sustainability, while noting that the presence of PFAS in fast fashion 'can introduce harmful chemicals into recycling streams'. CTWG WA was concerned that Australia 'lacks clear national protocols to identify, separate, and manage PFAS treated textiles at end of life' and recommended:

> 1. National Protocols for Identification and Segregation: Develop and implement clear guidelines for identifying, labelling, and separating PFAS treated textiles at collection and recycling points.

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37 Ms Rachel Burgess, Acting Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water, *Committee Hansard*, 5 September 2025, p. 16.

38 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 12.

39 Australian Bedding Stewardship Council, *Submission 45* (47th Parliament), p. 2.

40 Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), p. 2.

> 2. Investment in PFAS-Safe Recycling and Destruction Infrastructure: Support the establishment of advanced treatment facilities in Western Australia and other jurisdictions to manage PFAS-contaminated textiles, including thermal destruction and emerging technologies.
>
> 3. Product Stewardship Requirements: Embed PFAS detection, separation, and disposal requirements into all national clothing stewardship schemes, including Seamless and relevant state programs.
>
> 4. Consumer Education and Transparency: Fund education initiatives for consumers, local councils, and recycling operators to improve understanding of PFAS-related risks in textiles and enable informed disposal decisions.
>
> 5. Support for Bioleaching Innovation: Allocate dedicated funding to accelerate research, pilot trials, and commercial readiness of bioleaching and other advanced biological treatment technologies for PFAS contaminated textiles.[41]

Views of state and local governments on imported goods

8.39 Many local and state government bodies including Brisbane City Council, the Local Government of New South Wales (NSW), the Northern Territory Department of Lands, Planning and Environment, and the Local Government Association of Queensland expressed concerns about inadequate national regulation of PFAS in imported goods placing an unfair burden on regional bodies who have to deal with the downstream effects of PFAS in consumer goods.[42]

8.40 These submitters argued that a lack of Commonwealth oversight of PFAS in consumer goods leaves state and local governments to manage the environmental and health consequences of having these goods in circulation—a challenge for which they argued they are not properly resourced.[43]

8.41 The Local Government Association of Queensland submitted:

> Local governments remain concerned that products containing PFAS continue to be imported into Australia and that greater compliance expectations imposed on councils are not being balanced by appropriate

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41 Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), pp. 2–3.

42 Brisbane City Council, *Submission 143* (47th Parliament), pp. 2–4; Local Government of NSW, *Submission 34* (47th Parliament), pp. 2–3; Northern Territory Department of Lands, Planning and Environment (DLPE), *Submission 68* (47th Parliament), pp. 1-6; Local Government Association of Queensland, *Submission 137* (47th Parliament), p. 13.

43 Brisbane City Council, *Submission 143* (47th Parliament), pp. 2–4; Local Government of NSW, *Submission 34* (47th Parliament), pp. 2–3; Northern Territory Department of Lands, Planning and Environment (DLPE), *Submission 68* (47th Parliament), pp. 1-6; Local Government Association of Queensland, *Submission 137* (47th Parliament), p. 13.

> action from the State and Federal government, despite strong commitments to stop contamination at the source.[44]

8.42 This was echoed by the Northern Territory Department of Lands, Planning and Environment who stressed that smaller jurisdictions, such as the Northern Territory, have limited resources and depend on 'national frameworks' to support their regulation of PFAS.[45]

8.43 This is compounded by a lack of mandatory product labelling and import documentation, which makes it difficult for state regulators to trace or isolate the source of contamination once it has already entered the supply chain.[46]

Regulation

8.44 Inquiry participants made a number of recommendations aimed at increasing the regulation and management of PFAS in consumer goods. Numerous community members and organisations argued for a complete phase out or ban on non-essential uses of PFAS in Australia and products imported to Australia, focussing on personal care items, as well as products for children and babies.[47]

8.45 Submitters also recommended that Australia aligns with international jurisdictions, such as the European Union, in taking a firmer stance to reduce the levels of PFAS in consumer goods.[48]

8.46 Inquiry participants noted that it is currently impossible to quantify the extent of PFAS in consumer products. Submitters argued there is a need to better understand the extent of PFAS in consumer products, to consider import and export restrictions, and for Australia to advocate for stronger international product regulation when it comes to PFAS. Submitters were concerned about the lack of information as to what goods contain PFAS, and at what levels—most notably, imported goods.[49]

8.47 Considering many consumer products end up in waste streams, some submitters argued that it would be easier and cheaper to reduce the number of PFAS-containing products circulating in the Australian economy rather than

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44 Local Government Association of Queensland, *Submission 137* (47th Parliament), p. 10.

45 Northern Territory Department of Lands, Planning and Environment (DLPE), *Submission 68* (47th Parliament), p. 4.

46 Brisbane City Council, *Submission 143* (47th Parliament), p. 3.

47 STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 19; Australia & New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), p. 2; Natural Turf Alliance, *Submission 79* (47th Parliament), p. 30; Louise Keats, *Submission 109* (47th Parliament), p. 6.

48 STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 19.

49 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 12; Australian Bedding Stewardship Council, *Submission 45* (47th Parliament), p. 2. Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), p. 2.

deal with the PFAS once it has reached the waste stream. This evidence is discussed in Chapter 9 of this report.

8.48 The committee heard arguments in support of compulsory labelling of PFAS in consumer products. Submitters suggested that public health warning labels be mandated for products and packaging that contain PFAS, especially those products with a higher risk of chemical leaching. Some submitters also recommended that mandatory labelling be supplemented by 'public awareness initiatives on the presence and risks of PFAS in household and [information and communications technology] goods', as this would help individuals to make informed choices about the goods they purchase.[50]

8.49 Questions about the mandatory labelling of PFAS in consumer products were asked of the Department of Health as well as the Australian Competition and Consumer Commission (ACCC). The department submitted that:

> Existing products on the market that may have contained PFAS would also be subject to laws requiring labelling where PFAS is included as an ingredient. For example, the labelling of cosmetic products is regulated under the Consumer Goods (Cosmetics) Information Standard 2020, administered by the Australian Competition and Consumer Commission.
>
> … Additionally, businesses can not provide false or misleading information under Australian Consumer Law. This applies to all products, including cookware and any claims about being 'non-toxic', 'PFAS-free', or 'eco-friendly' as well as any omissions of fact that could mislead consumers. In addition, if a product contains chemicals that could pose a health risk, failing to disclose this information may be considered deceptive conduct.[51]

8.50 The ACCC clarified that it:

> … does not have powers to restrict the importation of consumer goods into Australia. However, the importation of some goods to which a permanent ban applies is prohibited under customs regulations that are enforced by Australian Border Force (ABF).[52]

8.51 Further, the ACCC stated that it does not currently undertake any testing and surveillance for PFAS or other chemicals. However, if there was a mandatory

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[50] Ms Tracey Anton, *Committee Hansard*, 4 June 2025, p. 13; Professor Bradley Clarke, Associate Professor, Analytical Chemistry and Environmental Science, University of Melbourne, *Committee Hansard*, 4 June 2025, p. 65; Louise Keats, *Submission 109* (47th Parliament), p. 17; Noran Vogt, *Submission 6* (47th Parliament), p. 1; Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), p. 2.

[51] Department of Health, Disability and Ageing, response to questions taken on notice, public hearing 10 June 2025 (received 9 July 2025), [p. 4].

[52] Australian Competition & Consumer Commission, response to written questions from Senator Thorpe (received 21 July 2025), [p. 1].

standard or product ban in place, the ACCC 'may commission testing of certain products if we were investigating compliance with the standard or ban'.[53]

8.52 Asked if it would have a role in enforcing an importation ban on consumer goods containing PFAS, the ACCC said it would not. It also stated that it is not in a position to assess the practical implications of an import ban, and that it has 'not considered whether an information standard for goods containing PFAS should be made'.[54]

8.53 Chapter 10 of this report includes further evidence on phasing out non-essential uses of PFAS, and the role of the national regulation.

Funding for research and development

8.54 The CTWG WA noted that while many alternatives to fabrics that use PFAS exist, such alternatives do not exist for certain kinds of safety gear, for example, fire-fighter uniforms. Thus, the CTWG WA recommends that more funding be provided for research and development into non-PFAS solutions for certified safety gear and uniforms.[55]

8.55 The CTWG WA also called for increased funding into the Seamless Clothing Stewardship Scheme, whose research focuses on creating designs standards and frameworks that are environmentally friendly, as this will also help Australian producers create garments that are PFAS-free.[56]

8.56 The CTWG WA submitted that currently there are no national protocols to guide the safe and effective recycling of garments containing PFAS.[57] CTWG WA recommended that more funding be provided for research into emerging treatment technologies for textile waste, such as bioleaching (the use of organic microorganisms to break down toxic compounds). Bioleaching has been successfully operationalised by other industries, but is still in its infancy in textiles, and so more research is needed to establish whether it is an effective solution to the issue of PFAS in textile waste.[58]

8.57 Submitters also noted a lack of robust evidence surrounding certain human exposure pathways for PFAS and recommended that more studies be done on the mechanisms by which humans can be exposed to PFAS through everyday

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53 Australian Competition & Consumer Commission, response to written questions from Senator Thorpe (received 21 July 2025), [p. 1].

54 Australian Competition & Consumer Commission, response to written questions from Senator Thorpe (received 21 July 2025), [p. 2].

55 Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), pp. 1–2.

56 Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), pp. 1–2.

57 Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), p. 3.

58 Circular Textile Working Group Western Australia, *Submission 146* (47th Parliament), pp. 2–4.

goods. While evidence on the exact nature of these exposure pathways—and the potential health impacts—are limited, preliminary studies and evidence from academics suggest that the presence of PFAS in household goods and clothing can lead to increased human exposure to PFAS in the home.[59]

8.58 The committee's views and recommendations are outlined in Chapters 11 and 12 of this report.

[59] CSIRO, *Submission 22*, p. 7; Dr Mariann Lloyd-Smith, *Submission 3* (47th Parliament), p. 7.

Chapter 9
PFAS in waste streams and agricultural impacts

Introduction

9.1 PFAS are present in numerous consumer and industrial products. After these products reach the end of their life, the associated PFAS can end up in landfill or wastewater treatment plants. Due to the persistent nature of PFAS, they do not readily break down. This can result in PFAS returning into the environment and agricultural systems.

9.2 This chapter investigates PFAS in waste streams, including PFAS contamination of wastewater (biosolids), their use in Australian agriculture, food organics and garden organics (FOGO), and landfill contamination. The chapter outlines the challenges of treating or removing PFAS and considers the importance of removing PFAS 'at the source'.

9.3 The chapter then covers the current regulatory environment governing the management of PFAS-contaminated waste—including the role of the *PFAS National Environmental Management Plan 3.0* (PFAS NEMP) and other government initiatives aimed at reducing the impact of PFAS contamination in Australia.

PFAS in waste streams

9.4 The following sections consider the presence of PFAS in various waste streams, including wastewater, biosolids, FOGO and landfill.

Wastewater

9.5 The presence of PFAS in an array of consumer goods such as cosmetics, clothing, and cookware, as well as industrial products, can lead to PFAS ending up in wastewater. Household activities such as showering, laundering clothes, and washing up, as well as PFAS from commercial industrial uses, means that PFAS makes its way into the wastewater system.[1]

9.6 The PFAS NEMP and *Guidelines for Sewerage Systems* are used in the management of wastewater. However, Veolia noted that management is complex as wastewater site discharge licences are issued by states and territories and limits for contaminants are site specific.[2]

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1 Mr Paul Plowman, Executive General Manager, Water and Environment Services, Sydney Water Corporation, *Committee Hansard*, 22 January 2025, p. 22.

2 Veolia, *Submission 58* (47th Parliament), pp. 3–4; Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 9.

9.7 Wastewater treatment plants were cited as both the potential recipients and further sources of PFAS contamination.[3]

9.8 Because PFAS interact with organic particles there is currently 'no viable treatment process for PFAS in wastewater'. As a result, 'PFAS received at wastewater treatment plants ends up in biosolids'.[4]

9.9 The Department of Climate Change, Energy, the Environment and Water (Department of Environment) confirmed this position, stating that wastewater treatment processes are 'not typically able to destroy PFAS, meaning that PFAS can be present in biosolids and treated water', which can be a pathway for further contamination.[5]

9.10 For example, testing conducted at wastewater treatment plants in Victoria found PFOS levels below human health guidelines, but at some sites contamination exceeded the 99 per cent species protection guideline for aquatic ecosystems.[6]

9.11 The WSAA remarked that 'while utilities take comprehensive measures to treat wastewater and meet regulatory and community expectations, the accumulation of PFAS in these systems presents significant technical, environmental, and economic challenges'.[7]

9.12 One example was PFAS contamination from Dutson Downs which is managed by Gippsland Water. Dutson Downs is a 'waste management and resource recovery facility that services and supports domestic and commercial business in Gippsland and the broader Melbourne region'. Gippsland Water became aware of PFAS contamination from the Esso Longford Natural Gas Plant, impacting Dutson Downs, in 2016 and has since undertaken three detailed site investigations and invested over $8 million in testing and management activities.[8]

9.13 Gippsland Water was asked about the results of recent testing which suggested that PFAS levels have *increased* since a cleanup notice was issued in 2019. Noting that PFAS contamination is predominantly 'due to legacy activities', General

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3 See, for example: Friends of the Earth, *Submission 46* (47th Parliament), p. 5; qldwater, *Submission 90* (47th Parliament), [p. 7]; Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 1]; Dr Matt Landos, Future Fisheries Veterinary Service Pty Ltd, *Committee Hansard,* 12 March 2025, p. 3.

4 Australia & New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), p. 2.

5 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), pp. 3 and 9. See also: Friends of the Earth, *Submission 46* (47th Parliament), p. 5.

6 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 7.

7 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 2.

8 Gippsland Water, response to questions on notice, public hearing 4 June 2025 and written questions from Senator Thorpe (received 23 June 2025), pp. 2–3.

Manager Commercial Business, Mr Aquilina suggested that PFAS levels in aquifers are 'quite variable' and subject to seasonal variation:

> We are now in the process of working with some subject matter experts, or technical experts, to try and quantify the extent, if any, of PFAS moving off that site.
>
> What our data shows today is that the PFAS contamination that we have identified is generally relatively localised, but we are investigating—and we have to continue to investigate to understand it before we can put in any remedial action—to try and quantify if, when and how, potentially, that has moved offsite.[9]

9.14 Water utilities advised that treatments to remove PFAS, particularly for wastewater, are costly because they are complex, requiring many pretreatment steps and because there are further costs associated with safely disposing of filters and waste.[10]

9.15 The Concerned Waterways Alliance was troubled by PFAS levels in effluent released by wastewater treatment plants, and the release and reuse of this treated wastewater. It described its concerns for the environment, including wildlife and humans, because of bioaccumulation and persistence of PFAS.[11]

9.16 Submitters and witnesses also expressed concern over oxidised PFAS precursor compounds or degradation products which may persist in wastewater which flows into waterways or is used for other purposes.[12] There is limited understanding of these products and the extent to which they occur in Australian water supplies.[13]

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9 Mr Simon Aquilina, General Manager, Commercial Business, Central Gippsland Region Water Corporation, Committee Hansard, 4 June 2025, p. 39.

10 qldwater, *Submission 90* (47th Parliament), [p. 11]; Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), pp. 2 and 4.

11 Concerned Waterways Alliance, *Submission 30* (47th Parliament), [pp. 3 and 5].

12 Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 3]; Dr Linda Birnbaum, opening statement, public hearing 10 June 2025 (received 10 June 2025), [p. 2].

13 Friends of the Earth, *Submission 46* (47th Parliament), p. 7. See also Ms Jane Bremmer, Chair, Toxics Free Australia, *Committee Hansard,* 12 March 2025, p. 2; Commonwealth Scientific and Industrial Research Organisation (CSIRO), response to written questions from Senator Thorpe (received 2 December 2024), [pp. 1–2]; Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 4.

Biosolids

9.17 Biosolids is a term used to describe treated sewage sludge, derived from the wastewater treatment process.[14] Due to the essential nutrients present in biosolids, it is commonly applied to land as an agricultural fertiliser.[15]

9.18 The central advisory and advocacy body within Queensland's urban water and sewerage services sector, Queensland Water Directorate (qldwater), described some of the important nutrients present in biosolids:

> Biosolids represent a valuable agricultural resource that provides Australian agriculture with organic carbon, macronutrients (nitrogen, phosphorous, potassium and sulphur) and micronutrients (copper, zinc, calcium, magnesium and zinc).[16]

9.19 Similar to wastewater, there are limited treatment options for PFAS contamination of biosolids. According to the Australia and New Zealand Biosolids Partnership, other than land application, the only alternative avenues to dispose of biosolids are landfill or incineration. Both options have limitations:

> Servicing by existing landfills is not feasible because the physical landfill capacity does not exist in Australia to accept the volume of biosolids produced.
>
> Planning and construction of thermal treatment technology would take a decade or more and will come at significant costs.
>
> Additionally, we note that methane from landfills [is] a major concern regarding reducing greenhouse gas emissions, and diverting biosolids to landfill would significantly contribute to methane emissions.[17]

9.20 Nevertheless, some wastewater treatment service providers are designing or already using thermal treatment technology to remove PFAS from biosolids.[18]

9.21 For example, the Australian Capital Territory (ACT) water and wastewater service provider, Icon Water, uses thermal treatment technology to treat biosolids and to make an 'agricultural soil conditioner called Agri-Ash':

> The heat kills pathogens and removes many contaminants of concern (such as PFAS), as well as drying out the material for more product per volume in

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[14] Australia and New Zealand Biosolids Partnership, *What are biosolids?*, 2020, What are biosolids?—Biosolids (accessed 4 February 2025).

[15] Australian Academy of Technological Sciences and Engineering, *Submission 18* (47th Parliament), p. 3.

[16] Queensland Water Directorate, *Submission 90* (47th Parliament), p. 6.

[17] Australia and New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), p. 4.

[18] Icon Water *Submission 120* (47th Parliament); Mr Paul Plowman, Executive General Manager, Water and Environment Services, Sydney Water Corporation, *Committee Hansard,* 22 January 2025, p. 22.

> a form which is easy to handle and apply. Monitoring has demonstrated effective destruction of PFAS in the solid material with heat treatment.[19]

9.22 At the committee's public hearing in Penrith, Sydney Water revealed that it is currently in the process of investing in a thermal treatment plant to better treat PFAS contamination of biosolids:

> … we're currently designing our first thermal treatment facility in north-west Sydney to take our biosolids and treat it at very high temperatures to destroy the PFAS molecules. Out of that, you get a biochar, which can be beneficially reused… but it's extremely energy intensive and very, very expensive.[20]

9.23 However, in addition to being very expensive, thermal processing may remove the 'microbial content' and 'bioavailable nutrients' within biosolids, rendering them less useful in agriculture.[21] The Australia and New Zealand Biosolids Partnership submitted:

> Biochars [biosolids that have undergone thermal processing] are a process product that is not well understood, having limited soil remediation characteristics that are better used as a base material for use in other products (such as construction products or filter media).[22]

Food organic and garden organic

9.24 PFAS contamination of FOGO waste is increasingly recognised as a concern.[23] Many local councils across Australia have FOGO kerbside collection services.[24] FOGO kerbside collections offer a way to recycle food waste into compost and reduce methane emissions from landfill. This compost can then be used in agricultural systems to increase carbon in the soil.[25]

9.25 According to the New South Wales Environmental Protection Authority (NSW EPA), common sources of PFAS contamination in household and commercial FOGO waste can include 'compostable' packaging products, as well as paper towels and cardboard products containing PFAS being placed into FOGO bins.[26]

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19 Icon Water, *Submission 120* (47th Parliament), p. 5.

20 Mr Paul Plowman, Executive General Manager, Water and Environment Services, Sydney Water Corporation, *Committee Hansard*, 22 January 2025, p. 22.

21 Australia and New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), p. 27.

22 Australia and New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), p. 27.

23 See, for example, Australian Organics Recycling Association (AORA), *Submission 42* (47th Parliament), p. 4; Local Government NSW, *Submission 34* (47th Parliament), p. 2; Australian and New Zealand Biosolids Partnership (ANZBP), *Submission 53* (47th Parliament), p. 19.

24 Local Government NSW, *Submission 34* (47th Parliament), p. 2.

25 Department of Climate Change, Energy, the Environment and Water, *Recovering organic waste?*, 16 December 2024 (accessed 5 February 2024).

26 NSW Environmental Protection Authority, *What's the GO with FOGO?*, April 2023, p. 32.

9.26 Local Government NSW submitted that wider government regulation on PFAS products is needed for FOGO waste to remain a useful recyclable product.[27]

9.27 Toxics Free Australia—a not for profit civil society network working to prevent pollution—stated that packaging, particularly cardboard and paper, creates a 'huge problem for the FOGO policy' of state and federal governments. The network was concerned that packaging containing PFAS will ultimately end up in landfill, instead of being able to be composted.[28]

9.28 Similarly, the Minderoo Foundation pointed out that even environmentally conscious consumers that are motivated to use FOGO bins 'are largely unaware that the alternative food packaging they purchase and later place in the "green" bin is ending up in landfill and potentially leaking PFAS into the earth'.[29]

9.29 Veolia has waste and resource recovery facilities that accept municipal solid waste, garden organics and combined FOGO, as well as commercially sourced waste. Veolia submitted that the:

> … ubiquitous and diffuse nature of PFAS present within consumer and food products means that, as receivers of waste material, we have very limited control over PFAS in the waste streams entering our facilities or the amount of PFAS in the resulting recycled organic outputs we produce.

As such, the continued presence of PFAS in source products limits Veolia's ability to stem the flow of PFAS into output products, like compost.[30]

9.30 The Local Government Association of Queensland recommended that the Commonwealth Government 'works collaboratively with State and Territory governments to establish and implement a nationally consistent flexible policy schedule for compost end products use dependent on PFAS limits'.[31]

Landfill

9.31 Landfill is another source of PFAS contamination.[32] Products containing PFAS that are disposed of in landfill break down over time. Consequently, PFAS can be found in landfill leachate. In some cases, this leachate can migrate out of the landfill and pollute the surrounding environment.[33]

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27 Local Government NSW, *Submission 34* (47th Parliament), p. 2.

28 Ms Jane Bremmer, Chair, Toxics Free Australia, *Committee Hansard*, 12 March, p. 9.

29 Minderoo Foundation, *Submission 115* (47th Parliament), p. 7.

30 Veolia Australia, *Submission 58* (47th Parliament), p. 3.

31 Local Government Association of Queensland, *Submission 137* (47th Parliament), p. 5.

32 CSIRO, *Submission 22* (47th Parliament), p. 7.

33 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 6.

9.32 To reduce the risk of PFAS entering the environment, state and territory governments impose regulatory guidance for disposing of known PFAS contaminated waste. These regulations are guided by the PFAS NEMP, which is discussed in greater detail later in this chapter.

9.33 Landfill owners noted regulations apply to waste that is specifically known and identified as containing PFAS, such as material removed from contaminated sites during remediation. Much less is known about the PFAS content of general household waste, including food packaging. Noting that they have 'no control over the material that society produces and disposes of', Australian Landfill Owners Association advocated that 'product manufacturers, importers and suppliers [should be made to] take ownership of the end of life management of materials they produce and supply to consumers and the economy'.[34]

Agriculture

9.34 There are several pathways in which PFAS may be introduced onto agricultural land. The first pathway is through the application of biosolids as fertiliser. The second is the presence of PFAS in ground and stock water. The third is the presence of PFAS in some pesticides. These pathways are covered in the sections below.

Application of biosolids as fertiliser on agricultural land

9.35 PFAS in biosolids spread on agricultural land as fertiliser is a risk factor for the contamination of topsoil on farming land. CSIRO noted that PFAS do not break down in the wastewater process and are 'disposed of in biosolids or discharged in wastewaters'. The subsequent land application of biosolids and irrigation with wastewater can lead to the contamination of agricultural topsoils.[35]

9.36 The Australian Academy of Technological Sciences and Engineering described the harmful impact even a small amount of PFAS contamination can have over time:

> Environmental concerns include the 'time bomb effect', which describes the delayed, yet potentially harmful, impact of using biosolids (treated sewage sludge) as fertilisers. Over time, this can lead to the gradual release of toxic heavy metals like cadmium and lead into the soil, which may accumulate and eventually contaminate the food chain. PFAS compounds also interact with soil through hydrophobic adsorption and can be taken up by plants, especially in soils with low organic carbon.[36]

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[34] Australian Landfill Owners Association, *Submission 24*, Attachment 2: ALOA, Submission on PFAS Draft NEMP version 2, p. 2.

[35] CSIRO, *Submission 22* (47th Parliament), p. 8.

[36] Australian Academy of Technological Sciences and Engineering (ATSE), *Submission 18* (47th Parliament), p. 3.

9.37 Further, studies have shown that crops grown in PFAS-contaminated soil can accumulate PFAS, 'leading to direct human exposure through dietary consumption'.[37] In addition, livestock grazing on PFAS contaminated pastures can also lead to PFAS contamination of meat, milk and eggs.[38]

9.38 Friends of the Earth raised concerns with PFAS-contaminated biosolids being permitted for agricultural use under the current national environmental management plan:

> Essentially the NEMP allows PFAS levels to be 'diluted' by mixing in soil that does not contain PFAS. I have problems accepting that farmers accepting biosolids may not be aware that they are polluting their properties with PFAS because the water authorities do not provide them with this information.[39]

Potential presence of PFAS in groundwater and stock water

9.39 The national Guidelines for Groundwater Quality Protection in Australia can be used by state and territory governments to establish their own regulatory systems.[40] However, PFAS is not referenced and recommended PFAS levels have not been specified.[41]

9.40 Some submitters expressed concern that PFAS can leach and flow into groundwater from other water sources. PFAS has been found in groundwater at numerous sites across Australia and some communities rely on bore and groundwater for drinking and household use.[42]

9.41 PFAS in groundwater can also lead to the contamination of water used for agriculture, including for livestock. When contaminated groundwater or

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37 Australian Academy of Technological Sciences and Engineering (ATSE), *Submission 18* (47th Parliament), p. 3.

38 Australian Academy of Technological Sciences and Engineering (ATSE), *Submission 18* (47th Parliament), p. 3.

39 Friends of the Earth, responses to questions taken on notice, 22 January 2025 (received 13 June 2025), [p. 2].

40 Water Quality Australia, *Groundwater quality protection* (accessed 17 July 2025).

41 Water Quality Australia, *Guidelines for groundwater quality protection in Australia: National Water Quality Management Strategy*, 2013. See also: EPA Victoria, response to written questions from Senator Thorpe (received 27 June 2025), [p. 3].

42 Dr Clarke, University of Melbourne, *Committee Hansard*, 4 June 2025, p. 61; Friends of the Earth Australia, *PFAS Chemicals in Australian Drinking Water—A Summary*, 3 May 2024; Cancer Council Australia, *Submission 62* (47th Parliament), p. 4; Friends of the Earth, *Submission 46* (47th Parliament), p. 3; EPA Victoria, response to written questions from Senator Thorpe (received 27 June 2025), [p. 2]; Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025), p. 8.

wastewater are applied to land and crops, they can leach into agricultural topsoils, resulting in PFAS entering food crops and livestock.[43]

9.42 At a hearing in Penrith, the committee heard evidence from residents of a nearby community, Richmond, which was affected by PFAS contamination emanating from the Royal Australian Air Force (RAAF) Base. Farmer, Mr Alastair McLaren, told the committee that his family ran a small farmers market business called 'Paddock to Plate'. In 2018, they discovered that one of their leased farms in Richmond was impacted by PFAS contamination from the firefighting foam used for training purposes at RAAF Base Richmond.[44]

9.43 Mr McLaren wanted his family of six to have blood tests so they would know if they had elevated levels of PFAS from eating the beef they produced. When the results were returned, he stated that the 'entire family were over the 95th percentile for PFAS' in their blood.[45]

9.44 Ms Joanna Pickford, another property owner near the Defence base, told the committee that her land was also contaminated by PFAS, which she discovered through testing her chickens, which had high levels of PFAS.[46]

9.45 Anti-PFAS advocate, Mrs Tracey Anton argued that the failure of regulators to set maximum PFAS levels for irrigation and stock water represents a 'total maladministration' of livestock raised on contaminated land and water.[47]

9.46 The Victorian EPA said it has not set limits for PFAS in stock water because livestock tend to 'eliminate PFAS much faster than humans, meaning we see fewer PFAS in the animal'. The EPA also stated that 'livestock are also exposed less frequently or have long periods of little to no exposure', and concluded that normal farming practices often minimise or reduce PFAS levels:

> Whilst developing stock water criteria is a useful precautionary screening step, any exceedances in stock water would not mean there is risk to food consumers. For this reason, at contaminated sites, it is our preference that assessments use human health risk assessments that consider the farming practices in question.[48]

Presence of PFAS in some pesticides

9.47 The committee heard differing perspectives on the presence of PFAS chemicals in pesticide products and the extent to which that may be problematic.

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43 CSIRO, *Submission 22* (47th Parliament), p. 8.

44 Mr Alastair McLaren, Private capacity, *Committee Hansard*, 22 January 2025, p. 6.

45 Mr Alastair McLaren, Private capacity, *Committee Hansard*, 22 January 2025, p. 6.

46 Ms Joanna Pickford, Private capacity, *Committee Hansard*, 22 January 2025, p. 5.

47 Mrs Tracey Anton, Private capacity, *Committee Hansard*, 4 June 2025, p. 8.

48 EPA Victoria, response to written questions on notice received 27 June 2025, [p. 4].

9.48 The committee received evidence that pesticide products used in Australia may contain a variety of chemicals that meet the definition of PFAS. Pesticides that contain PFAS are known as 'forever pesticides' due to their 'extreme persistence in the environment'.[49]

9.49 There are several ways in which PFAS chemicals may be present in pesticide products. The first is as an active ingredient. Pesticide Action Australia claimed PFAS may be included as an active ingredient in pesticides, because 'the fluorinated qualities of the chemicals make the pesticide more effective and stable'. In addition, PFAS may 'extend shelf life and provide an even coating'.[50]

9.50 Mrs Tracey Anton recommended a forensic audit of the use of PFAS-contaminated pesticides in Australian agriculture,[51] while Toxics Free Australia called for the government to 'immediately eliminate PFAS and TFA from pesticides and pesticide containers'.[52]

9.51 The Australian Pesticides and Veterinary Medicines Authority (APVMA) evaluates, registers and regulates agrochemicals, including organofluorine compounds in Australia. The APVMA stated that it has 'relied on' the United States Environmental Protection Agency (US EPA) working definition for PFAS compounds. It explained that:

> Out of more than 600 active constituents currently used in APVMA registered agricultural chemical (pesticide) products, there are 7 that meet the US EPA PFAS definition.
>
> … Out of approximately 9,700 APVMA registered agricultural chemical products, there are fewer than 10 that contain non-active ingredients that would meet the US EPA PFAS definition.[53]

9.52 The CSIRO noted that certain organofluorine compounds 'have been registered and/or approved for use as insecticides, fungicides, and herbicides in Australia (e.g. fipronil, bifenthrin, flutriafol, and trifluralin)'. While the 'half-lives of these substances are generally reported to be in months to years', CSIRO noted that, some of these substances may 'undergo abiotic/biotic degradation to release shorter chain PFAS'.[54]

9.53 CropLife Australia, which represents the innovators, developers, manufacturers, formulators and registrants of crop protection and ag-

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49 Pesticide Action Australia, *Submission 122* (47th Parliament), [p. 1].

50 Pesticide Action Australia, *Submission 122* (47th Parliament), [p. 1].

51 Tracey Anton, *Submission 128* (47th Parliament), p. 9.

52 Toxics Free Australia, *Submission 72* (47th Parliament), [p. 5].

53 Australian Pesticides and Veterinary Medicines Authority (APVMA), response to written questions on notice from Senator Thorpe (received 3 December 2024), [p. 4].

54 CSIRO, *Submission 22* (47th Parliament), p. 8.

biotechnology products, submitted that, while pesticide formulations 'may include fluorinated compounds' as part of the active ingredient or co-formulant, 'they do not meet the persistent, bio-accumulative or toxicity criteria to be called a forever chemical'.[55]

9.54 CropLife emphasised that these parts of a pesticide undergo 'thorough' and 'rigorous' risk assessment by the APVMA, which conducts 'thorough scientific hazard and risk assessments for every pesticide product to ensure that it is safe for humans, animals and the environment when used according to label instructions'.[56]

9.55 The second way that PFAS may appear in pesticide products is as an 'inert' ingredient. Pesticide Action Australia stated that, because of 'commercial secrecy, inert ingredients in pesticide formulations are not publicly disclosed, despite the dangers they may pose'.[57]

9.56 The third way in which PFAS may be present in a pesticide product is through leaching from the fluorinated container. Dr Mariann Lloyd-Smith highlighted that studies by the US EPA have shown that 'plastic pesticide containers can also leach PFAS into products'.[58]

9.57 Dr Matt Landos, Director of Future Fisheries Veterinary Service Pty Ltd, argued that Australia's regulatory regime for pesticides is less robust than systems in other countries, including the United States, Japan and the European Union:

> [APVMA] have packages of data around toxicity and around safety, efficacy and a range of other parameters that they assess when registering or permitting pesticides for use. However, some of the sensitive end points are not necessarily regulatory requirements. At the moment, we have a vast array of pesticides that have come into use and have been approved for use but have never been assessed for their endocrine disruption or their immunotoxicity end points. They remain in use and registration, but we've never sought to assess them for those parameters.[59]

9.58 Dr Landos also noted that Australia has no re-registration scheme for pesticides, with a previous scheme being repealed in July 2014. A re-registration scheme would require periodic examination (every seven to 15 years) of active constituents and products in pesticides to ensure safety, based on consideration of current science:

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55 CropLife Australia, *Submission 88* (47th Parliament), p. 3.

56 CropLife Australia, *Submission 88* (47th Parliament), p. 3.

57 Pesticide Action Australia, *Submission 122* (47th Parliament), [p. 1].

58 Dr Mariann Lloyd-Smith, *Submission 3* (47th Parliament), p. 3.

59 Dr Matt Landos, Future Fisheries Veterinary Service Pty Ltd, *Committee Hansard,* 12 March 2025, p. 4.

> In Australia, we have a system which steadfastly refuses to do that, and you can see from the problems in the APVMA's pesticide regulator that their attention to doing reviews on chemicals has been barely present at all. It left chemicals under review for more than 20 years. Not only that, they don't necessarily look for this contamination of PFAS in products. They simply make a claim that the registrant should agree that it's not to be present, and it's taken on trust that it's not present.[60]

Approaches to managing PFAS in waste streams

9.59 Evidence demonstrates that PFAS are found in a range of waste streams and agriculture. There were calls for consistent PFAS regulations across all states and territories in relation to wastewater and waste management to provide certainty to the sector.[61]

9.60 There are several approaches to managing and preventing PFAS contamination. Some approaches involve setting end of pipe guideline values for PFAS in soil, water, and biosolids. Other approaches focus on controlling PFAS at source to prevent PFAS entering waste streams.

PFAS National Environmental Management Plan

9.61 States and territories are primarily responsible for waste and pollution, and waste management policies vary between states and territories. However, the Commonwealth government plays a coordinating role in PFAS management.

9.62 A key coordinating mechanism is the PFAS NEMP which sets nationally consistent environmental standards for managing PFAS contamination.[62]

9.63 The history and status of the PFAS NEMP was discussed in the committee's interim report and its implementation is discussed in Chapter 10 of this report. This section focuses on the NEMP's environmental guideline values for soil, water and biota, and guideline limits for the disposal of PFAS contaminated waste.

Guideline values for PFAS in soils

9.64 One example of guideline values set in the PFAS NEMP is the 'human health investigation levels for soil'. The purpose of these guideline values is 'to identify the level of a contaminant that will minimise human health and ecological

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60 Dr Matt Landos, Future Fisheries Veterinary Service Pty Ltd, *Committee Hansard*, 12 March 2025, p. 4. See also: Parliament of Australia, *Agricultural and Veterinary Chemicals Legislation Amendment (Removing Re-approval and Re-registration) Bill 2014*.

61 Veolia, *Submission 58* (47th Parliament), pp. 3–4 and 6.

62 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 17.

risks'.[63] The PFAS NEMP provides similar guideline values for 'human health investigation levels' of PFAS contamination in biota and 'ecological water'.[64]

9.65 One limitation of these guideline values, identified in the *Independent review of land uses around key Defence bases impacted by per- and poly-fluoroalkyl substances* (the PFAS Independent Review), is their failure to take into consideration the uptake of PFAS by livestock, and the potential for subsequent ingestion of PFAS by humans consuming meat or other animal products.[65]

9.66 A recommendation of the PFAS Independent Review was for a national coordinating body to develop additional policy guidance:

> … to address risks associated with food production in the context of PFAS contamination', including developing new Health Investigation Levels that will inform risk assessments for the suitability of relevant land uses.[66]

9.67 In the Government's response to the review, it committed to work with the states and territories to 'consider a review of Health-based Investigation Levels relevant to land use scenarios that involve food production'.[67]

Guidance on PFAS for primary produces

9.68 There is currently little to no regulation around PFAS levels in food. The PFAS Independent review recommended a new national coordinating body work to develop 'additional policy guidance' to address 'risks associated with food production in the context of PFAS contamination'.[68]

9.69 In its response to The Independent review, the Government agreed with this recommendation and acknowledged that existing Health-Based Investigation Levels:

> … focus on the human health risks from ingestion of contaminated soils and water. They don't inform risk related to the uptake of PFAS by livestock, and the potential for subsequent ingestion of PFAS by humans consuming meat or other animal products. Relevant research is currently underway to investigate the impact of PFAS in livestock in Australia. The Government

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63 HEPA, *PFAS National Environmental Management Plan: Version 2.0*, January 2018, p. 13.

64 Department of Climate Change, Energy, the Environment and Water, *PFAS National Environmental Management Plan: Version 3.0*, 2025, pp. 50–51.

65 Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [p. 12] (accessed 10 November 2025).

66 Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination*, December 2024, [p. 12].

67 Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination*, December 2024, [p. 12].

68 Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination*, December 2024, [p. 12].

> will actively monitor the outcomes of this research to inform if additional future policy is needed to support producers. The outcomes of the research will be published. … The Government will work with states and territories through the National Environment Protection Council to consider a review of Health-based Investigation Levels relevant to land use scenarios that involve food production in the National Environment Protection (Assessment of Site Contamination) Measure 1999.[69]

9.70 The Independent review also recommended the national coordinating body prioritise developing 'additional guidance for primary producers to meet national and international standards for PFAS in food'; and appoint an independent assessor to work with Commonwealth, state, and territory authorities to identify primary producers in management areas around RAAF Base Williamtown, Swartz Barracks and RAAF Base Tindal. Government agreed, or agreed in principle, to these recommendations, stating:

> The Government will continue to respond to evolving national and international standards relating to food production and to work with state and territory governments to ensure additional guidance is provided to primary producers in areas impacted by PFAS contamination, as necessary. To date, only the European Union has established maximum levels for PFAS in meat imports.
>
> …
>
> If measures to meet European Union and other potential international standards for PFAS in foods are assessed as not being feasible to implement and residual risk exists, the Commonwealth should consider working collaboratively with state/territory and local governments to provide additional support to producers.[70]

Allowable limits of PFAS in biosolids

9.71 The current PFAS NEMP, version 3.0, was released for consultation in 2022 and adopted in 2025. The updated NEMP includes guidance values for allowable limits of PFAS in biosolids. These limits were based on the outcomes of a human health and ecological risk assessment for PFOS, PFHxS and PFOA in biosolids undertaken for the NSW EPA.[71]

9.72 Limits in the NEMP are only advisory unless integrated into state and territory regulations. Some states have already introduced their own limits for PFAS contamination in biosolids. For example, Queensland has had prescriptive

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[69] Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [p. 12].

[70] Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [p. 13].

[71] National Chemicals Working Group of HEPA, *PFAS NEMP 3.0 Supporting Document: biosolids criteria,* September 2022, p. 5.

limits on PFAS in biosolids since 2020.[72] Queensland is also leading the way in having PFAS trigger levels for finished compost products.[73]

9.73 By contrast, Toxics Free Australia called for the government to 'immediately stop the use of PFAS-contaminated biosolids being applied to agricultural lands'.[74]

Disposal of solid PFAS-contaminated waste to landfill

9.74 NEMP 3.0 provides criteria for the disposal of solid PFAS-contaminated materials to landfill.[75] The PFAS NEMP provides different acceptance criteria based on the landfill type and whether it is lined, clay/single composite lined, or double composite lined.[76]

Source control

9.75 A common argument from the waste and wastewater industries—apparent in submissions to the inquiry—was the importance of regulating PFAS at source to prevent PFAS from entering waste streams rather than relying on expensive 'end-of-pipe' solutions.[77]

9.76 The Waste Management and Resource Recovery Association emphasised that 'the ubiquitous nature of PFAS in the environment currently means that it can be difficult and costly to "manage" end-of-pipe'.[78] The Association expressed frustration that waste services are expected to monitor and test for PFAS to strict thresholds when much of the contamination is coming from 'compost products' for which there are 'no PFAS input controls'.[79]

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72 Queensland Government, *End of Waste Code Biosolids (ENEW07359617) Waste Reduction and Recycling Act 2011*, August 2024.

73 Queensland Government, *Regulatory position statement Per- and poly-fluoroalkyl substances (PFAS) in organic material processing (composting)*, March 2024.

74 Toxics Free Australia, *Submission 72* (47th Parliament), [p. 5].

75 Heads of EPA Australia and New Zealand (HEPA), *PFAS National Environmental Management Plan: Version 3.0*, 2025, pp. 138–141.

76 Heads of EPA Australia and New Zealand (HEPA), *PFAS National Environmental Management Plan: Version 3.0*, 2025, p. 141.

77 See, for example, Australian Landfill Owners Association, *Submission 24* (47th Parliament), p. 1; Waste Management and Resource Recovery Association, *Submission 40* (47th Parliament), p. 2; Veolia Australia New Zealand, *Submission 58* (47th Parliament), p. 2; JJ's Waste and Recycling, *Submission 59* (47th Parliament), p. 1.

78 'End-of-pipe' refers to methods or technologies used to treat or filter pollutants or waste after they have been generated by a process, rather than preventing pollution at its source.

79 Waste Management and Resource Recovery Association, *Submission 40* (47th Parliament), [p. 7].

9.77 The Australian Landfill Owners Association (ALOA) argued for more government action on source control:

> ALOA reiterates that we believe that EPAs and Government need to influence the producers and suppliers of significant PFAS inputs to the Australian market, rather than the current and very linear 'end of pipe' approach to policy development. Landfills (like wastewater treatment plants) have no control over the materials that society produces and disposes of (whereas Government does). [80]

9.78 Organic waste processing company, Loop Organics, submitted:

> In accordance with the waste hierarchy, the most appropriate way of managing risks from PFAS is to prevent PFAS from entering wastes and wastewater in the first place—i.e., avoidance. Phasing out and cessation of the use of these PFAS is likely to be a far more cost effective and more rapid solution compared to seeking to treat PFAS in wastewater and restrict the use of biosolids and composts and the implications for varied unintended consequences.[81]

9.79 The Australia and New Zealand Biosolids Partnership provided similar evidence, saying, 'the cost to buy PFAS is as little as $150/kg and the cost to treat PFAS in wastewater is estimated to be in the order of $4M to $25M/kg of PFAS'.[82] The Partnership therefore advocated 'source control', including:

- phasing out domestic uses of PFAS;
- imposing requirements to label products that contain PFAS; and
- greater communication on the effect of PFAS, and exposure pathways.[83]

9.80 JJ's Waste and Recycling Operation—the largest privately owned waste management company in Australia—submitted that to eliminate PFAS:

> … in waste feedstocks and recycled products such as compost, there must be a focus from government on phasing out PFAS at the source, effectively preventing contaminants being released into the environment rather than solely focusing on imposing limits for PFAS on the waste and recycling industry.[84]

9.81 Similarly, the qldwater expressed the sector's frustration that water and sewerage service providers in Queensland 'are subject to trigger values for the

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80 Australian Landfill Owners Association, *Submission 24* (47th Parliament), p. 1; see also Veolia, *Submission 58* (47th Parliament), pp. 2, 4 and 6; qldwater, *Submission 90* (47th Parliament), pp. [8–9 and 13].

81 Loop Organics, *Submission 61* (47th Parliament), p. 2.

82 Australia & New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), p. 2.

83 Australian and New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), [p. 2].

84 JJ's Waste and Recycling, *Submission 59* (47th Parliament), p. 2.

land application of biosolids for compounds derived from the community for which there are no such controls'.[85]

9.82 Local Government NSW recommended that the Commonwealth Government regulate PFAS entering Australia:

> Local governments are concerned that it will be impossible to control PFAS contamination in water, wastewater or waste management systems without restrictions on the sale, use and import of products containing PFAS.
>
> …
>
> Wider government regulation is required to restrict the use of PFAS in consumer products, with particular focus on items pertaining to food packaging and food preparation (as well as clothing, personal toiletries and cosmetics).[86]

9.83 The Waste Management and Resource Recovery Association of Australia called on the Commonwealth Government to place:

> … much tighter restrictions on what can be designed and placed on market and how it is managed, including adopting existing labelling and registration schemes such as the Classification, Labelling and Packaging (CLP) and Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) programs. These exist under the European Union (EU) Waste Directives, which monitor and manage the use of these chemicals however they also importantly provide public awareness of the presence of these chemicals in products purchased, yet Australians have no such protections.[87]

9.84 As of 1 July 2025, the import of PFOA, PFOS and PFHxS to Australia is prohibited, with limited exceptions, such as for research or laboratory purposes. However, the ban will not apply if the chemicals are unintentionally present in products at low levels.[88] Further discussion on this ban is included in Chapter 10 of this report.

9.85 The committee's views and recommendations are included in Chapter 12 of this report.

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85 Queensland Water Directorate, *Submission 90* (47th Parliament), p. 10.

86 Local Government NSW, *Submission 34* (47th Parliament), [p. 2].

87 Waste Management and Resource Recovery Association of Australia, *Submission 40* (47th Parliament), [p. 3].

88 Department of Climate Change, Energy, the Environment and Water, *Industrial Chemicals Environmental Management Standard (IChEMS): Perfluorohexanesulfonic acid (PFHxS) and related substances*, 21 July 2025 (accessed 19 August 2025).

Chapter 10
PFAS policy, regulation and coordination

Introduction

10.1 A key question for the committee in conducting this inquiry was whether the current policy and regulatory settings around PFAS are right in Australia. The committee considered a variety of evidence relating to:

- chemical assessment and regulation;
- national PFAS policy and coordination;
- adequacy, focus, and funding of data and research, and the role of research organisations; and
- potential options for phasing out PFAS.

10.2 Evidence on these matters is presented in this chapter, with the committee's views and recommendations presented in the final chapters of this report.

10.3 Evidence on drinking water policy, including standards, acceptable limits, PFAS testing and removal, is presented in Chapter 7.

Chemical assessment and regulation

10.4 The assessment and regulation of chemicals is a complex policy area. A brief outline of chemical assessment and regulation in Australia was provided in Chapter 2 of the committee's interim report, focusing on the Commonwealth's role.[1] In short, while chemicals are regulated under both state and territory and Commonwealth laws two Commonwealth Acts—the *Industrial Chemicals Act 2019* and the *Industrial Chemicals Environmental Management (Register) Act 2021*—regulate the importation and manufacture of industrial chemicals in Australia. According to the Department of Climate Change, Energy, the Environment and Water (the Department of Environment), the Industrial Chemicals Environmental Management Standard (IChEMS) was established in 2021 to 'fill a gap in the regulatory framework for chemicals and work seamlessly with the *Industrial Chemicals Act 2019* administered by the Australian Industrial Chemicals Introduction Scheme (AICIS)'.[2]

10.5 In order to have regulatory effect, the IChEMS must be adopted by Australian jurisdictions into their own regulatory frameworks. As of April 2025, three Australian jurisdictions had adopted the IChEMS (Queensland, New South Wales and Victoria); three had partially adopted it (the ACT, Tasmania and

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1 Select Committee on PFAS (per and polyfluoroalkyl substances), *Interim report*, March 2025, pp. 17–19 (accessed 10 November 2011).

2 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 7.

South Australia); while Western Australia and the Northern Territory had not adopted it yet.[3]

10.6 Neither AICIS nor the IChEMS have a role in regulating industrial chemicals where they are regulated by other Commonwealth agencies, including where PFAS chemicals are 'used in agricultural and veterinary chemical products, medicines, medical devices or foods'. These products are regulated by:

- the Therapeutic Goods Administration for medicines and their packaging;
- Australian Consumer Law in relation to other packaging, ingredients for personal care products, and cosmetics; and
- the Australian Pesticides and Veterinary Medicines Authority (APVMA) for veterinary medicines and pesticides.[4]

10.7 The *Industrial Chemicals Act 2019* is administered from within the Commonwealth Health portfolio, and the *Industrial Chemicals Environmental Management (Register) Act 2021* is administered within the Commonwealth Environment portfolio. AICIS regulates the importation and manufacture of industrial chemicals, including those found in cosmetics, cleaning products, and other consumer goods. However, AICIS *does not* regulate the products themselves. AICIS's engagement with PFAS chemicals commenced in 2002 and included international engagement, publishing alerts about the risks of PFAS, and recommending industry seeks to phase out the use of a number of PFAS chemicals. AICIS has provided advice to government, industry and the public over this time, and:

> - since 2004, AICIS has required additional information (above the standard information package) for the risk assessment of higher concern PFAS chemicals not listed on the [Australian Inventory of Industrial Chemicals];
> - in April 2024, AICIS updated the legal definition of higher concern PFAS chemicals to more precisely capture a broader class of PFAS chemicals requiring a risk assessment by AICIS before being introduced into Australia.[5]

Industrial Chemicals Environmental Management Standard (IChEMS) listing

10.8 Until 2021, there was 'no appropriate national risk management framework to manage environmental risks' from PFAS chemicals. The IChEMS was designed to 'efficiently translate environmental hazard and exposure information in AICIS risk assessments into on-the-ground risk management approaches'. After

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3 Presentation: Sonia Goldie, Director, Industrial Chemicals Environmental Management Section, Chemicals and Atmosphere Branch, IChEMS, April 2025, [p. 14] (accessed 2 October 2025).

4 AICIS, *Submission 65* (47th Parliament), p. 11.

5 Australian Industrial Chemicals Introduction Scheme (AICIS), *Submission 65* (47th Parliament), pp. 8–9.

the IChEMS was established, a number of PFAS chemicals were scheduled for risk management, drawing on information from AICIS assessments. New standards for the three groups of PFAS that are listed on the Stockholm Convention (PFOS, PFOA and PFHxS) were created in December 2023 and came into force on 1 July 2025.[6]

10.9 This ban on the import, industrial use and manufacture of a number of PFAS was enacted by listing PFOS, PFOA and PFHxS—and related chemicals—under IChEMS Schedule 7:

> Schedule 7 contains the highest risk chemicals, all uses of industrial chemicals listed in Schedule 7 should be phased out. From 1 July 2025 the industrial use of, PFOA, PFOS, and PFHxS (whether on their own or in mixtures) is prohibited except in specific circumstances.[7]

10.10 The New South Wales (NSW) Premier's Department submitted that the 'IChEMS framework will play an important role in phasing out PFAS in our everyday items to prevent future contamination in our environment'. The Department of Environment stated that the ban will 'bring Australia closer to ratifying the Stockholm Convention listings of these PFAS and support the objectives in the National PFAS Position Statement', and submitted:

> All PFAS are expected to eventually be listed on the IChEMS Register, with details of their risk to the environment and required mitigation measures. The IChEMS criteria for categorising chemicals and identifying mitigation measures provide a framework to recognise the extreme persistence of PFAS, their unknown long-term impacts on the environment, and the need for proportionate risk mitigation that aims to prevent their release into the environment.[8]

10.11 This ban applies to the import, use and manufacture of these three PFAS, and related chemicals, by Australian entities. Asked if the Schedule 7 listing would prevent the import of consumer products (known as 'articles') *containing* PFAS that have been manufactured overseas, the Department of Environment clarified that the IChEMS Register Act provides the Minister with discretion to specify one or more risk management measures:

> (a) Schedule 7 requirements (prohibition) can apply to articles if the Minister considers it appropriate.
> (b) To date all Schedule 7 decisions have specified that the import, export and manufacture of the chemical (whether on its own or in mixtures or in articles) are prohibited.

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6 Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 7.

7 Queensland Government, *Industrial Chemicals Environmental Management Standards (IChEMS),* Last reviewed: 18 Mar 2025 (accessed 27 June 2025).

8 New South Wales Premier's Department, *Submission 20* (47th Parliament), p. 8; Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 7.

(c) This means that when prohibition applies, importers cannot bring in ready-made finished products that contain the substance.
(d) All Schedule 7 decisions to date have allowed for continued use of articles that are already in the market before commencement of the standard.[9]

10.12 The ban *does* apply to products that importers may seek to import and sell in Australia. However, it does not apply to articles that are already in the market (prior to July 2025), and it does not introduce any (new) requirement for products containing PFAS to be labelled. The ban does not apply to 'personal imports'—products that are purchased from overseas by individual consumers.[10]

10.13 Ms Kate Lynch, Division Head, Circular Economy Division, Department of Environment, confirmed that there is 'currently no [general] requirement' for PFAS to be identified in product labelling (some specific kinds of products may require labelling, such as cosmetics). Mr Graeme Barden, Executive Director of AICIS, added:

> … the labelling of chemical products in the broad doesn't find a central home, so it's a little difficult for us to provide the answer, but, generally speaking, that's not required as a general rule, to my understanding.[11]

10.14 Asked to comment on 'essential uses' under the ban, the Department of Environment clarified that, while there are 'exceptions', there are no essential uses permitted for Schedule 7 chemicals:

> When making a standard, the Minister must comply with the Industrial Chemicals Environmental Management (Register) Principles 2022 (the principles). The principles set out the risk characteristics for each schedule. Section 7 of the principles require that chemicals listed in Schedule 7 do not have an essential use in Australia.[12]

Detection, disclosure and enforcement

10.15 The Schedule 7 listing of PFAS applies to articles (other than those already in the market). However, the IChEMS does not specify how Australian businesses should ensure they do not import products containing banned PFAS. Advice

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9 Department of Climate Change, Energy, the Environment and Water, Additional information sought by the Committee Secretariat—IChEMS (received 21 July 2025), [p. 1].

10 Department of Climate Change, Energy, the Environment and Water, *IChEMS General Frequently Asked Questions*, no date (accessed 3 October 2025).

11 Ms Kate Lynch, Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water; Mr Graeme Barden, Executive Director, Australian Industrial Chemicals Introduction Scheme, Department of Health and Aged Care, *Committee Hansard*, 13 November 2024, p. 12.

12 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 24 September 2025), p. 3.

provided on the department's website states that the IChEMS standards outline 'what businesses need to achieve, rather than how to achieve it', providing flexibility:

> Businesses need to ensure they have appropriate quality assurance measures in place. These could include:
>
> - specifying chemical composition in contracts
> - purchasing from countries with similar standards and/or companies with appropriate certifications
> - periodic testing and analysis.[13]

10.16 The department was asked whether it had received any self-reports from the packaging industry on PFAS in food contact packaging—a known source of PFAS in imported products. The department replied that it had not.[14]

10.17 At the committee's September hearing, Acting Division Head, Circular Economy Division, Ms Rachel Burgess clarified that the IChEMS incorporates 'minimum standards', which apply to all chemicals that are scheduled under the scheme. An aspect of these standards is that 'information must be provided but also sought'. In other words, importers are expected to ask manufactures 'to identify whether those particular substances are there or not and … make efforts to confirm' that information. However, Ms Burgess also acknowledged that there are no detection or enforcement mechanisms relating to the IChEMS listing, and there is not currently any legislation in place 'to give effect to those standards at the border':

> We are working through processes to understand and identify further methods that we could recommend to industry and that they could apply when they're importing these goods. As to how we would do it on the ground, that is certainly something we are still working through in designing the Commonwealth implementation of those standards.[15]

10.18 Ms Burgess noted that it is 'early days' for the Commonwealth in thinking and planning around how to actively implement the ban, which will be challenging. However, the Department of Environment will work with industry and 'leverage existing international regulatory frameworks' as it considers regulatory and administrative options for enforcing the ban.[16]

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13 Department of Climate Change, Energy, the Environment and Water, *Chemicals, products and articles under IChEMS: What does IChEMS mean by 'articles'?* no date, [p. 2] (accessed 2 October 2025).

14 Department of Climate Change, Energy, the Environment and Water, response to questions on notice, public hearing 5 September (received 24 September 2025), [p. 2].

15 Ms Rachel Burgess, Acting Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water, *Committee Hansard*, 5 September 2025, p. 3 and p. 17.

16 Ms Rachel Burgess, Acting Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water, *Committee Hansard*, 5 September 2025, p. 3.

10.19 Further discussion on PFAS in consumer goods is presented in Chapter 8 of this report.

Ratification of the Stockholm Convention listings for PFAS

10.20 The IChEMS listing is a critical step towards Australia's ratification of a number of amendments to the Stockholm Convention which listed PFAS chemicals, including PFOS, PFOA and PFHxS, on the Convention. Ms Burgess reported that the Department of Environment is working with the Department of Foreign Affairs and Trade to determine what additional changes need to be made to Australia's existing regulations to satisfy the requirements of ratification:

> Currently we are in conversations with colleagues across government, looking at what existing regulatory frameworks we could potentially use to give effect to those national standards. … An example of a regulatory framework that would contribute to enabling us to ratify would be leveraging things such as the existing customs regulations. That would give us the border controls that would be required.[17]

10.21 Ms Burgess said while this work is a priority, the Government has an 'ambitious' agenda in terms of legislative reform in 'the environmental space'. As such, she was unable to provide an estimated timeframe for the ratification.[18]

10.22 Committee members were interested in how the government could streamline the ratification process for the next time chemicals of concern are added to the Convention. The department submitted that:

> Adoption of IChEMS into regulatory frameworks by Commonwealth, state and territory governments, along with existing regulatory frameworks to protect public and worker health and safety, would provide the Australian Government with a systematic and repeatable method to demonstrate the fundamental provisions of the Stockholm Convention can be given effect for industrial chemicals.[19]

Views of inquiry participants

10.23 Chemistry Australia argued that Australia's chemical regulatory agencies 'are amongst the best in the world', and represent 'world's best practices, including the application of sound science at the core of regulatory decision-making'. According to Chemistry Australia, AICIS and IChEMS 'provide the regulatory tools needed to address PFAS substances'.[20] However, other inquiry participants expressed concerns about the timeliness, adequacy, and design of the PFAS

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17 Ms Rachel Burgess, Acting Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water, *Committee Hansard*, 5 September 2025, p. 13.

18 Ms Rachel Burgess, Acting Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water, *Committee Hansard*, 5 September 2025, pp. 13 is –14.

19 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 19.

20 Chemistry Australia, *Submission 101* (47th Parliament), p. 3.

listing, and made recommendations aimed at improving Australia's chemical assessment and regulation.

10.24 The Waste Management and Resource Recovery Association described the listing of a number of PFAS on the IChEMS Register as 'wholly insufficient' to stop the circulation of PFAS within Australian supply chains, particularly as Australia has 'no national program requiring all manufacturers—local and import—to report and identify hazardous chemicals within the products they produce and supply'.[21]

10.25 Similarly, the Queensland Water Directorate commented that, while the ICheMS listing is 'often acclaimed as the means to control PFAS entry into the community', and represents an important first step, it 'does not go far enough'.[22]

Timeliness

10.26 Several inquiry participants criticised the length of time it has taken for Australia to implement a ban on PFAS chemicals. Australia and New Zealand Biosolids Partnership noted that perfluorooctanesulfonic acid (PFOS) was listed in the Stockholm Convention in 2009, yet implementation of scheduling PFOS in IChEMS did not occur until mid-2025 and a number of Australian regulators still described PFAS as 'emerging contaminants'.[23]

10.27 STOP PFAS Blue Mountains submitted that the problem of PFOS contamination 'should have been dealt with [by the Commonwealth Government] back in the early 2000s', when Mr Charles Auer from the United States Environmental Protection Authority (US EPA) wrote to the Australian Government to warn it about 'the potential health and environmental impacts of PFOS':

> In his letter, Auer warned Australia about an 'important development in the US which concerns a persistent, bioaccumulative, and toxic chemical'. … The response by the Australian government was potentially negligent. No immediate warning was sent out to water companies. No immediate legislation or testing was put in place. It would be another 24 years before Sydney Water would first test our Blue Mountains drinking water for PFOS chemicals. And despite the warnings in 2000, it was not a mandatory test.[24]

10.28 Assistant Chief Fire Officer at Fire Rescue Victoria, Mr Mick Tisbury also criticised the pace of regulatory action, saying, if you look closely at the PFAS

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21 Waste Management and Resource Recovery Association, *Submission 40* (47th Parliament), [p. 4].

22 Queensland Water Directorate, *Submission 90* (47th Parliament), [pp. 9–10].

23 Australia & New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), [p. 26]; See, for instance: EPA Victoria, *Per- and polyfluoroalkyl substances (PFAS)*, updated 19 June 2025 (accessed 10 November 2025).

24 STOP PFAS Action Group, *Submission 76* (47th Parliament), p. 8.

Schedule 7 listing, it becomes apparent that those currently using PFAS-containing foam 'can keep using it', and have five years to transition.[25]

Method of regulation

10.29 Some inquiry participants criticised Australia's method of regulating potentially hazardous chemicals, including the burden of proof for evidence of harm, the quality and comprehensiveness of information provided, and Australia's approach to regulating PFAS individually, rather than as a class. Several participants also expressed concerns with industry having undue influence over the chemical regulation processes.

10.30 Inquiry participants noted that, under Australia's existing chemical regulation regime, the 'burden of proof' does not tend to fall on chemical manufacturers. Associate Professor in Analytical Chemistry and Environmental Science, University of Melbourne, Dr Bradley Clarke explained that this historical approach originated in the United States, where the burden fell on academic researchers and environmental protection authorities to 'demonstrate harm', rather than on chemical manufacturers to 'demonstrate safety'. Dr Clarke suggested chemical assessment processes should be amended so that chemical manufacturers be required to demonstrate safety before chemicals are introduced, as is the case for pharmaceuticals.[26]

10.31 Senior Research Fellow in the Faculty of Medicine and Health at the University of Sydney, Dr Nicholas Chartres, was concerned that information requirements for bringing chemicals to market in Australia may not include 'sufficient assessment of critical human health effects, across diverse populations during sensitive time periods'. According to Dr Chartres, medium- to high-risk chemicals are assessed by AICIS prior to introduction and listed on a public database. Information required to be submitted to AICIS may include 'genetic toxicity in vitro' and 'genetic toxicity in vivo', 'along with acute and repeated dose toxicity, and irritation and sensitisation studies'. However, information on carcinogenicity, toxicity to reproduction, developmental toxicity and neurotoxicity (among others) is only to be included 'if available'.[27]

10.32 Dr Chartres was also critical of Australian regulators' policies against using animal toxicology data to test the hazard characteristics of industrial chemicals, saying this is 'a deeply flawed scientific approach'. Dr Chartres said animal

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[25] Mr Mick Tisbury, Assistant Chief Fire Officer, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, p. 24.

[26] Dr Bradley Clarke, Associate Professor in Analytical Chemistry and Environmental Science, University of Melbourne, *Committee Hansard*, 4 June 2025, p. 59.

[27] Dr Nicholas Chartres, answers to written questions on notice, 22 January 2025 (received 11 February 2025), p. 1.

toxicological studies are used by authoritative bodies around the world including the United States EPA and the European Chemicals Agency.[28]

10.33 Dr Chartres recommended Australia considers adopting the Navigation Guide Evidence-to-Decision Framework for Environmental Health (UCSF EtD)—developed by Dr Chartres and colleagues at the Program on Reproductive Health and the Environment, University of California, San Francisco (UCSF)—as a way of overcoming the current:

> … lack of legal requirements for full disclosure of where chemicals are present and their potential adverse health effects, industry influence, and suboptimal methods used to capture risks from chemical exposures which do not incorporate current scientific knowledge for hazard and risk assessme.[29]

10.34 Australia generally regulates industrial chemicals individually. Some international jurisdictions have taken different approaches to phasing out the use of PFAS. Instead of prohibiting individual PFAS chemicals, they have proposed prohibiting PFAS as a *class* of chemicals. Dr Chartres explained:

> In February 2023, five European countries (Denmark, Germany, the Netherlands, Norway, and Sweden)—proposed a PFAS 'universal restriction' under the EU chemical regulation REACH. The ban would include the entire PFAS chemical 'universe', a family of >10,000 chemicals, with some 'exemptions' until alternatives can be found.[30]

10.35 Similarly, the US states of Maine and Minnesota are working to introduce bans on non-essential PFAS, with a prohibition to apply to 'products which contain intentionally added PFAS, including pesticides and soil amendments' (except in cases where PFAS is unavoidable), by 1 January 2032.[31]

10.36 Dr Chartres said banning PFAS as a *class* of chemicals could potentially allow governments to regulate all PFAS without having to provide detailed risk assessments for each one, and the case to regulate PFAS as a class of chemicals becomes 'compelling' when considering the thousands of PFAS currently in

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[28] Dr Nicholas Chartres, answers to written questions on notice, 22 January 2025 (received 11 February 2025), p. 3.

[29] Nicholas Chartres, Max T. Aung, Susan L. Norris, Courtney Cooper, Lisa A. Bero, Roger Chou, Devon C. Payne-Sturges, Wendy E. Wagner, Jessica W. Reyes, Lisa M. Askie, Daniel A. Axelrad, Deysi Flores Vigo, Jill E. Johnston, Juleen Lam, Keeve E. Nachman, Eva Rehfuess, Rachel Rothschild, Patrice Sutton, Lauren Zeise, Tracey J. Woodruff, 'Development of the Navigation Guide Evidence-to-Decision Framework for Environmental Health: Version 1.0', *Environmental Science & Technology, 59:9*, February 2025, p. 4231 (accessed 2 October 2025).

[30] Dr Nicholas Chartres, answers to written questions on notice, 22 January 2025 (received 11 February 2025), p. 8.

[31] Dr Nicholas Chartres, answers to written questions on notice, 22 January 2025 (received 11 February 2025), p. 8.

existence, and the likelihood that, if PFAS are banned individually, other PFAS will simply be brought in and used in place of those that are banned.[32]

10.37 Director of Ecology Databank Services, Dr Kate Hughes argued the risk associated with banning individual PFAS is that 'PFAS continues to be manufactured, with new chemical formulae regularly replacing older ones that are due for bans, phase out or restrictions'.[33]

10.38 Conversely, Chemistry Australia argued against 'adoption of definitions and approaches that indiscriminately capture substances based on their chemical structure alone'. In Chemistry Australia's view, banning PFAS as a class of chemicals would be 'counterproductive':

> It is widely acknowledged that the risks associated with PFAS substances are not equal. It is, therefore, neither scientifically accurate nor appropriate to group all PFAS together or take a one-size-fits-all regulatory approach. Doing so risks diverting resources to low-risk substances and increasing the complexity of regulatory activities.[34]

10.39 Environmental Risk Sciences Pty Ltd argued that Australia has 'well established Government guidance on how to undertake a human health and ecological risk assessment' and there is 'no reason for PFAS to be assessed differently to other chemicals':

> In fact, it is our experience that treating PFAS differently to other chemicals can create practical, logistical, financial and risk communication issues. These issues can outweigh any positive effects and benefits that may be gained from applying an overly cautious approach to PFAS management.[35]

10.40 The National Health and Medical Research Council (NHMRC)—a portfolio agency of the Department of Health, Disability and Aged Care—stated that Commonwealth agencies responsible for classification and regulation of chemicals have considered different approaches for grouping PFAS chemicals and have not yet agreed on an approach. NHMRC has researched different approaches undertaken by key overseas jurisdictions, including the European Union, and determined that, at this stage, there are concerns 'about the feasibility of implementing a guideline value for a PFAS sum/mixture with the current options available, given the limited health evidence available for other

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32 Dr Nicholas Chartres, Senior Research Fellow, School of Pharmacy, Faculty of Medicine and Health, University of Sydney, *Committee Hansard,* 22 January 2025, pp. 1 and 15–16.

33 Dr Kate Hughes, *Submission 89* (47th Parliament), p. 1.

34 Chemistry Australia, *Submission 101* (47th Parliament), p. 2.

35 Environmental Risk Sciences Pty Ltd, *Submission 19* (47th Parliament), p. 1.

PFAS'. A method for grouping PFAS together for regulatory purposes 'may be reconsidered should further evidence and methods become available'.[36]

10.41 Mr Barden said that AICIS 'is able to and does group chemicals together for assessment', which creates 'efficiencies', allowing AICIS to 'bring together different datasets on chemicals that have similar characteristics, and … build recommendations about risk management that can deal with those as a group'. However, Mr Barden noted that under existing laws, regulatory changes (such as restrictions) must still be enacted on a 'chemical-by-chemical basis'.[37]

10.42 Ms Burgess said that the Department of Environment groups chemicals together in relation to scheduling decisions, wherever 'possible and appropriate', but does not believe it would be appropriate to 'consider all PFAS at once'.[38]

10.43 The department expanded on this response, submitting:

> PFAS are a diverse group of chemicals that exhibit a range of structural, behavioural and functional properties. This means that their risk characteristics vary.
>
> From an environmental risk management perspective, not all PFAS would meet the requirements for listing in Schedule 7, which would prohibit their import, export, manufacture, or use.
>
> For example, the PFAS perfluorobutanesulfonic acid (PFBS), is commonly used for its water and oil repellent properties in cleaning products, waxes, polishes and surface coatings.
>
> The Commonwealth Risk Assessment for PFBS concluded that it was persistent in the environment, not bioaccumulative and not toxic under the Australian Environmental Criteria for Persistent, Bioaccumulative, and/or Toxic Chemicals. This means that under the principles, PFBS would be a schedule 4 or 5 chemical and that activities relating to PFBS would not be prohibited.[39]

Details of the IChEMS listing

10.44 Submitters raised concerns with some of the detail of the IChEMS listing for PFAS, including the current limit for 'unintentional' PFAS contamination in imported products under the Schedule 7 regulation.

10.45 The Queensland Water Directorate noted that the limit for 'unintentional' PFAS is 25 μg/kg for PFOS, PFOA, PFHxS, and suggested this is too high, considering

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[36] Department of Health and Aged Care, answers to questions taken on notice, 22 January 2025 (received 11 February 2025), [p. 3].

[37] Mr Graeme Barden, Executive Director, Australian Industrial Chemicals Introduction Scheme, Department of Health and Aged Care, *Committee Hansard*, 13 November 2025, p. 17.

[38] Ms Rachel Burgess, Acting Division Head, Circular Economy Division, Department of Climate Change, Energy, the Environment and Water, *Committee Hansard*, 5 September 2025, p. 22.

[39] Department of Climate Change, Energy, the Environment and Water, response to questions on notice, public hearing 5 September (received 24 September 2025), [p. 4].

'the trigger limits for PFOS in soil under the Queensland End of Waste Code for Biosolids of 1 μg/kg'.[40]

10.46 The Queensland Water Directorate recommended the limit for 'unintentional' PFAS contamination for imported products be set at a 'much lower concentration' and that the scheduling decision be 'extended to include other PFAS compounds'.[41]

10.47 Some suggested it may be unclear how products will be tested for PFAS under Schedule 7. Professor Stuart Khan, Head of the School of Engineering at the University of Sydney, maintained that residue testing would be critical in order to support the IChEMS scheduling:

> We must now expand IChEMS scheduling to include a much wider range of PFAS, and we must properly resource the capability for chemical residue testing in a wide range of products, including cosmetics, furniture, fabrics, food and food packaging, to support IChEMS restrictions and other risk management activities.[42]

10.48 The Environmental Defenders Office (EDO) noted that, although all states and territories have agreed to implement the requirements of the ICheMS Register in their jurisdictions, 'several jurisdictions are lagging in this commitment'. For instance, the Northern Territory and Australian Capital Territory:

> … have not yet indicated how they intend to implement ICheMS, and [Western Australia] produced draft regulations for consultation in February 2024 which have not yet been finalised. Each State and Territory must ensure that the requirements of the IChEMS Register are implemented in their respective jurisdiction. As noted above, Environment Ministers have agreed to update the PFAS National PFAS Plan to incorporate the ICheMS standards, however the Plan remains nonenforceable'.[43]

10.49 Mr Tisbury of Fire Rescue Victoria criticised exemptions under the ICheMS, including emergency uses, saying:

> Who do you reckon goes to the emergencies? It's us [firefighters]. Who are the ones who keep getting exposed? It's us, all because the industry doesn't want to change that. And they've known this.[44]

10.50 The Minderoo Foundation noted that the listing provides 'exceptions for articles already in use', saying 'this legislation will not protect Australians from

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40 Queensland Water Directorate, *Submission 90* (47th Parliament), [p. 9].

41 Queensland Water Directorate, *Submission 90* (47th Parliament), [pp. 9–10].

42 Dr Stuart Khan, Professor and Head of School, School of Civil Engineering, University of Sydney, *Committee Hansard,* 22 January 2025, p. 3.

43 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 11.

44 Mr Mick Tisbury, Assistant Chief Fire Officer, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, pp. 24–25.

exposure via items on the market containing these PFAS or the many other PFAS compounds that are unregulated'.[45]

10.51 According to the Department of Environment, regulatory adoption of IChEMS standards across all jurisdictions 'will provide comparable protections across Australia, greater consistency for business, and a national approach to dealing with chemicals agreed globally as requiring management'.[46]

10.52 The department stated that it 'expects to make standards under the IChEMS for a further 12 PFAS in the 2025–26 financial year' and it 'is reviewing legislative mechanisms to support implementation of the IChEMS standards in the Commonwealth jurisdiction'.[47]

10.53 EDO recommended that the ICheMS Register be incorporated into state and territory laws, 'including consistent enforcement provisions, civil penalty provisions for breaches and consistent frameworks for exemptions to prohibitions, restrictions and other risk management measures'.[48]

10.54 This view was echoed by Chemistry Australia, which submitted:

> … the key to strengthening Australia's chemicals management regime is improving harmonisation and uniformity amongst states, territories, and the Commonwealth. Having nine separate jurisdictions (state, territory and Commonwealth) with several separate agencies ([Work Health and Safety] and EPA) responsible for overlapping elements of chemical management and operating with different rules, requirements, priorities and focuses makes chemical management more complex and costly for the industry and hinders the delivery of outcomes for the community.[49]

10.55 Similarly, the Australian Bedding Stewardship Council recommended that governments 'align national PFAS regulations under IChEMS to ensure consistent policies across jurisdictions'.[50]

10.56 STOP PFAS Action Group recommended that AICIS be given 'more power and more resources to better manage the risk of PFAS chemicals in products', including cosmetics, and that companies should be required to test their products for PFAS.[51]

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45 Minderoo Foundation, *Submission 115* (47th Parliament), p. 6.

46 Department of Climate Change, Energy, the Environment and Water, Additional information sought by the Committee Secretariat—IChEMS (received 21 July 2025), [p. 1].

47 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 21 July 2025), [pp. 1–2].

48 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 11.

49 Chemistry Australia, *Submission 101* (47th Parliament), p. 3.

50 Australian Bedding Stewardship Council, *Submission 45* (47th Parliament), [p. 4.]

51 STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 13.

10.57 Noting that Australian companies already do not manufacture PFAS compounds, the Australian Academy of Science suggested mandatory reporting on importation, storage and use of PFAS, saying this 'could provide valuable data to inform risk assessments'.[52]

National PFAS policy and coordination

10.58 State and territory governments are responsible for day-to-day regulation of pollution prevention and contamination management. However, the Commonwealth Department of Environment sets national standards aimed at achieving 'better protection of the environment through improved management of environmental risks and achieving nationally consistent outcomes across the Commonwealth, states and territories'.[53]

10.59 The Department of Environment explained that standards and guidelines are developed which 'support those responsible for managing chemicals to apply risk proportionate mitigation measures, where necessary', and that the department works closely with states and territories to ensure these standards are implemented consistently across jurisdictions.[54]

National Environment Protection Measures

10.60 The Commonwealth government provides regulatory guidance through the *National Environmental Protection Council Act 1994* (Cth) (NEPC Act) and the National Environment Protection Council (NEPC). The NEPC has two primary functions:

- to make National Environment Protection Measures (NEPMs); and
- to assess and report on the implementation and effectiveness of NEPMs in participating jurisdictions.[55]

10.61 The Department of Environment oversees the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (ASC NEPM) which 'aims to provide adequate protection of human health and the environment where site contamination has occurred, through implementing a national approach to assessment of site contamination'.[56]

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52 Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), p. 2.

53 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), pp. 6–7.

54 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), pp. 6–7.

55 National Environment Protection Council (NEPC), *About us*, last updated November 2023 (accessed 10 November 2011).

56 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 7.

10.62 While the current version of the ASC NEPM does not include explicit guidance on PFAS, the Department of Environment explained that 'non-mandatory guidance consistent with the ASC NEPM is available in the PFAS National Environmental Management Plan' (PFAS NEMP). Commonwealth agencies, including the Department of Defence and Airservices, utilised both the ASC NEPM and the PFAS NEMP when conducting PFAS investigations and planning remediation activity.[57]

10.63 The Department of Environment submitted that existing standards and guidance for industrial chemical management, water quality and contamination management 'set a clear pathway for consistent national action to respond to PFAS, including by industry as the main users of chemicals'. The department indicated it 'works closely' with chemical regulators across the Commonwealth, and states and territories, and concluded:

> [PFAS] Interventions should be taken with the understanding that results may take many decades to achieve. Strong policy and regulatory frameworks that are fit-for-purpose, modern and align with community expectations help to protect the environment. Governance and coordination mechanisms should ensure clear oversight, accountability and consistency in decision-making, response and management of not just PFAS, but other chemicals of concern and contamination issues.[58]

10.64 The Environmental Defenders Office (EDO) recommended reform of the *National Environment Protection Measures* framework to better regulate PFAS. EDO noted that NEPMs made under the NEPC Act 'are legislative instruments which are given effect by individual legislation and guidelines in each state and territory'.[59]

10.65 Further, while NEPMs provide 'nationally agreed guidance in relation to a variety of prescribed environmental matters … there is no legal requirement to enact NEPMs into enforceable national or subnational law'.[60]

10.66 According to EDO, the ASC NEPM has been used as a guide for investigation, assessment and management of PFAS contamination on Commonwealth land, such as Defence bases and airports. However, 'uptake of the Site Contamination Policy Framework and enforceability of the ASC NEPM between jurisdictions is uneven'.[61]

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57 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 7.

58 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 10.

59 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 7.

60 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 7.

61 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 8.

10.67 EDO therefore recommended:

> In order to ensure a consistent regulatory and legislative approach, NEPMs such as the ASC NEPM must be wholly integrated into enforceable state and territory laws. This will ensure that the enforcement, mitigation and prevention of PFAS contamination is addressed evenly throughout Australia.[62]

PFAS National Environmental Management Plan

10.68 Inquiry participants expressed a range of views about national coordination of PFAS management and remediation in Australia, including the PFAS NEMP.

10.69 The complexity of dealing with PFAS contamination was acknowledged by key submitters, including leading PFAS research organisation, crcCARE:

> In Australia, the challenges are particularly pronounced from policy, risk assessment, and remediation perspectives. Currently, Australian policies regarding PFAS management are fragmented and lack comprehensive national standards. This inconsistency creates gaps in addressing contamination, leading to delays in effective risk communication and mitigation strategies.[63]

10.70 As discussed in the committee's interim report, the PFAS NEMP is Australia's national guide for managing PFAS contamination in the environment. It has been jointly developed by the Commonwealth, state, territory, and New Zealand governments through the Heads of Environmental Protection Authorities Australia and New Zealand (HEPA), to provide nationally consistent guidance.[64]

10.71 The NEMP has been updated multiple times to 'reflect new scientific evidence and guidance'. The current version—NEMP 3.0—was adopted on 10 December 2024 and includes new and additional guidance and standards on priority areas, including:

- new guideline values for investigation and risk assessment;
- guidance around remediation of contaminated land;
- guidance on re-use of resource recovery products; and
- risk-based criteria for re-use of biosolids contaminated with PFAS.[65]

10.72 The Department of Environment also noted that with respect to the management of wildlife (which is primarily the responsibility of state and territory governments and land managers), NEMP 3.0 'provides nationally

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62 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 8.

63 crcCARE, *Submission 36* (47th Parliament), p. 2.

64 Department of Climate Change, Energy, the Environment and Water, PFAS National Environmental Management Plan 3.0, last updated 4 March 2025 (accessed 27 June 2025).

65 Department of Climate Change, Energy, the Environment and Water, PFAS National Environmental Management Plan 3.0, last updated 4 March 2025.

agreed guidance for managing the impacts of PFAS contamination on matters of national environmental significance' under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*.[66]

10.73 According to EDO, the updated NEMP 'complements' the standards established under the IChEMS, which 'ban, severely restrict, or reduce the environmental impact of three PFAS along with over 500 related substances'. The NEMP 'provides a prescriptive framework for the community, environmental regulators, governments and industry to address PFAS contamination'. However, the NEMP is 'not enforceable':

> Accordingly, the National PFAS Plan affords significant discretion to decision-makers and regulators in the extent to which they implement the National PFAS Plan framework. The National PFAS Plan therefore does little to create concrete standards or enforceable mechanisms by which to hold polluters to account.[67]

10.74 Environmental consultants, Dr Matthew Askeland and Mr Andrew Mitchell were concerned that existing regulatory tools are addressing 'only three of the thousands of known PFAS' and coordination between agencies 'is limited'. They argued that 'poor coordination between regulatory agencies' causes 'inefficiencies and uneven enforcement', with the majority of 'cleanup' falling to water authorities and waste processors, who do not create PFAS contamination, but are 'left to manage it'.[68]

10.75 Toxics Free Australia criticised the NEMP as failing to address the source of PFAS pollution, saying the NEMP is 'essentially a mechanism that defines the allowable levels of PFAS pollution in our Australian environment' but does not attempt to '"turn off the tap" to this ongoing source of harm'.[69]

10.76 Section 1 of NEMP 3.0 confirms that addressing 'current use and management of PFAS-containing products and articles' is not within the scope of the NEMP. It also states that environmental regulators 'may take action to restrict and manage the use of PFAS-containing products and articles under national or their jurisdictional legislation'.[70]

10.77 Dr Askeland and Mr Mitchell contended that, while the NEMP 'has been pioneering', the latest draft 'mixes basic "PFAS 101" material with regulatory

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66 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 21 July 2025), p. 2.

67 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 9.

68 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 4.

69 Toxics Free Australia, response to written questions from Senator Thorpe (received 2 May 2025), [p. 9].

70 Heads of EPA Australia and New Zealand (HEPA), *PFAS National Environmental Management Plan Version 3.0*, 2025, p. 5 (accessed 27 June 2025).

guidance, potentially confusing end-users'. They proposed that the NEMP should 'be concise, clear, and risk-proportionate, and consider international best practices, such as adopting holistic regulatory frameworks'.[71]

10.78 Dr Wells and Professor Lea reported seeking 'regulatory information' during the conduct of their research but found the NEMP was 'severely lacking in resources pertaining to wildlife or risks to wildlife'. They also submitted that the NEMP was 'difficult to understand and interpret as a lay person'.[72]

10.79 Toxics Free Australia was concerned that the NEMP does not address the issue of airborne PFAS emissions.[73] Dr Askeland and Mr Mitchell echoed this concern, saying:

> PFAS exposure through dust, aerosols, and volatilised forms is often overlooked. PFAS can bind to dust particles, travel through the air, or volatilise under certain conditions. This contributes to both direct human exposure and broader environmental spread. For example, PFAS-contaminated dust settling on roof catchments can impact rainwater collection systems.[74]

10.80 Friends of the Earth was critical that the NEMP allows PFAS in biosolids 'to be "diluted" by mixing in soil that does not contain PFAS'.[75]

10.81 Asked how Australia is 'tracking the reduction of PFAS through various sources', the Department of Environment submitted that states and territories 'undertake the majority of environmental monitoring'. However, the government's initiative to include PFAS as an indicator in the ABS National Health Measures Survey will 'strengthen PFAS exposure'.[76]

PFAS NEMP and fresh, estuarine and marine water

10.82 Overarching environmental frameworks and measures exist to manage PFAS in rivers, lakes, groundwater, wastewater, and recycled water:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth);
- *National Environmental Protection Council Act 1994* (Cth) and related NEPM; and

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71 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 4.

72 Dr Melanie R Wells and Professor Mary-Anne Lea, *Submission 133* (47th Parliament), [p. 3].

73 Toxics Free Australia, response to written questions from Senator Thorpe (received 2 May 2025), [p. 10].

74 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 7.

75 Anthony Amis—Friends of the Earth, Response to written questions from Senator Thorpe and one question taken on notice, public hearing 4 June 2025 (received 13 June 2025), [p. 2]. See: HEPA, *PFAS National Environmental Management Plan Version 3.0*, 2025, p. 115.

76 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 24 September 2025), p. 2.

- Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination, including the *PFAS National Environmental Management Plan 3.0* (PFAS NEMP).[77]

10.83 Local regulatory tools and measures are in place to help manage PFAS contamination in water supplies in Australia, with state, territory, local governments and other stakeholders generally responsible for management of the actual water resources.[78]

10.84 The overarching National Water Quality Management Strategy is a voluntary framework, that provides nationally agreed policy, process, and guidelines on the management of water quality across all water types, for the productive and sustainable use of water for a variety of purposes, including drinking, environment, industry, recreation, cultural and spiritual purposes.[79] A range of guidelines for water quality management have been issued under the Strategy.[80]

10.85 However, there were criticisms of the water regulation framework. For example, EDO noted there is 'currently no NEPM which relates to marine, estuarine and freshwater quality'. EDO recommended the Australian Government develops 'a water quality National Environment Protection Measure to establish enforceable water quality standards, objectives and goals to protect our water systems from PFAS contamination'.[81]

10.86 The Concerned Waterways Alliance recommended the introduction of 'enforceable national limits for PFAS concentrations in soil, water, and biota to standardise management efforts across states', and the alignment of Australian

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77 For further discussion of PFAS regulation see Chapter 10. Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), pp. iv and 6–7, 14; Department of Climate Change, Energy, the Environment and Water, *PFAS National Environmental Management Plan 3.0*, 2025 (accessed 16 July 2025); Council of Australian Governments, *Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination*, [2020].

78 Water Quality Australia, Department of Agriculture and Water Resources, *Charter: National Water Quality Management Strategy*, 2018, p. 8.

79 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 15; Australian Government, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, *About the Water Quality Guidelines*, 24 June 2025 (accessed 16 July 2025); Water Quality Australia, Department of Agriculture and Water Resources, *Charter: National Water Quality Management Strategy*, 2018, pp. 4 and 8.

80 See also: *Guidelines for Managing Risks in Recreational Water* and its addendum, *Guidance on per- and poly-fluoroalkyl substances (PFAS) in recreational water*. NHMRC, *Submission 57* (47th Parliament), [pp. 1–2]; Water Quality Australia, Department of Agriculture and Water Resources, *Charter: National Water Quality Management Strategy*, 2018, p. 10; Water Quality Australia, *Guidelines for water quality management* (accessed 16 July 2025).

81 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 8.

standards with 'international best practices', such as standards adopted by the European Union and the United States Environmental Protection Authority.[82]

Views of state, territory and local governments

10.87 State, territory and local government entities that participated in the inquiry recognised PFAS contamination as a significant ongoing concern. State and local governments described supporting and participating in the NEMP, though some had concerns about the impacts of stronger regulation, including more restrictive drinking water guidelines, and the resource requirements of implementing NEMP 3.0.[83]

10.88 The Tasmanian Government submitted that implementing the revised NEMP will create 'significant challenges and costs' to Tasmania, with at least one expert needing to be hired for three years 'to develop an understanding of Tasmania's requirements in relation to the PFAS NEMP 3.0, and to commence the first stages of implementation'. Environmental Protection Authority Tasmania (EPA Tas) expects to prioritise reviewing PFAS monitoring and treatment requirements, with a view to imposing:

> … limits of PFAS in effluent/wastes being discharged to land or waters) at wastewater treatment plants and associated reuse schemes and biosolids application, and monitoring (and treatment) of PFAS levels in leachate from landfills.[84]

10.89 EPA Tas also noted that its primary legislation 'requires the EPA to regulate by individual activity/premise', meaning monitoring and reporting requirements, treatment requirements, and 'imposition of discharge limits' have to be considered individually. EPA Tas expects to apply 'a risk-based approach … in determining which activities should be addressing PFAS issues as a priority'.[85]

10.90 The Northern Territory Department of Lands, Planning and Environment (NT DLPE) submitted that state and territory governments have a role to play in supporting national PFAS initiatives, including by incorporating national guidance documents into jurisdictional management approaches, but need to be resourced to do so:

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82 Concerned Waterways Alliance, *Submission 30* (47th Parliament), [p. 6].

83 New South Wales Premier's Department, *Submission 20* (47th Parliament), p. 11; Tasmanian Government, *Submission 73* (47th Parliament), [p. 2]; Northern Territory Department of Lands, Planning and Environment, *Submission 68* (47th Parliament), p. 6.

84 Tasmanian Government, *Submission 73* (47th Parliament), [p. 2]; Environmental Protection Authority Tasmania, response to written questions from Senator Thorpe (received 1 April 2025), p. 2.

85 Environmental Protection Authority Tasmania, response to written questions from Senator Thorpe (received 1 April 2025), p. 2.

> With detailed and clear guidance from national level guidelines, jurisdictions have a firm basis to adopt more uniform measures to prevent, control and manage the risks of PFAS to human health and the environment, using their existing legislation. However adequate resourcing at jurisdictional level is necessary to drive successful outcomes.[86]

10.91 Brisbane City Council highlighted a number of issues it faces in implementing national PFAS policies, including:

- financial and resource implications
- closed landfill leachate management
- project management at parks and closed landfill sites
- regulatory and policy issues
- household waste collection, treatment and disposal
- reuse of soil contaminated with low levels of PFAS
- use of pesticide and herbicide products.[87]

10.92 The Council noted a lack of 'clear and consistent national standards', including in relation to acceptable levels of PFAS in biosolids reuse and argued there is a need to shift from addressing 'end-of-life/contamination issues towards limiting the manufacturing and importing of PFAS -containing products'. Brisbane City Council also proposed that policies be developed which acknowledge 'legacy' contamination, such as by introducing 'a reduced landfill levy when remediating public space'. Addressing these issues 'requires urgent national-level action and support'.[88]

10.93 The Tasmanian Government expressed its intention to 'work collaboratively to develop broadscale monitoring programs and policy in relation to PFAS' but said it would 'welcome Australian Government support for funding the implementation of the PFAS NEMP 3.0'.[89]

10.94 The Local Government Association of Queensland recommended Commonwealth and state governments work collaboratively with local government 'to ensure a pragmatic and phased transition approach to the introduction of any new standards relating to PFAS'. It also recommended an 'appropriate level of funding and support [be provided] to local government where increases in PFAS standards are required'.[90]

10.95 The Department of Environment submitted that the NEMP is implemented by individual jurisdictions 'under their own legislation and regulations', the

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86 Northern Territory Department of Lands, Planning and Environment, *Submission 68* (47th Parliament), p. 6.

87 Brisbane City Council, *Submission 143* (47th Parliament), cover letter.

88 Brisbane City Council, *Submission 143* (47th Parliament), cover letter and p. 1.

89 Tasmanian Government, *Submission 73* (47th Parliament), [p. 3]

90 Local Government Association of Queensland, *Submission 137* (47th Parliament), p. 17.

Commonwealth 'does not actively monitor jurisdictional implementation', and that there are 'no departmental resources dedicated to overseeing that implementation'.[91]

Views of inquiry participants

10.96 Inquiry participants acknowledged the valuable role played by the NEMP in providing national guidance for PFAS management and coordination, while making a number of suggestions for improving the NEMP and its application across jurisdictions.

10.97 Loop Organics noted that existing mechanisms, including the NEMP, allow 'thresholds [to] be determined by each states' regulatory authority', leading to 'different regulations State by State'. This is confusing for industry and consumers. Loop Organics recommended 'nationally agreed thresholds and regulations [to] provide a level playing field and greatest public confidence'.[92]

10.98 EDO recommended that the Commonwealth seeks to develop the National PFAS Plan 'into a distinct PFAS Environment Protection Measure to be created under and in accordance with the *National Environment Protection Council Act 1994*'.[93]

10.99 The Water Services Association of Australia recommended a 'collaborative approach, led by a taskforce of regulatory agencies and relevant peak industry bodies' to 'enhance coordination and information-sharing'. It suggested a new national body—Environment Protection Australia, which is being established by the Commonwealth government—'could play a key role in this effort, aligning the objectives of both the NEMP and IChEMS processes and addressing regulatory gaps'.[94]

10.100 Dr Matthew Askeland and Mr Andrew Mitchell submitted that the NEMP 'must be refined'. While initial versions 'were groundbreaking', they argued NEMP 3.0 'should undergo an independent review to ensure it is risk-proportionate, clear, and actionable':

> Separating technical "PFAS 101" information from regulatory guidance would improve usability. Better collaboration with industry and more

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91 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 21 July 2025), [p. 4].

92 Loop Organics, *Submission 61* (47th Parliament), p. 2.

93 Environmental Defenders Office, *Submission 55* (47th Parliament), p. 9.

94 Water Services Association of Australia, *Submission 56* (47th Parliament), p. 3. See also: Department of Climate Change, Energy, the Environment and Water, *EPBC Act reform*, last updated 28 February 2025 (accessed 30 June 2025).

> transparent decision-making are also needed, so PFAS is managed effectively without leaving gaps or confusion.[95]

10.101 Enviropacific suggested there is a need to 'harmonise PFAS management policies' to ensure alignment between the NEMP and IChEMS processes, and address 'regulatory gaps and variances between PFAS waste management threshold levels'.[96]

10.102 Some submitters outlined concerns that state environmental protection agencies are hampered by the Commonwealth, with one submitter arguing:

> We will only get effective PFAS contamination management if the [state] EPA is given complete independence from Government and is given the funding, resources and power to truly hold State and Commonwealth Governments, and other organisations to account. It cannot happen whilst the EPA is beholden to other Government departments. Ideally another body independent from Government should be set up.[97]

Public information, health messaging, and precautionary signage

10.103 A number of submitters proposed that PFAS contamination should be monitored and publicly reported by an independent national body.[98]

10.104 EDO also argued for 'greater transparency' around notifying communities of PFAS incidents and possible risks to human health, recommending that the government mandates 'monitoring and reporting on PFAS contaminated sites and exposure events be made publicly available, for example through the creation of a consolidated national contaminated sites register'.[99]

10.105 This recommendation was echoed by the Australian Academy of Science which proposed:

> A public PFAS exposure map, drawn from government data collected using published, consistent, methodology and data standards, would provide a clear, accurate, and nationally coordinated picture of PFAS concentrations in the Australian environment. This would be of value to lawmakers, policymakers, regulators and the general public. The map of exposure sites against environmental guideline values produced by the UK Royal Society for Chemistry is a useful model. Professor Oliver Jones at RMIT University

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95 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 7.

96 Enviropacific, *Submission 142* (47th Parliament), p. 7.

97 Name withheld, *Submission 97* (47th Parliament), [p. 5].

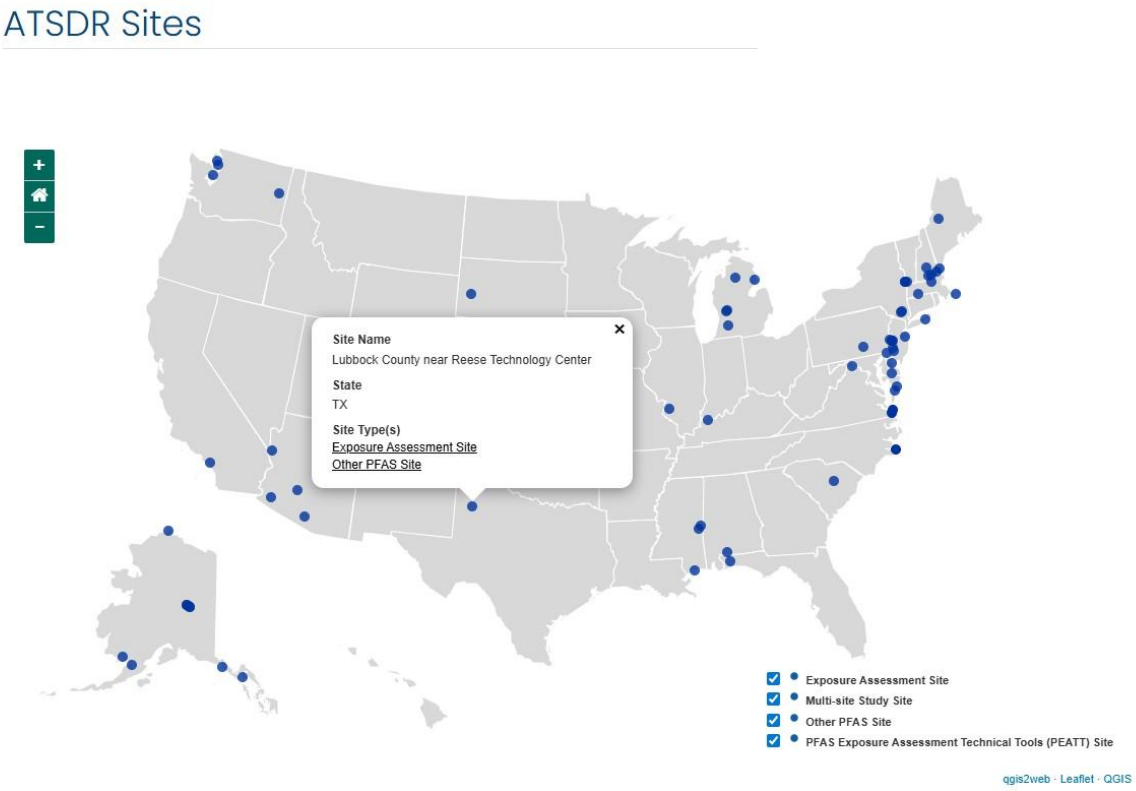
98 See, for instance: Name withheld, *Submission 97* (47th Parliament), [p. 6]; Ms Carol Stanford, *Submission 48* (47th Parliament), p. 6; Environmental Defenders Office, *Submission 55* (47th Parliament), pp. 9–10.

99 Environmental Defenders Office, *Submission 55* (47th Parliament), pp. 9–10.

has developed a similar map of this type for Victoria as part of a policy brief on PFAS management.[100]

10.106 An example is provided by the United States Agency for Toxic Substances and Disease Registry (US ATSDR), which provides an interactive map of PFAS contamination sites on its website (Figure 10.1, below).

Figure 10.1 United States Agency for Toxic Substances and Disease Registry—Map of PFAS sites



Source: United States Agency for Toxic Substances and Disease Registry, Map of PFAS sites, 12 November 2024.
Note: The map is interactive and is shown with one of the sites highlighted. A list of site names below provides links to further information about each site.

10.107 Ms Anton argued for better public health messaging:

> Currently, Australia has no trusted health agencies that provide critical sources of PFAS information to reduce PFAS exposure. We have outdated, fragmented and hard to access online information about PFAS exposures, risks and interventions. … The Australian Government's communication messaging around PFAS health risks is misleading and dangerously outdated.[101]

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[100] Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025), p. 2.

[101] Tracey Anton, *Submission 128* (47th Parliament), pp. 6 and 17–18.

10.108 Ms Anton recommended that all existing Australian government PFAS webpages be taken down and replaced with a new national website, managed by 'a national EPA', which should include:

> … a new national health and education website like the United States Government National Institute of Environmental Health Science which is constantly updated. https://www.niehs.nih.gov/health/topics/agents/pfc
>
> A workSafe health web portal to provide workers with interventions and advice to reduce their PFAS exposure.[102]

10.109 The Australian Academy of Science recommended that public health messaging about PFAS more clearly delineate between communities that are exposed and the wider community, where PFAS contamination levels are low. Professor Oliver Jones from RMIT University said:

> We want to be very careful about worrying people, because there will be people, such as firefighters and those at the Wreck Bay community, for example, who have been exposed to very high concentrations that, potentially, have a health effect. The everyday person has probably got a small—85 per cent, according to the latest data, have some PFAS in their blood—amount in them, but you don't want to worry people unnecessarily.[103]

10.110 Representatives from the Department of Defence noted that the department works to install precautionary signage around public waterways that are impacted by PFAS contamination from Defence facilities, including the Katherine River. In addition, Defence has recently undertaken work with the Victorian EPA and the Field & Game Association to install signage at the Heart Morass.[104]

PFAS Independent review and national coordinating body

10.111 The PFAS Independent review of land uses around Defence bases (Independent review) made 19 recommendations, most of which were agreed by the Government.

10.112 The Independent review recommended the establishment of a new national coordinating body. Ms Celia Perkins, Acting Associate Secretary at the Department of Defence stated that the body is being established 'with senior representation from all key portfolios, including health, environment and infrastructure, to promote a stronger and more integrated whole-of-government

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102 Tracey Anton, *Submission 128* (47th Parliament), p. 19.

103 Professor Oliver Jones, Professor of Chemistry, RMIT University, Australian Academy of Science, *Committee Hansard*, 10 June 2025, p. 14. See also: Dr Nathan Kilah, Senior Lecturer in Chemistry, University of Tasmania, Australian Academy of Science, *Committee Hansard*, 10 June 2025, pp. 12–13.

104 Ms Kathleen Leane, Assistant Secretary, PFAS Investigations and Management, Department of Defence, *Committee Hansard*, 5 September 2025, p. 19.

response to PFAS'. The Department of Defence is overseeing the PFAS national coordinating body and engaging directly with state and territory governments:

> Once established, Defence will provide Secretariat support to the National Coordinating Body and the Williamtown Working Group for the initial 12 months. The National Coordinating Body will pilot initiatives in New South Wales (NSW) in the first instance.[105]

10.113 Ms Perkins also advised that, in January 2025, Defence confirmed the 'membership and draft terms of reference' for the national coordinating body 'are now settled'. The body is expected to meet for the first time in November 2025:

> The Hon. Peter Khalil, Assistant Minister for Defence, together with New South Wales Minister for the Environment the Hon. Penny Sharpe, will provide oversight of the national coordinating body. … Members of the body will include senior officials from Commonwealth agencies, including Health, Infrastructure and [Department of Climate Change, Energy, the Environment and Water], together with senior New South Wales officials to support Minister Sharpe. Queensland and Northern Territory jurisdictions will be added over time.[106]

10.114 On 24 October 2025, the government announced that the Northern Territory and Queensland have now joined New South Wales as members of the national coordinating body, with the Northern Territory's Department of Chief Minister and Cabinet to focus on community engagement around Katherine, and Queensland's Department of Environment, Tourism, Science and Innovation to 'lead efforts to advance PFAS remediation and support communities near Swartz Army Barracks, near Oakey'.[107]

10.115 In relation to national PFAS policy and coordination, the Independent review recommended the national coordinating body:

- review the objectives of national policy for remediation of PFAS contamination to ensure they remain current;
- consider the need for further national guidance regarding planning and development in the context of historical contamination that may impact existing land uses; and

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[105] Ms Celia Perkins, Acting Associate Secretary, Department of Defence, *Committee Hansard*, 21 January 2025, p. 39; Department of Defence, response to written questions from Senator Thorpe—questions transferred from Department of Climate Change, Energy, the Environment and Water (received 17 July 2025), [p. 1].

[106] Ms Celia Perkins, Deputy Secretary, Security and Estate, Department of Defence, *Committee Hansard*, 5 September 2025, p. 2.

[107] Australian government, *Media release: PFAS National Coordinating Body Expands, 24 October 2025* (accessed 10 November 2025).

- consider the merit of providing further national guidance regarding recording contamination on property titles, including to improve consistency across jurisdictions.[108]

10.116 In its response, the Government acknowledged that 'complete removal of PFAS from the environment is not possible'. As such, remediation should aim to 'render a site acceptable and safe for long term continuation of its existing use or proposed use'. The Government outlined its intention to work with states and territories to review approaches to the assessment of site contamination in the National Environment Protection (Assessment of Site Contamination) Measure 1999 and the PFAS National Environment Management Plan, 'with a view to streamlining standards and guidance for PFAS in the environment'.[109]

10.117 The Government will also work across jurisdictions to develop national guidance to 'address situations where PFAS has migrated across jurisdictional boundaries' and to increase information-sharing about contaminated sites:

> The Government acknowledges that State/Territory and local governments control how information about PFAS contamination is recorded and communicated to property owners in their jurisdictions. … The National Coordinating Body will work with the NSW Government (as a pilot) to assess existing guidance in the NSW state and local government planning and environment frameworks. The Government will seek to identify opportunities to improve consistency and transparency in how the presence of historical contamination is communicated to potentially affected property owners.[110]

Data and research

10.118 This section considers Australian research and data collection on PFAS, including in areas such as: PFAS distribution and scale; impacts on human health; impacts on wildlife in the environment; remediation strategies and technologies; and waste management and destruction.

10.119 The CSIRO noted that while an extensive body of data and information exists, 'significant knowledge gaps' remain in relation to 'PFAS distribution and scale (i.e., waters, soils, sediments and biota)'. The CSIRO submitted there is 'likely an underestimation of the future impacts of PFAS in Australia'.[111]

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[108] Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [pp. 9–11].

[109] Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [p. 9].

[110] Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [pp. 10–11].

[111] CSIRO, *Submission 22* (47th Parliament), p. 4.

10.120 While there is research on PFAS in Australian wildlife, most of the data has been collected from deceased animals or blood samples and therefore 'lacks key health information'. CSIRO aims to close these gaps by:

> … evaluating PFAS burdens in conjunction with health and fitness measures using a systems biology and multi-omics ecotoxicology approach. This approach aims to identify major molecular pathways with a significant association to survival, reproduction and fitness.[112]

10.121 Although ad hoc data is collected by water authorities, health and environmental agencies, and academic researchers, there is currently no comprehensive data collection on levels of PFAS in humans, water, or the environment in Australia. The Australian Government has recently invested in further data collection and research, including:

- Provision of $800 000 to the Australian Bureau of Statistics to include PFAS biomarker testing in the Intergenerational Health and Mental Health Study to 'help us to understand PFAS exposure levels in the Australian population'. The main collection of samples occurred over 2022–23, with study results to be released in 2025.
- Provision of $11.7 million for health and medical research through the NHMRC Targeted Call for Research scheme to 'increase our understanding of the acute and long-term potential human health effects from PFAS exposure'. Nine grants have been awarded with research to be presented by 2025.[113]
- Provision—through the Department of Defence—of approximately $26 million in funding for 21 research and technology programs to support PFAS investigation and remediation activities, and $12.5 million to establish a National Research Program to study the potential effects of PFAS exposure on human health. Since 2018, Defence and CSIRO have been working together on a PFAS research program. The outcomes of this research are applied to remediate and manage PFAS contamination at Defence bases, and to develop better processes for construction and maintenance work where PFAS is encountered.[114]

10.122 The NHMRC clarified that, in relation to its $11.7 million Targeted Call for Research:

> Applications are investigator-initiated and therefore based on the expertise and research interests of those applying for funding. It is also important to note that grants are awarded based on competitive peer review with the best

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112 CSIRO, *Submission 22* (47th Parliament), pp. 6–7.

113 National Health and Medical Research Council, *Submission 57* (47th Parliament), p. 4.

114 Department of Defence, *Submission 66* (47th Parliament), [p. 4].

> science and most significant research proposals funded based on the available funding allocation.[115]

10.123 The NHMRC confirmed that some findings of these projects have been recently published. However, these findings 'have not contributed to NHMRC's current review [of the Australian Drinking Water Guidelines] which is considering existing guidance/guideline values and reviews from overseas jurisdictions'. NHMRC explained that findings from these studies 'would need to be peer reviewed, published and considered as part of a body of evidence rather than as individual studies if they were to be included in NHMRC guideline development processes'.[116]

10.124 crcCARE explained that the lack of a 'centralised coordination mechanism' for PFAS research in Australia means it is difficult to share data, resources and expertise:

> Contamination Research when led by crcCARE in Australia ensured a central coordinating body thus leading to breakthrough research and science underpinning many policies. It is crcCARE who developed and launched the Australian National Remediation Framework and also initiated [PFAS National Environmental Management Plan], which was later taken up by EPA Victoria and other State and Territory EPAs, including the Commonwealth.[117]

10.125 The Australia & New Zealand Biosolids Partnership advocated for more research into understanding environmental and human exposure to PFAS, recommending 'expansion from "extent" to "extent and effects"' of PFAS contamination.[118]

10.126 According to crcCARE, the 'research landscape is complex, with challenges around funding, coordination, and industry influence'. crcCARE is advocating for improved policies and innovative remediation techniques, noting that limited funding and resources 'have hindered the ability to conduct comprehensive testing and monitoring'.[119]

10.127 CSIRO submitted that funding for Australian research 'is increasing (state and federal Government departments and industry)'. This is due to:

- increased regulatory pressure;
- the potential for litigation and expensive remediation costs;
- increased community concerns and expectations;

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115 National Health and Medical Research Council, *Submission 57* (47th Parliament), p. 5.

116 Department of Health and Aged Care, response to questions on notice, public hearing 22 January 2025 (received 11 February 2025), [p. 1].

117 crcCARE, *Submission 36* (47th Parliament), p. 9.

118 Australia & New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), [p. 2].

119 crcCARE, *Submission 36* (47th Parliament), p. 5.

- increasing international obligations; and
- a 'recognition that if not managed correctly [it] will lead to large numbers of contaminated sites for future generations to manage (legacy sites).[120]

10.128 A number of submitters, including crcCARE, argued that, while industry has an important role to play in PFAS research, industry-funded studies 'often have methodological limitations or conflicts of interest' which undermine their findings. More transparency around industry-funded research, and 'rigorous conflict-of-interest guidelines' would bolster the 'integrity of the scientific evidence'.[121]

10.129 Researchers, including Professor Jochen Mueller from the Queensland Alliance for Environmental Health Sciences and Professor Denis Michael O'Carroll from the University of New South Wales noted that PFAS research is often funded through government-administered partnerships with industry, including Australian Research Council fellowships. For example, Professor O'Carroll's work on PFAS has been conducted with a number of 'industry partners', including Ixom, Orica, ARUP, Shimadzu, EnviroPacific, and Property NSW.[122]

10.130 Professor O'Carroll acknowledged that there is a 'perceived implication that working with industry is bad'. However, many government funding programs 'leverage industry funding', meaning researchers are 'encouraged to work with industry'.[123]

10.131 According to Professor O'Carroll, this relationship can cause difficulties in relation to environmental research, because it is 'unlikely that any industry wants for us to identify problems':

> An example is that in July we were on the ABC 7:30 report and the crew wanted to film us sampling. A local council denied access to public land given the perceptions. They didn't really have the power to deny access given it is public land but highlights the challenges with researchers identifying problems.[124]

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120 CSIRO, *Submission 22* (47th Parliament), p. 10.

121 crcCARE, *Submission 36* (47th Parliament), p. 10.

122 Professor Jochen Mueller, Theme Leader, Emerging Environmental Health Risks, Queensland Alliance for Environmental Health Sciences, *Committee Hansard*, 13 November 2024, p. 34; Professor Denis O'Carroll, response to written question from Senator Thorpe (received 14 November 2024), p. 1.

123 Professor Denis O'Carroll, response to written question from Senator Thorpe (received 14 November 2024), p. 1.

124 Professor Denis O'Carroll, response to written question from Senator Thorpe (received 14 November 2024), p. 1.

10.132 It was Professor O'Carroll's view that more government funding 'would be helpful' and this funding should not be 'tied to industry'.[125]

10.133 The committee heard evidence that complex research ethics approval requirements across Australian states and territories is contributing to the slow pace of research on PFAS and human health in Australia. Professor Deborah Glass submitted that progress on her research into the impacts of heavy PFAS exposure on firefighters has been hampered by complex and convoluted ethics approval processes, involving the need to gain approval from multiple state-based ethics committees. She described the process as 'cumbersome, repetitive and time-consuming'.[126]

10.134 Professor Glass recommended the following changes to the ethics approval process:

> Researchers doing national studies should be able to make a single application via a single portal. The research would be allocated, to any one of the [Human Research Ethics Committees (HRECs)]. The approval of that HREC should be then nationally accepted without further paperwork. Data custodians should accept that HRECs have properly considered data privacy. Annual reporting could similarly be to one HREC.[127]

Role of research organisations

10.135 Due to the complex and technical nature of the PFAS problem, scientific, engineering, and medical research organisations have a sizeable role to play in the development of public policy and regulatory frameworks. Relevant submitters highlighted their willingness to contribute to these processes and made suggestions for how governments can utilise their expertise.

10.136 CSIRO submitted that it 'recognises the scale of the problem, and the urgent need to prioritise and act so Australians and their environments can be safe'. While the CSIRO 'does not have a role with establishing or operationalising federal or state regulatory frameworks', it acknowledged that it can 'contribute appropriate science outcomes' to 'underpin their establishment and revision':

> We partner across the breadth of regulatory agencies, industry and community groups to understand and fill knowledge gaps and advance technologies that would assist with defining, prioritising and controlling risks from chemicals such as PFAS.[128]

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[125] Professor Denis O'Carroll, response to written question from Senator Thorpe (received 14 November 2024), p. 1.

[126] Professor Deborah Glass, *Submission 21* (47th Parliament), [p. 3].

[127] Professor Deborah Glass, *Submission 21* (47th Parliament), [p. 3].

[128] CSIRO, *Submission 22* (47th Parliament), pp. 4 and 14.

10.137 The CSIRO noted that an 'extensive body of data and information' already exists in Australia—some of it public and some of it 'non-disclosed'—and suggested that:

> Accelerating the integration and mapping of this data would enhance our understanding of PFAS distribution and scale across Australia, enable robust human and environmental risk assessments, and make informed and effective management decisions at local and regional scales.[129]

10.138 Some submitters advocated for Australia to work more collaboratively with international agencies in sharing research and developing regulation. STOP PFAS Blue Mountains was concerned that Australia's NHMRC did not approach the US EPA in conducting its recent review of safe PFAS levels in Australian drinking water, noting that the US EPA used 'the best available peer-reviewed science'.[130]

10.139 Dr Ravi Naidu, Managing Director and CEO of crcCARE explained that he initiated a PFAS International Symposium in 2015, which brings together international researchers to discuss evidence, 'policies, and what more we need to do'. The symposium—held once every two years—'leads to a white paper or a research paper that identifies gaps'. The next symposium is due to be held in 2026.[131]

Views of inquiry participants

10.140 crcCARE suggested 'current weaknesses' of the national approach include 'lack of [a] cohesive national strategy and insufficient research funding dedicated to PFAS Management'. To address these gaps, crcCARE recommended governments partner with research organisations to develop 'unified regulatory frameworks, enhance stakeholder engagement, and promote research into sustainable remediation technologies'.[132]

10.141 CSIRO submitted that there is an opportunity for further investment in research and development, 'linking agencies across Australia to address priority concerns', and increasing the focus on longitudinal research. An integrated, scaled investment program would 'greatly advance solutions to the PFAS challenge facing Australia'.[133]

10.142 Loop Organics suggested that, before commencing new PFAS research, existing state, territory and Commonwealth data should be consolidated 'at a national level', and consideration should be given to 'making PFAS data

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129 CSIRO, *Submission 22* (47th Parliament), p. 4.

130 STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 14.

131 Dr Ravi Naidu, Managing Director and CEO, crcCARE, *Committee Hansard*, 10 June 2025, p. 32.

132 crcCARE, *Submission 36* (47th Parliament), p. 2.

133 CSIRO, *Submission 22* (47th Parliament), p. 10.

available as open source, where possible to promote transparency, better research outcomes and improve public confidence'.[134]

10.143 Dr Askeland and Mr Mitchell argued that 'Australia needs to move toward an approach that accounts for cumulative risks, supported by broader toxicological research'. In addition, they suggested addressing the issue of airborne PFAS contamination, saying:

> … we need baseline data on PFAS in indoor and outdoor air, a better understanding of volatilisation and aerosolization conditions, and assessments of health risks from inhalation or dermal contact. Identifying and controlling these airborne pathways would broaden our capacity to reduce PFAS exposure. [135]

10.144 Australia & New Zealand Biosolids Partnership recommended future research design incorporates 'appropriate control trials', and that agricultural research is better coordinated 'with more centralised guidance'.[136]

10.145 crcCARE contended that continued investment in research and development 'is essential to ensure public health, environmental protection, and safeguard cultural and economic values'. It recommended that Australia maintains 'its commitment to PFAS research until the community feels safe and has confidence in science surrounding PFAS management'.[137]

10.146 Water treatment technology company SciDev Limited encouraged approaches which promote industry collaboration and innovation, recommending that the government establishes 'an interdisciplinary joint council comprising regulators, industry experts, and researchers to evaluate PFAS treatment technologies', and creates an Australian 'repository of PFAS data and technology evaluations', as has been done in the United States and Europe.[138]

10.147 Inquiry participants also noted the need for dedicated research into the impacts of PFAS on First Nations communities. crcCARE recommended more culturally sensitive approaches to engaging with First Nations communities in research studies.[139] In addition, Managing Director and CEO, Dr Ravi Naidu said there needs to be more research conducted to understand unique impacts on specific cohorts of people, including Indigenous Australians.[140]

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134 Loop Organics, *Submission 61* (47th Parliament), p. 3.

135 Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 4.

136 Australia & New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), [p. 2].

137 crcCARE, *Submission 36* (47th Parliament), p. 23.

138 SciDev Limited, *Submission 41* (47th Parliament), p. 7.

139 crcCARE, *Submission 36* (47th Parliament), p. 10.

140 Dr Ravi Naidu, Managing Director and CEO, crcCARE, *Committee Hansard*, 10 June 2025, p. 35.

10.148 The National Aboriginal Community Controlled Health Organisation (NACCHO) observed a 'critical lack of disaggregated, site-specific data on PFAS contamination in Aboriginal and Torres Strait Islander communities', saying:

> Many communities are located near Defence bases, airports, and industrial sites, which are known PFAS hotspots. Monitoring is inconsistent and often excludes culturally significant sites.
>
> The Australian PFAS Chemicals Map shows contamination hotspots, but it is not comprehensive and lacks consistent data for many Indigenous lands. National testing programs often exclude smaller water providers, which disproportionately affects remote Aboriginal and Torres Strait Islander communities.[141]

10.149 In line with Priority Reform 4 of the National Agreement on Closing the Gap (promoting Indigenous data sovereignty), NACCHO recommended the Government 'embed Aboriginal and Torres Strait Islander governance in environmental health research to support self-determination, community-led decisions, and culturally safe data practice'.[142]

Potential options for phasing out PFAS in Australia

10.150 Many inquiry participants recommended phasing out, or banning the use of, PFAS in Australia. However, not all submitters agreed with a blanket ban. This section considers options for phasing out PFAS in Australia, including how any such ban could be implemented.[143]

10.151 Many submitters, including water utilities, scientific bodies, and state and local government groups, highlighted the benefits of addressing PFAS at the source, rather than attempting to remediate contamination once it is in the environment. The Australia & New Zealand Biosolids Partnership advocated for 'root-cause source control' of PFAS chemicals, noting it is cheaper to prevent PFAS entering the environment than it is to clean it up. It recommended:

- Bans on industrial use,
- A phasing out of domestic use,
- A requirement for labelling of products that contain PFAS (such as makeup, insecticides, clothing, non-stick pans, and food packaging etc),
- A need to communicate proportionately the effect of PFAS, and the exposure pathways, because the mention of PFAS—which is

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141 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 9.

142 National Aboriginal Community Controlled Health Organisation, *Submission 17* (48th Parliament), p. 3.

143 See, for instance: Louise Keats, *Submission 109* (47th Parliament), [p. 6]; Australia & New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), [p. 2]; WWFA—Australia and AMCS, *Submission 54* (47th Parliament), p. 2; Minderoo Foundation, *Submission 115* (47th Parliament), p. 6; CSIRO, *Submission 22* (47th Parliament), p. 14.

> ubiquitous—creates an emotive response. Communication should be informed by research and build an understanding of risk and exposure.[144]

10.152 CSIRO reported on 'increasing calls' to regulate or phase out PFAS internationally:

> The European Chemicals Agency (ECHA) is currently evaluating a submission by European Union (EU) Countries (Germany, Denmark, the Netherlands, Norway, and Sweden) to restrict the 'manufacture, placing on the market, and use of PFAS' in Europe. The persistent organic pollutants regulation in the EU restricts the use of PFOS, PFOA, PFHxS and related compounds. The EU REACH list of Substances of Very High Concern included other PFAS chemicals (e.g., PFHpA, PFBS), as having probable serious effects to human health and the environment, to be replaced with safer alternatives. ... The USA has initiated or is considering numerous bills or restriction on PFAS manufacture and use to protect human and environmental health. In 2021, Maine was the first US state to bring into law a phase out of the sale and use of products containing intentionally added PFAS by 2030, except for 'currently unavoidable' uses. The law was modified in 2024 to a phase out of products by 2032 and ban of PFAS in key products such as cookware, textiles, children's products, cosmetics, and menstrual products by 2026 instead of 2030, and in artificial turf, outside apparel for extreme weather conditions and fluorinated containers by 2029. Minnesota state has since introduced in 2023 a law to restrict the uses of PFAS by 2032, ban PFAS in products such as cookware, dental floss, and menstrual products by 2025, and require companies to disclose if they are using PFAS in any product.[145]

10.153 The Minderoo Foundation provided further international examples:

- In 2020 Denmark implemented a ban on the use of PFAS in paper-, board based and cellulose-based packaging.
- In January 2024 New Zealand announced a ban on the use of PFAS in cosmetic products from the end of 2026.
- In April 2024 the US the U.S. House of Representatives introduced 'the Forever Chemical Regulation and Accountability Act of 2024', a proposal to phase out all non-essential uses of PFAS in ten years.
- In August 2024 Canada announced a precautionary, group-based objective for drinking water, establishing limits based on a sum of 25 PFAS.
- For 2025: The European Union (EU) has committed to extending its phase out of PFAS, moving from restricting select subgroups towards a complete ban on PFAS in consumer products (aside from specific industrial applications of PFAS where no viable substitutes are available and the chemicals are deemed critical for health or technology).[146]

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144 Australia & New Zealand Biosolids Partnership, *Submission 53* (47th Parliament), [pp. 1–2].

145 CSIRO, *Submission 22* (47th Parliament), pp. 13–14.

146 Minderoo Foundation, *Submission 115* (47th Parliament), p. 6.

10.154 In light of these international developments, CSIRO suggested Australian governments could consider imposing restrictions or a phase out of 'some PFAS in products, especially in textiles, clothes, cooking utensils, and cosmetics to reduce human exposure and accumulation into the environment'. It noted that many of these products can be 'readily replaced while maintaining desired properties'.[147]

10.155 However, the CSIRO acknowledged that replacing PFAS in some products will be more complex and potentially more expensive if there is no readily available and safe replacement. CSIRO also cautioned against substitutions where PFAS are 'substituted for another PFAS or potentially hazardous chemical'.[148]

10.156 The Local Government Association of Queensland reported that, in 2024, Queensland councils passed a resolution calling on state and Commonwealth governments to 'ban the importation and use of products containing PFAS-group chemicals by the end of 2026'.[149]

10.157 Mr Tisbury argued that 'the time for talk is over'. He noted that it has been 25 years since the National Industrial Chemicals Notification and Assessment Scheme (now AICIS) began providing information about potential risks of PFAS:

> That's a quarter of a century that governments of all descriptions and regulators have known that this stuff is dangerous. A quarter of a century later, we're still having the same conversations. The time for talk is over. We've got a lot of solutions that we're happy to share. We've done a lot of work at the UN, but Australia still hasn't ratified the Stockholm convention on those three PFAS. Currently, here in Victoria, contrary to some beliefs, there is no federal ban on the use of PFAS-containing firefighting foam. There is no legislation in Victoria banning the use of firefighting foam containing PFAS. We have done that in spite of the regulators.[150]

10.158 The United Firefighters Union of Australia noted that PFAS-containing foams are still being used in a number of contexts and argued for an urgent and comprehensive ban on all firefighting foams containing PFAS in Australia, including by 'private sector entities, major hazard facilities and B Class foam extinguishers in Australia'.[151]

10.159 Dr Askeland and Mr Mitchell recommended phasing out 'non-essential PFAS uses' and mandating 'full disclosure of PFAS content', while tightening import

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147 CSIRO, *Submission 22* (47th Parliament), p. 14.

148 CSIRO, *Submission 22* (47th Parliament), p. 14.

149 Local Government Association of Queensland, *Submission 137* (47th Parliament), p. 4.

150 Mr Mick Tisbury, Assistant Chief Fire Officer, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, p. 17.

151 United Firefighters Union of Australia, *Submission 104* (47th Parliament), p. 5.

restrictions. STOP PFAS Blue Mountains recommended Australia adopts 'any restrictions or bans placed on PFAS in the [European Union (EU)]' and align Australia with the EU's approach to minimising the use of PFAS chemicals.[152]

10.160 World Wide Fund for Nature-Australia (WWF-Australia) and the Australian Marine Conservation Society (AMCS) recommended that the Commonwealth Government 'immediately implement bans on PFAS intentionally added to food packaging materials and consumer goods, as well as requiring that all products designed for organic disposal be certified as PFAS free'.[153]

10.161 Conversely, Chemistry Australia argued against a blanket ban, saying:

> PFAS materials are critical to numerous life-saving medical devices, technologies and medicines. Many advanced military, electronics, computing, aerospace and aviation technologies and safety systems rely on PFAS substances. PFAS substances will also play a crucial role in the energy transition, including solar cells, electric vehicles, wind turbines, and membrane technologies used to produce green hydrogen via electrolysis.[154]

10.162 Professor O'Carroll also recommended caution, saying 'some PFAS [are used] in drugs at very low concentrations and for human health'. While these uses are not widespread, Professor O'Carroll argued they are essential:

> A blanket ban might be a concern. I think I said earlier: what's the low-hanging fruit? Where are the easy wins to remove PFAS from the environment, from our wastewater treatment plants and from our landfills? We then can target those in the first instance.[155]

10.163 In response to calls to ban PFAS, the Department of Environment submitted that interventions on PFAS must be informed by evidence, be proportionate to the risk, pragmatic, and 'make efficient and effective use of available resources'. The department also expressed concern that an immediate ban on PFAS may lead to unintended consequences:

> The wide range of uses of PFAS in the modern economy, including in products and goods that most Australians rely on in daily life, means that immediate bans on all PFAS would have far-reaching socio-economic impacts. We do not yet fully understand the alternative chemicals that may replace the large numbers of PFAS. There is a risk of regrettable substitution, which occurs when a chemical of unknown or unforeseen (potentially greater) risk to the environment is used to replace a banned substance. More

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[152] Dr Matthew Askeland and Mr Andrew Mitchell, *Submission 60* (47th Parliament), p. 6; STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 19.

[153] WWFA—Australia and AMCS, *Submission 54* (47th Parliament), p. 2.

[154] Chemistry Australia, *Submission 101* (47th Parliament), p. 2.

[155] Professor Denis Michael O'Carroll, Professor, University of New South Wales, *Committee Hansard*, 13 November 2024, p. 22.

> information is needed to ensure we avoid adverse outcomes as PFAS are phased out.[156]

10.164 The Department of Environment argued that PFAS is a 'shared global problem' and international engagement is important 'to achieve desired policy outcomes for PFAS in Australia'. It was the department's view that tighter restrictions in Europe and the United States will 'help drive innovation for safer alternatives', which will benefit Australia over the long term. The department also acknowledged the need for Australia to 'keep pace with the evolving regulatory landscape internationally to avoid becoming a dumping ground for goods containing high concern PFAS'.[157]

10.165 Professor O'Carroll similarly noted that, with PFAS-containing firefighting foams banned in the European Union, there is a risk that manufacturers 'have no market for this product [and] we may end up as a dumping ground'.[158]

10.166 The Minderoo Foundation argued that a ban on PFAS can be successfully introduced while allowing for some genuinely 'essential uses':

> Minderoo and other international scientific experts agree that phasing out all PFAS as a chemical class is justifiable on the basis of their high persistence. This will be a more effective approach than managing PFAS one compound at a time. It makes sense given their structural similarity and that the precautionary principal would be upheld. Exceptions to bans should only be made in rare 'essential use' applications where no alternatives exist and PFAS compounds are used in controlled and closed environments with insignificant risk for environmental leakage or human exposure.[159]

10.167 Dr Hughes submitted that Australia's reluctance to act on PFAS risks repeating the 'mistakes of the past', where first-generation persistent organic pollutants (POPs)—including dichlorodiphenyltrichloroethane (DDT), dieldrin and chlordane—were not banned for decades 'due to massive pressure from chemical companies and lack of sufficient scientific evidence to convince politicians of the need to ban them or restrict their use':

> Australia was among the last countries to ban these POPs resulting in widespread contamination of people's homes, gardens and public spaces. Agricultural lands and sediments were contaminated, as were many animal species, including humans. The health impacts of these ubiquitous contaminants were significant, and they were finally (well almost) banned. Bans and restrictions on other POPs followed during the ensuing years but

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156 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 9.

157 Department of Climate Change, Energy, the Environment and Water, *Submission 33* (47th Parliament), p. 9.

158 Professor Denis Michael O'Carroll, Professor, University of New South Wales, *Committee Hansard*, 13 November 2024, p. 23.

159 Minderoo Foundation, *Submission 115* (47th Parliament), p. 6.

> regulation was, and remains, a cumbersome, highly politicised process and one that must not be repeated.[160]

10.168 The committee's views and recommendations are outlined in the next chapters.

[160] STOP PFAS Blue Mountains, *Submission 76* (47th Parliament), p. 14.

Part 2
Committee views and recommendations

Chapter 11
Committee views on health and related issues

Introduction

11.1 PFAS represents a wicked problem for Australian governments, including the Commonwealth. While PFAS chemicals have never been manufactured in Australia, products containing PFAS have been ubiquitous across the economy, with some used heavily before, and even after they were known to be hazardous to the environment and living things.

11.2 A number of PFAS variants—including PFOS (perfluorooctane sulfonic acid), PFOA (perfluorooctanoic acid) and PFHxS (perfluorohexane sulfonic acid)—are now present in almost every part of the environment and almost every human being on earth, albeit generally at low levels.

11.3 An ever-expanding body of international research warns that these, and potentially other, PFAS can act as endocrine disrupters, impacting hormones, reproductive health, and the immune systems of living organisms—including human beings. At least one PFAS—PFOA—has now been classified as carcinogenic by an international cancer body, and PFOS has been listed as potentially carcinogenic.

11.4 While scientific evidence around the health impacts of these chemicals continues to grow, more research—particularly around long-term impacts—remains to be done and, in Australia, debate continues as to the significance of any human health effects.

11.5 Throughout the inquiry, the committee heard from regulators, scientific bodies, academics, doctors, and toxicologists from Australia and overseas jurisdictions. There were differing views and interpretations among scientists and organisations, showing that reasonable people exposed to all sides of the argument may reach different conclusions. Indeed, members of the committee hold differing views and perspectives on the evidence received, making it difficult to reach consensus on these matters.

11.6 This chapter summarises the debate around PFAS and human health, presenting the committee's views on the evidence it has heard throughout the inquiry and drawing conclusions where possible. The next chapter provides the committee's analysis of evidence across other policy areas, including remediation, technology and national regulation.

11.7 Across these two chapters, where a majority of committee members could agree, the committee has drawn conclusions and made recommendations. Where consensus could not be reached, matters have been addressed by individual senators in their additional comments.

Current state of the science on the health effects of PFAS

11.8 Much of the evidence received by the committee spoke to the difficulties in establishing a conclusive causal link between PFAS exposure and adverse health effects, and the different lines of evidence required to establish such a link. Two lines of evidence on which the committee received information were epidemiological studies and experiments on laboratory animals; this evidence is considered below.

Epidemiological studies and experiments on laboratory animals

11.9 Epidemiological studies, particularly randomized controlled trials, are often considered the 'gold standard' for informing health policy.

11.10 The committee heard that there are significant challenges to conducting epidemiological studies on the health impacts of chemicals like PFAS. Epidemiological studies are typically conducted with a large population group of around 50 000 people over long timeframes. However, inquiry participants identified several complicating factors when attempting to use these types of studies for determining the health effects of PFAS exposure:

- First, epidemiological studies have to account for a range of other factors contributing to disease, such as lifestyle, diet, family history, smoking, and alcohol consumption.
- Second, adverse health effects from PFAS may occur long after exposure. This means the studies need to be very long-term. It also means adverse health effects may be occurring and even perpetuated long before scientific studies can conclusively identify them as causally related.
- Third, because epidemiological studies are observational studies, scientists can only really draw associations, not causations, about the relationship between exposure to PFAS and health effects.
- Fourth, while most of the population may have chronic low exposure to PFAS, a much smaller cohort has high exposure. Epidemiology is less useful for finding answers from small cohorts of people because minor random variations can easily alter the findings and affect the conclusions.
- Fifth, studies need to be replicable, and therefore robust results are generally drawn from multiple studies producing similar findings. This is a time-consuming and resource-intensive process and one for which, the committee was told, the appropriate funding pathways in Australia do not currently exist.

11.11 With a shortage of large-scale epidemiological studies on PFAS, scientists have often relied on findings from experiments on laboratory animals, and observations from smaller-scale studies.

11.12 Animal studies also have limitations. Animal studies tend to give short-lived laboratory animals larger doses in expectation of a quicker effect. Therefore, many animal studies try to compare a higher dose given to an animal over a

year with a much lower dose experienced by people over decades. In addition, humans and animals react differently to PFAS, and not all effects observed in animals may occur in humans.

11.13 Nevertheless, the weight of evidence has swayed some of the world's regulators to impose tight restrictions on PFAS chemicals, seeking to phase out their use to protect the environment and human health. Further, an eminent international body—the International Agency for Research on Cancer (IARC) at the World Health Organization—has now decided there is sufficient evidence to classify PFOA as carcinogenic, and PFOS as possibly carcinogenic.

Commonwealth government agencies' position and Guidance Statement

11.14 In evidence to the committee, the general position of Commonwealth government agencies, as well as the reviews that they rely on for formulating their health advice, is that there is no current evidence that supports a large impact on a person's health, even as a result of high levels of PFAS exposure, and that the health differences between people who have the highest exposure to PFAS and those who have had low exposure are generally small.

11.15 The enHealth guidance statement on PFAS represents Australia's official position on the health impacts of PFAS. enHealth states that the effects of PFAS exposure have generally been small and are unlikely to be important to health outcomes. It also states that a causative relationship between health effects and PFAS exposure has not been established to date.

11.16 The enHealth statement, as revised in 2024, draws on the Australian National University (ANU) PFAS Health Study, which was funded by the Commonwealth and included voluntary blood testing in three communities.

11.17 This study found elevated blood serum concentrations of PFAS and clear evidence of psychological distress in impacted communities, along with elevated cholesterol levels. It noted a number of other associations, including increased levels of uric acid, reduced kidney function, and lower birth weight in babies. However, evidence of these other adverse health impacts was either inconsistent across communities, or not strong enough to establish a clear connection to PFAS exposure.

11.18 The committee acknowledges that the ANU study provided limited evidence of adverse health outcomes. However, the committee notes the study's authors said it was not designed to investigate whether PFAS *cause* health effects, as that would require investigation of people over time (and the ANU study was point-in-time).

11.19 Other evidence that contributed to the 2024 revision of the enHealth statement included the 27th Australian total diet study, discussed in Chapter 2 of this report.

11.20 Based on its review of the science, enHealth determined that the health impacts of PFAS are likely to be small. enHealth also stated that specific health and disease screening, other health interventions, and lifestyle modifications are unnecessary, even for highly exposed groups in Australia.

11.21 For example, while the enHealth statement advises pregnant women to minimise their exposure to PFAS as a precaution, enHealth does not recommend that mothers living in or around sites contaminated with PFAS cease breast feeding.

11.22 The statement does, however, acknowledge that local authorities have advised people in certain locations to limit consumption of PFAS-contaminated water, home-grown produce, home-produced livestock, and locally harvested food such as fish, to reduce PFAS exposure.

Other perspectives on the scientific evidence

11.23 The committee received submissions and witness testimony that challenged the position of Commonwealth government agencies on the inconclusive nature of the scientific evidence regarding the health effects of PFAS.

11.24 Several inquiry participants argued that sufficient evidence already exists to indicate with reasonable scientific certainty that PFAS exposure—probably even at low levels, but certainly at high levels—has adverse health effects in humans. This included respected scientists from Australia, the United States and Denmark who gave evidence before the committee.

11.25 Scientists including Dr Nicholas Chartres and Professor Philippe Grandjean, along with United States Attorney, Mr Robert Billot, argued that the dangers of PFAS were known to the manufacturers for decades, but the research was suppressed. It was the view of these and other scientists that there is a growing international consensus on the dangers of PFAS to human health.

11.26 American toxicologist, Ms Jamie DeWitt pointed to studies which have found that PFOA suppresses immune responses, and others that provide strong evidence for a connection with kidney and testicular cancer, among other effects. Ms DeWitt argued that, when looked at together, the existing evidence from animal and human studies overwhelmingly supports that PFAS are hazardous to human health.

11.27 Several scientists pointed out that PFAS compounds are transferred to the foetus through the placenta, meaning the foetus is exposed to PFAS when its organs are developing. The committee was told that developmental defects have been documented in the children of women with high levels of PFAS exposure.

11.28 While it took a comparatively conservative view of the risks of PFAS as a cancer-causing agent overall, the Cancer Council Australia agreed that PFOA is implicated in causing testicular cancer and renal cancer in humans.

Views on safe levels of PFAS

11.29 Inquiry participants also discussed what may reasonably be deemed to be safe levels of PFAS exposure in humans.

11.30 The Health Based Guidance Values for PFAS, developed by Food Standards Australia New Zealand (FSANZ), provide tolerable daily intakes for PFOS, PFOA and PFHxS.

11.31 Commonwealth health agencies state that PFAS levels in the general food supply are well below Australian guidance values and there are no concerns from overall dietary exposure for the general Australian population.

11.32 Commonwealth health authorities argue it is extremely unlikely that specific foods consumed over a period would all be sourced from a contaminated site. Indeed, the assumption underlying the tolerable daily intakes for the general population is that, for example, meat from contaminated livestock would be distributed widely into the food chain through the supermarket system. And yet, on the ground, the committee received evidence of contaminated food being sold on a regular basis in a much more concentrated fashion at a small community market.

11.33 Despite this evidence, health agencies argued the tolerable daily intakes do not need to be reviewed. While the Australian Drinking Water Guidelines have recently been revised, with new, much more restrictive guideline values imposed, the tolerable daily intakes have not been updated since 2022 and there are no plans in place to update them.

11.34 Some inquiry participants agreed with the Commonwealth position, noting that there is no toxicological data or cancer slope factor that would enable the setting of safe levels of PFAS exposure at a lower level and that, based on current scientific knowledge, the current Australian guidelines are conservative.

11.35 By contrast, other inquiry participants argued that there is no safe level of additional PFAS exposure. They argued that PFAS exposure guidelines are now set much lower in the United States and Europe and suggested Australia is lagging behind those jurisdictions.

11.36 Committee members hold a variety of views on this matter but agree that the update of Australia's Drinking Water Guidelines may justify a review of the tolerable daily intakes, which were established almost five years ago.

Recommendation 1

11.37 The committee recommends that Food Standards Australia and New Zealand (FSANZ) reviews the Tolerable Daily Intakes for PFAS against the latest international research and regulatory settings and updated Australian Drinking Water Guidelines, and presents a report to the Australian

Parliament—no later than October 2026—which outlines the findings of the review.

11.38 As part of this review, FSANZ should reconsider the need to establish regulatory limits on PFAS in food, taking into account a holistic quantification of population PFAS exposure.

International regulators

11.39 The committee notes that the United States and many European countries have a different interpretation of the scientific evidence on PFAS and human health than the Australian government.

11.40 The committee appreciates that this difference may be confusing and frustrating for people. Australians are given precautionary advice to reduce their exposure to PFAS while simultaneously being told that effects associated with PFAS exposure are 'unlikely to be important to health outcomes'. Meanwhile, advice in other countries appears more definitive.

11.41 The committee understands that this may be especially frustrating for firefighters, residents in heavily exposed communities, and others whose PFAS exposure is significantly higher than the average Australian.

11.42 These inquiry participants argued that, particularly in light of recent research and reviews conducted by international regulatory authorities, there is now sufficient evidence that certain PFAS, including PFOS and PFOA, tend to disrupt the immune system of living organisms and likely contribute to human disease.

11.43 However, asked if recent evidence is sufficient to state with a degree of confidence that high levels of exposure to PFAS likely cause negative human health effects and/or disease, the Department of Health stated the emerging evidence was not sufficient to say that PFAS causes any particular disease.

Mental health and psychological distress

11.44 The Australian government acknowledges that people living in PFAS-contaminated areas are more likely to experience psychological distress, irrespective of their PFAS blood serum concentration.

11.45 The committee heard evidence that demonstrated this distress and saw it first-hand in Wreck Bay.

11.46 The committee acknowledges that individual circumstances may vary widely both within and between communities. For example, if a person buys all their food from the supermarket and drinks water brought in from another area, their exposure to PFAS may not differ significantly from Australians living away from hotspots. By contrast, people consuming food from contaminated land and waterways, and drinking contaminated water, may have much higher levels of PFAS in their blood than the general Australian population.

11.47 Nevertheless, the committee witnessed the distress associated with the uncertainty and fear around the unknown health effects of PFAS exposure and high levels of PFAS in the blood.

11.48 The committee understands that Commonwealth agencies provided access to targeted mental health and counselling services in PFAS-contaminated communities in the past but have not done so since 2019–20.

11.49 While exposed cohorts would have access to mainstream services, generalised mental health service providers lack knowledge of PFAS and may be unable to provide the kind of reassurance people are seeking.

11.50 The committee acknowledges that PFAS affected communities are concerned, are suffering from psychological distress, and are seeking answers. Existing public rhetoric and information about PFAS is contributing to the psychological distress that people experience.

11.51 It is incumbent upon governments to provide honest, transparent, up-to-date information and demonstrate a commitment to the mental and physical health and wellbeing of the most heavily exposed communities.

A 'precautionary approach' to health risks

11.52 One of the most difficult and contentious matters that committees face in an inquiry such as this is that sometimes, science can only take us so far and judgments have to be made about the nature and extent of any actions to be recommended in the face of uncertain and conflicting evidence. This necessarily entails careful consideration and the weighing up of many factors. One approach that governments can adopt in these cases is the precautionary approach.

11.53 The precautionary principle—or a precautionary approach—enables decision-makers to adopt protective measures when scientific evidence about an environmental or human health hazard is uncertain, but the stakes are high.

11.54 Australia takes a precautionary approach to managing the environmental impacts of those PFAS that it has recently banned, though the committee notes this does not extend to the broader group of PFAS chemicals, which may potentially have similarly damaging impacts. However, inquiry participants argued that Australia may not be taking a precautionary approach to managing the possible health impacts of PFAS.

11.55 Despite a lack of conclusive evidence that PFAS cause disease, enHealth recommends exposure to certain PFAS be minimised wherever possible, 'as a precaution'. enHealth does not recommend any testing or health interventions—even for those with the highest levels of exposure.

11.56 While there may be insufficient evidence for governments and regulators to say that PFAS directly cause disease in humans, it could also be argued there is

insufficient evidence to claim the impacts of PFAS are 'unlikely to be important to health outcomes', as is currently claimed in Australia's official guidance material.

11.57 Massive investments by the Australian government into PFAS remediation and the provision of alternative drinking water in heavily contaminated areas appear incongruous with the public health messaging that PFAS are 'unlikely to be important to health outcomes'. Recent revision of the Drinking Water Guidelines dramatically limiting allowable levels of PFOS, PFOA and PFHxS also appears incongruous with this advice.

11.58 In light of the above—along with the United States', United Nations', and European regulatory approaches and findings of the IARC on PFOA—this statement may be too definitive and should be reviewed.

Recommendation 2

11.59 The committee recommends that, as part of the current review of the *enHealth guidance statement—Per- and polyfluoroalkyl Substances (PFAS)*, the Australian Government considers the appropriateness of the statement that health effects associated with PFAS exposure 'have generally been small and are unlikely to be important to health outcomes' in the context of leading international research and health advice.

Testing and health interventions

11.60 The enHealth guidance statement does not recommend individual blood tests on the basis that there is currently insufficient scientific evidence about the health effects of PFAS to inform clinical management by a medical practitioner.

11.61 In line with this position, government agencies have not offered any blood testing, health or cancer screening, or specialised medical advice to impacted communities or cohorts (aside from in the context of research).

11.62 People exposed to high levels of PFAS who gave evidence were deeply unhappy with this approach. These witnesses observed that governments have invested heavily in monitoring the soil, water, and biota at PFAS contamination hotspots, but have chosen not to monitor the human populations in these areas. For many inquiry participants, this felt like a wasted opportunity and contributed to a sense of being abandoned or betrayed.

11.63 The committee understands that authorities may be reluctant to conduct monitoring, such as blood tests, because the Commonwealth health advice is that individual blood tests cannot determine whether any medical condition is attributable to exposure to PFAS and, therefore, blood tests cannot inform medical advice or health management. However, the committee heard evidence from individuals with heavy PFAS exposure that blood testing was worthwhile for them, and that taking measures to reduce their blood PFAS levels gave them

a sense of control and improved their mental health. The committee also notes that organisations in some international jurisdictions, including the United States, have conducted work towards establishing relevant PFAS blood levels and clinical advice.

11.64 Firefighters, as an example, have been proactive in researching, developing and implementing solutions to reduce their PFAS exposure, test and reduce blood serum PFAS levels, and also to address the impacts of PFAS on the environment.

11.65 Committee members appreciated the heartfelt testimony of firefighters, including Assistant Chief Fire Officer (ACFO) Mick Tisbury and Commander David Hamilton, who have 'skin in the game' due to years of PFAS exposure. In the absence of official government health advice, these individuals have chosen to have their PFAS levels tested, and in many cases to undertake PFAS reduction through blood and/or plasma donations.

11.66 Committee members respect and understand these decisions and are grateful for the work—world leading in many respects—that ACFO Tisbury, Commander Hamilton and other firefighters have done in relation to PFAS.

11.67 When asked about testing during the inquiry, health authorities suggested that PFAS blood testing would simply lead to unnecessary stress, because there is nothing that can be done for those with high blood serum PFAS levels. However, the committee notes that Fire Rescue Victoria disputed this suggestion.

11.68 Fire Rescue Victoria offers subsidised blood testing to its firefighters and provides 'Clinician's advice' to those who are seeking to understand what their results mean, and what they can do about them. This advice is upfront about the scientific uncertainties surrounding PFAS and human health. It provides a schedule of suggested health screening, based on specific PFAS blood serum levels, and outlines proven reduction methods.[1]

11.69 The committee observes that Australian health authorities have not developed or made available any such advice and have no plans to do so, only advising people to limit their exposure to PFAS—a suggestion that provides little comfort to those who have already been heavily exposed.

Concluding comments on a precautionary approach

11.70 The committee notes that, in taking a precautionary approach to legacy contamination from Defence facilities and airports, the Australian government has:

- invested over $1 billion in environmental investigation and remediation;

[1] Mr Mick Tisbury, Assistant Chief Fire Officer, Fire Rescue Victoria, *Committee Hansard*, 4 June 2025, p. 17. See also: Fire Rescue Victoria, PFAS Clinician's Advice, provided by ACFO Tisbury and Commander Hamilton, 10 September 2025.

- paid out almost half a billion dollars in class action settlements and other compensation payments; and
- invested millions in research on PFAS and human health and remediation technologies.

11.71 Meanwhile, investment in testing, screening and/or health interventions for heavily exposed populations has been modest (and only for research purposes).

11.72 Some committee members feel there is an uneasy disparity between the quantum of investment in environmental PFAS investigation and remediation, and the characterisation of the health impacts as 'small'.

11.73 In considering this evidence, some committee members feel that the Australian government should extend the precautionary approach to PFAS health policy, as it is to PFAS environmental policy. This could involve enhanced health and cancer screening of heavily exposed cohorts, and greater support for health interventions like PFAS blood serum level reduction.

11.74 However, other committee members supported the government's view that there is insufficient scientific evidence for medical practitioners to provide meaningful health advice, screening, or intervention to those with high PFAS blood serum levels.

11.75 The committee was unable to reach a consensus on this issue but remained sympathetic to people's desire to have information about their own health and options for taking action—even if that action is simply more regular and proactive monitoring for certain health effects and diseases.

11.76 The committee acknowledges proactive health monitoring is unlikely to produce negative health effects and may improve mental health and wellbeing for relevant cohorts. The committee also notes that the number of Australians that have been heavily exposed to PFAS is small, meaning that precautionary health monitoring is unlikely to be cost-prohibitive.

11.77 As such, in line with the precautionary principle, the committee suggests that PFAS blood testing and enhanced health monitoring should be considered for the most heavily exposed groups.

Recommendation 3

11.78 The committee recommends that the Australian Government considers providing subsidised PFAS blood testing, enhanced health and cancer screening, and targeted mental health support for those people with the highest levels of PFAS exposure, including some firefighters, people exposed at work, and residents of heavily contaminated areas (especially those with exposure to home-grown produce, contaminated seafood, plants and animals, river and creek waters, and/or bore water).

Population biomonitoring

11.79 Australia's top scientific and health organisations recommended establishing a national biomonitoring program to track the accumulation of PFAS and other chemical contaminants in the bodies of Australians, with a focus on children and pregnant women.

11.80 The committee acknowledges the government's recent investment in PFAS biomarker testing through the Australian Bureau of Statistics' National Health Measures Survey. This is a positive initiative.

11.81 Regular, ongoing testing, and testing for a wider variety of chemical contaminants that may impact human health, should now be considered, with any future biomonitoring to include a focus on children and pregnant women.

Recommendation 4

11.82 The committee recommends that the Australian Government consults with the Australian Academy of Health and Medical Sciences and other relevant stakeholders on designs for a national, longitudinal chemicals biomonitoring program (similar to existing programs in the United States, South Korea, Japan, and several European countries) and associated longitudinal PFAS health research projects.

11.83 A national biomonitoring program should incorporate a focus on monitoring exposure levels of children and pregnant women and identifying any associated health effects or trends.

11.84 In designing the program, the government should consider using leftover blood held by pathology laboratories.

Public health messaging and a dose–response relationship

11.85 Almost all Australians have PFAS in their blood, albeit at low levels. The committee notes evidence from the Australian Bureau of Statistics (ABS) PFAS blood testing that in the Australian population, levels of the three most common PFAS are falling. This is a positive sign.

11.86 For most Australians their level of PFAS exposure is low. For some people, however, their level of PFAS exposure is high. It is reasonable that a person with a high level of exposure to substances that the government recommends avoiding would be concerned about that exposure. Evidence to the inquiry clearly indicated a heightened level of concern among people who have been exposed to high levels PFAS.

11.87 The committee understands there is still uncertainty around the degree and mechanism of impacts of PFAS on human health. However, Australia's current public health messaging about PFAS does not acknowledge a dose–response relationship. That is, it does not acknowledge that high levels of PFAS exposure are more likely to be detrimental to human health.

11.88 This is perhaps because governments are not currently able to specify what constitutes a 'high' or 'risky' level of PFAS exposure. As noted earlier, the general position of enHealth is that the current evidence does not support a large impact on a person's health, even as a result of high levels of PFAS exposure. Further, the health differences between people with the highest and lowest exposure to PFAS are generally deemed small.

11.89 At the same time, despite scientific uncertainty, regulators have relied on available evidence to set allowable limits of PFAS in drinking water and food. In practical effect, this would appear to be the same as estimating a safe versus unsafe dose of PFAS in any given source of food and drinking water.

11.90 Therefore, the committee considers there would be a benefit in enHealth estimating what constitutes 'high risk' PFAS exposure. Public health messaging about PFAS would be more meaningful if it differentiated between heavily exposed cohorts and the wider community, where PFAS contamination levels are low.

11.91 The committee notes that the PFAS enHealth Guidance is currently being reviewed. While not wanting to pre-empt the review and its outcomes, committee members believe there would be value in enHealth reviewing the extent to which the risks to human health are likely increased for those who have been heavily exposed to PFAS. Depending on the outcome of the review, the committee considers that enHealth should acknowledge if high levels of PFAS exposure are likely to be riskier than low levels. In the committee's view, this would increase public confidence in health advice that low levels of exposure to PFAS are likely to be safe.

Recommendation 5

11.92 The committee recommends that the review of the enHealth PFAS guidance statement consider whether the risks to human health from exposure to PFAS are dose dependent. Should the review determine that to be the case, the guidance should acknowledge that the risks are likely increased for those who have been heavily exposed and are lower for those with low levels of exposure to PFAS.

Health of the residents of Wreck Bay

11.93 The committee notes evidence from residents of Wreck Bay and their supporters about the impacts of PFAS on their health and wellbeing. Community members, a doctor who worked at Wreck Bay for many years, and journalists researching premature mortality among Wreck Bay residents all believe there is a 'cancer cluster' in the community.

11.94 In contrast, the Department of Health has argued that health and cancer statistics for Jervis Bay, which encompasses Wreck Bay, do not indicate an increased incidence of cancer or mortality.

11.95 Committee members acknowledge that these conflicting positions offer up more questions than answers.

11.96 There is no doubt the community has endured unimaginable loss, losing a large number of comparatively young people to cancer over recent years—including rare cancers.

11.97 Community members sincerely believe that these deaths and cancers are caused by PFAS.

11.98 The committee acknowledges the stress, confusion, pain and suffering that the Wreck Bay community has endured and continues to endure. The community is frustrated that government agencies have not chosen to investigate what community members and others see as a disproportionate occurrence of cancer and other health effects among the population.

11.99 People are scared and confused; nothing that government agencies have told them has reduced or alleviated this fear and confusion. Coupled with the profound cultural loss and grief for the human lives lost in the community in recent years, this unresolved fear represents a communal trauma.

11.100 Wreck Bay people are searching for answers.

11.101 Committee members have questions too. What data is the government relying on when it says there is no increase in cancer or mortality in Wreck Bay? Does that data look at Wreck Bay as a discrete population—separate from the rest of Jervis Bay Territory? Has the government looked into the incidence of specific cancers that have been related to PFAS (such as kidney, testicular and breast cancer) in the community? Does the government have any theories on why so many people, including young people, have died from cancer at Wreck Bay in recent years?

11.102 Around 152 people live in Wreck Bay. Access to health services is limited, especially for those with mobility or transport challenges. Estimates provided by the Department of Health during this inquiry suggested testing for some of the health effects most commonly associated with PFAS exposure might cost a few thousand dollars per person. Even if tests are conducted periodically, this would not represent a large investment.

11.103 Committee members suggest that the government considers providing publicly funded blood testing, enhanced cancer screening, targeted general health monitoring, and longitudinal data collection for impacted residents at Wreck Bay who wish to take part.

11.104 Connected to this, the government should consider commissioning longitudinal PFAS health research on the population. The geographically contained nature of the Wreck Bay community provides a potential opportunity for targeted longitudinal research and monitoring, noting that the small size of the population may limit the conclusions that can be drawn.

11.105 Any testing, monitoring and research should be delivered in partnership with the Wreck Bay Aboriginal Community Council, the community, and relevant Aboriginal Community Controlled Health Organisations.

11.106 The committee also notes the proposal from La Trobe University for its Gabra Biik, Wurruwila Wutja Indigenous Research Centre and Biomedical and Environmental Sensor Technology (BEST) Research Centre to help facilitate monitoring and engagement across First Nations communities. This should be considered.

Recommendation 6

11.107 The committee recommends that the Australian Government considers providing PFAS blood testing, cancer screening and general health monitoring for all impacted residents of Wreck Bay who wish to take part, with a particular focus on children and pregnant women.

11.108 These services must be provided in a culturally appropriate and easily accessible manner, in collaboration with the Wreck Bay Aboriginal Community Council and relevant Aboriginal Community Controlled Health Organisations.

Recommendation 7

11.109 The committee recommends that the Australian Government considers commissioning longitudinal research into the health impacts of exposure to PFAS contamination on the community at Wreck Bay.

11.110 This research should utilise existing data from available sources as well as collecting new data through the testing and health monitoring outlined in Recommendation 6.

Work health and safety

11.111 Work health and safety regulators across Australia rely on the enHealth Guidance to determine whether PFAS exposure constitutes a workplace hazard. The existing enHealth guidance arguably describes the risks associated with heavy PFAS exposure as being minimal.

11.112 This contrasts with the workplace practices of the Department of Defence, for instance, which takes considerable action to protect its personnel from PFAS exposure. The committee saw similar practices being employed by Enviropacific at the SOLVE hazardous waste facility, where workers follow strict safety protocols to avoid unnecessary PFAS exposure.

11.113 While some workers, such as firefighters at Fire Rescue Victoria, have access to information, testing and advice, the committee heard that a patchwork of workers' compensation legislation in place around Australia leaves some PFAS-exposed workers falling through the cracks, such as private sector firefighters,

Emergency Vehicle Technicians, retired Army Fire Service personnel, and—until recently—firefighters on Norfolk Island.

11.114 The committee was pleased to hear that, in August 2025, the Government (through the Department of Infrastructure) extended the disease provisions relating to firefighters under the Federal Comcare Scheme to firefighters on Norfolk Island. This is a positive step, but it remains critical that no relevant group of exposed workers is left behind.

11.115 PFAS is a workplace hazard and workers in Australia deserve to feel and be safe at work. Employees in any industry who have been exposed to large amounts of PFAS should be eligible for support under nationally consistent policies and regulations.

11.116 In the context of this broad inquiry, the committee was unable to delve deeply into the issues of PFAS, work health and safety and workplace entitlements. However, the committee supports calls from inquiry participants for the Commonwealth to take a leadership role in reviewing national work health and safety regulations to ensure they are protective and nationally consistent, and that no group of heavily exposed workers is left out.

Recommendation 8

11.117 The committee recommends the Australian Government:

- **works with the states and territories to ensure that workers are protected from unnecessary PFAS exposure in all states and territories;**
- **reviews relevant Commonwealth work health and safety legislation, regulations, and official advice with the aim of ensuring a consistent approach to occupational PFAS exposure—and actively encourages states and territories to do the same;**
- **amends the *Australian Code for the Transport of Dangerous Goods by Road & Rail* to classify PFAS as a 'dangerous good'; and**
- **develops a publicly available online resource to provide state regulators, employers, and employees with information about PFAS as a workplace hazard, including how to initiate and progress remediation of contamination.**

11.118 Where necessary, work health and safety regulations should also be amended to extend provisions to employees of private companies working on PFAS remediation, such as for Defence.

Recommendation 9

11.119 The committee recommends the Australian Government:

- **works with relevant state and territory regulators to ensure that all veterans and firefighters exposed to PFAS—including members of the Australian Army Fire Service and Retired Firefighters' Group—are**

considered and eligible as part of any remediation, research, testing, and support programs; and

- **includes Airservices Australia Emergency Vehicle Technicians in its workers compensation scheme for firefighters, by amending the *Safety, Rehabilitation and Compensation Act 1988* (Cth).**

Recommendation 10

11.120 The committee recommends the Australian Government works with state and territory work health and safety regulators to develop a national regulatory framework which enables state and territory WorkSafe agencies to issue notices and progress regulatory responses to PFAS exposure in Australian workplaces.

Chapter 12
Committee views on other matters

Introduction

12.1 The Australian Government was first warned about the risks of PFAS (specifically, PFOS and PFOA) in May 2000 by the United States Environmental Protection Agency (US EPA). Commonwealth government agencies began working to reduce the use of PFAS-containing firefighting foams from 2002.

12.2 It took until 2017 for Australian governments to establish a national PFAS position statement, promoting a collaborative approach to managing legacy contamination and preventing future releases.

12.3 Finally, in 2025 a number of long-chain PFAS chemicals, including PFOS, PFOA and PFHxS, were prohibited from import, manufacture and export under the Industrial Chemicals Environmental Management Standard (IChEMS).

12.4 Despite this 25-year history, inquiry participants noted with disappointment that PFAS are still described as 'emerging contaminants' by many regulators.

12.5 Like asbestos and DDT in previous decades, PFAS have been caught up in 'regulatory lag', with restrictions and control measures taking decades to achieve.

12.6 It is encouraging to see that Australian governments are now taking decisive action to 'turn off the tap' of PFAS entering the environment and our bodies, but there is more that can be done.

12.7 This chapter presents the committee's views and recommendations on matters raised in the report other than health and related issues, which was covered in the previous chapter.

12.8 Specifically, this chapter addresses:

- dealing with the legacy of PFAS-containing firefighting foams, including remediation of current and former fire stations and fire training grounds;
- addressing social and environmental impacts of PFAS contamination;
- addressing impacts on First Nations communities, lands and waters;
- remediation programs and technologies;
- PFAS in water supplies;
- PFAS in consumer goods, waste streams, and agriculture; and
- PFAS policy, regulation and national coordination.

12.9 As with Chapter 11, the committee has summarised evidence received and drawn conclusions where members could reach agreement. Any additional views and recommendations relating to these matters are incorporated in senators' additional comments.

PFAS firefighting foams—a terrible legacy

12.10 The largest source of significant PFAS contamination in Australia has been the use of PFAS-containing firefighting foams. These foams were used all around Australia from the 1970s until the 2000s, at high volumes, and were allowed to simply run off into the environment, polluting waterways, soil, plants and wildlife.

12.11 Firefighters and others in associated jobs were regularly drenched in these foams and believed at the time that the products were safe. Indeed, the committee heard that children and firefighters were even sprayed with PFAS-containing foams during celebrations and that the foams ran into rivers and creeks, creating a blanket of bubbles on the surface that children would play in.

12.12 Highly exposed workers, including firefighters, emergency vehicle technicians and those who work (or worked) at contaminated sites, now live with the impacts of this PFAS exposure—including elevated levels of PFAS in their blood—and the uncertainty of future impacts on their health and longevity.

12.13 The committee appreciates this can be highly stressful and has economic and social impacts for them and their families.

12.14 Responsibility for the heavy use of these foams rests primarily with the Commonwealth (Department of Defence (Defence) and Airservices), though state and territory firefighting organisations were also heavy users.

12.15 Defence has been phasing out legacy firefighting foams containing PFOS and PFOA since 2004. Airservices did not cease using PFAS-containing foams until 2010. Even now, PFAS-containing foams are still available for use in a number of specific circumstances.

12.16 Firefighters and their unions have played a leading role in advocating for domestic and international bans, regulation, and remediation of PFAS. They have commissioned and volunteered for research, developed and tested cleanup technologies and remediation techniques, and are keen to share the results of their research and development for the good of the nation.

12.17 Assistant Chief Fire Officer at Fire Rescue Victoria, Mr Mick Tisbury, has been working to eliminate the use of PFAS-containing foams and support impacted firefighters for decades. Mr Tisbury told the committee that governments and regulators have known for the last 25 years that PFAS is dangerous and therefore action is required, not more talk.

12.18 The committee heard that only three states have banned PFAS-containing foams—South Australia, Queensland, and New South Wales. Firefighters were also concerned that the national import and export ban that came into place in 2025 (the IChEMS listing) provides a five-year transition period for those who are still using the foams and permits accepted uses, including 'emergencies'.

12.19 Committee members acknowledge the frustration felt by Mr Tisbury, Commander Dave Hamilton, and the other firefighters who gave evidence during the inquiry. We note the widespread calls from these and other exposed workers for regulatory change to improve the safety of their work, protect Australia's environment, and better support those who were heavily exposed in the past.

12.20 Phasing out all remaining uses of PFAS-containing foams and safely disposing of legacy stores of these products should be a priority.

12.21 Fire Rescue Victoria provided compelling evidence that existing PFAS-free (fluorine-free) firefighting foams are effective on all kinds of fires. Indeed, three Australian states are now completely fluorine-free. The committee also notes the work being done at Charles Darwin University to develop even better fluorine-free foams.

12.22 Where policies or standards maintain the use of legacy, PFAS-containing foams, these must be amended as a priority, and the cost of replacing hardware and cleaning out storage tanks must not be used as an excuse for inaction.

Recommendation 11

12.23 The committee recommends the Australian Government:

- **fast-tracks the deployment of PFAS-free firefighting foams to replace all legacy PFAS-containing foams;**
- **moves to quickly replace all legacy firefighting equipment that still utilises or stores PFAS-containing foams, and ensures the safe disposal of existing stocks;**
- **bans or severely restricts the use of firefighting foams containing PFAS by Commonwealth entities; and**
- **works through cross jurisdictional bodies to achieve an urgent national ban on the use of PFAS-containing firefighting foams, including by private sector entities, major hazard facilities and B Class foam extinguishers in Australia.**

12.24 It is critical that legacy PFAS-containing firefighting foams are not replaced with new products that also contain toxic chemicals.

12.25 The Commonwealth must do its due diligence to ensure that replacement fluorine-free foams are safe.

Recommendation 12

12.26 The committee recommends that the Australian Government provides funding for toxicological studies of fluorine-free foams so as to ensure that legacy PFAS-containing foams are not replaced by the next harmful products.

12.27 Firefighting organisations are working to remediate contamination at fire training facilities, current and former fire stations, airports, and surrounding areas, including waterways. While remediation of firefighting facilities would generally be a state and territory responsibility, the committee agrees that Commonwealth oversight and grant funding would enable more effective and targeted remediation of these PFAS 'hotspots'.

12.28 Firefighters also noted a lack of readily available resources and information for fire services and other employers wanting to take positive steps to remediate contaminated worksites.

12.29 Governments, led by the Commonwealth, need to leverage the research and development work already undertaken by state-based organisations including Fire Rescue Victoria to enable greater resource-sharing across jurisdictions.

Recommendation 13

12.30 The committee recommends that the Australian Government works with states and territories to establish a fund and taskforce to support the remediation of severely PFAS-contaminated sites, including current and former fire stations (and surrounds), firefighting training facilities, and nearby water catchments that have been impacted, and ensures the availability of uncontaminated drinking water at all fire stations.

12.31 To complement this initiative, the Australian Government should establish an expert tripartite panel comprised of government, private sector and unions, to:

- **advise on reducing PFAS exposure risk to workers;**
- **advise on effective remediation of PFAS-contaminated sites;**
- **advise on new and established techniques and technologies; and**
- **encourage further innovation through supporting site remediation research and development.**

12.32 The committee understands that there are high levels of PFAS contamination at Norfolk Island Airport Fire Station and responsibility for remediating this area is unclear.

Recommendation 14

12.33 The committee recommends the Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts assumes full responsibility for remediation and management of PFAS contamination on and around Norfolk Island airport.

Social and environmental impacts of PFAS

12.34 Inquiry participants, including environmental organisations, scientists, community members, sports and recreation groups highlighted their concerns with the impacts of PFAS contamination on Australia's environment, wildlife and ecology.

12.35 Research organisations provided compelling evidence that PFAS contamination of Australia's surface water and groundwater is negatively impacting many terrestrial and aquatic species, leading to reduced reproduction and species decline. This includes species of national significance, such as platypuses.

12.36 Addressing the impacts of PFAS on the environment is complicated by factors including:

- patchy and incomplete data on the prevalence and distribution of PFAS in the environment;
- interplay of PFAS with other environmental contaminants and pollutants;
- limited options for remediation, storage, and management of legacy PFAS contamination;
- questions around jurisdictional responsibility; and
- challenges with national coordination in a federation.

12.37 While there is isolated high-quality research on environmental impacts of PFAS in Australia, research organisations including crcCARE, CSIRO, and the Australian Academy of Science highlighted the lack of baseline data for PFAS levels in the Australian environment. These organisations recommended national PFAS environmental monitoring, with standardised testing methodologies, be conducted to better inform regulatory responses and future research and focus remediation efforts.

12.38 Committee members support calls for targeted national PFAS environmental monitoring to establish a baseline, identify trends, and better inform PFAS policy and investment decisions.

12.39 Committee members also note that the only publicly available map of PFAS contaminated sites in Australia is currently maintained by volunteers at Friends of the Earth, which collates information from across Australia using media reports, freedom of information requests, and government sources.

12.40 Commonwealth government agencies with data about environmental PFAS contamination should work together with state and territory environment protection authorities, and local government authorities, to produce an official map, which includes PFAS 'hotspots', contamination levels, and information about remediation activity.

Recommendation 15

12.41 The committee recommends that the Australian Government funds and coordinates a strategic national PFAS environmental monitoring program to track contamination levels and trends in the Australian environment, including key waterways and native wildlife species, and publish emerging data.

Recommendation 16

12.42 The committee recommends that the Australian Government works with state and territory and local governments to improve data-sharing on PFAS contamination and remediation activity, and develop a publicly available, interactive online PFAS map which identifies PFAS contamination locations and remediation activity.

12.43 Along with the risk posed by PFAS contamination to wildlife and ecology, inquiry participants noted impacts on lifestyle and recreation, land conservation, and the use and enjoyment of Australia's land and waterways.

12.44 A striking example was provided by Field & Game Australia, which purchased and is working to restore the Heart Morass in Victoria. Field & Game Australia made this investment without knowing about the significant PFAS contamination of the site and the impacts it would have on their plans to restore and rejuvenate the land for environmental and recreational purposes.

12.45 Inquiry participants recommended that the Commonwealth provides compensation and funding for conservation of environments impacted by heavy PFAS contamination, such as the Heart Morass.

12.46 Committee members agree that where PFAS contamination has impacted environments, waterways and wetlands of cultural and environmental significance, the Commonwealth Government should work with states and territories to fund and support cleanup and remediation of these areas.

12.47 Recreational use of these areas should still be able to be conducted safely. For instance, bushwalking, hunting and sightseeing may be low-risk activities as long as plants and wildlife are not consumed. However, there is currently a lack of information and guidance material to enable organisations to provide reassurance and advice to potential users of the space.

12.48 The Commonwealth Environment Department should work with its state and territory counterparts to develop user-friendly guidance and public information to assist organisations that are undertaking remediation activities to do so safely. This could include information for volunteers and workers engaged in remediation activities, and safety information for school groups and other recreational users of PFAS-contaminated environments.

Recommendation 17

12.49 The committee recommends that the Australian Government works with state and territory government entities to establish a mechanism to fund and support conservation and remediation of PFAS-contaminated environments that have significant social, cultural, recreational, heritage and/or environmental value.

12.50 This initiative should include the development and provision of information to assist organisations to undertake remediation activities safely, and safety information for school groups and other recreational users.

Impacts on First Nations communities, lands and waters

12.51 A number of significant sites of PFAS contamination are geographically located in or near First Nations communities.

12.52 Inquiry participants highlighted the unique impacts of PFAS contamination on First Nations communities, lands and waters, where contamination can interrupt cultural practices, restrict consumption of traditional foods, and complicate communities' connection with the land.

12.53 The committee was privileged to be welcomed onto Aboriginal lands at Wreck Bay by the local community, where we saw firsthand the devastating impacts of PFAS contamination on the land and people, their lives and cultural practices.

12.54 The committee would like to have travelled to other Aboriginal communities impacted by PFAS contamination to hear their concerns firsthand but was unable to do so due to the timing of the 2025 Federal election.

12.55 Drawing on evidence from Aboriginal health organisations, the ANU PFAS Health Study, and the *Independent Review of land uses around key Defence bases impacted by PFAS contamination* (PFAS Independent review), the committee identified several key issues relating to Commonwealth government engagement with First Nations people affected by PFAS.

12.56 The committee also considered evidence provided by the Defence throughout the course of the inquiry, and statements in the Government's response to the PFAS Independent review, before forming its views, which are outlined in this section.

Commonwealth government engagement with Wreck Bay

12.57 PFAS contamination has had a devastating impact on the lands and waters, and the community at Wreck Bay. Wreck Bay people's connection to their lands and waters, their spiritual and cultural practices, access to foods and medicines, and sense of happiness and well-being have been dramatically disturbed.

12.58 A profound sense of loss and grief is evident in the testimonies provided by community members. The committee thanks community members for their honesty and courage in sharing their loss and concerns for the future.

12.59 Governments must understand that for the community in Wreck Bay and other First Nations communities, contamination of the land and waters means more than a reduction in land value, an inconvenience, or a loss of income. Contamination of the land and waters impacts every aspect of the community's identity, culture, lifestyle and story.

12.60 That loss cannot be quantified in dollar terms.

12.61 The committee understands that the $22 million settlement paid by the Commonwealth to the Wreck Bay community for cultural loss was deeply disappointing to many residents. We also recognise that no settlement could have made up for the loss that Wreck Bay people have endured and continue to endure.

12.62 The committee was encouraged to see the strength and perseverance of the community as it works to find new ways to practice culture, preserve cultural history, and tell important stories. The heritage and land management work of the Wreck Bay Aboriginal Community Council (WBACC) and the Bherwerre Rangers is to be commended and supported.

12.63 It is the committee's view that delays and inadequate communication and engagement from Defence in the past have damaged the community's trust in the investigation and remediation process, despite Defence's public apology to the Jervis Bay community, including the people of Wreck Bay, in 2023.

12.64 In spite of significant trepidation and distrust, WBACC and many community members remain willing to engage in the remediation process and want to play a bigger role. They are also seeking support to find new ways to record, pass on, and continue cultural practices that are restricted due to the contamination.

12.65 The committee observes that Wreck Bay is Aboriginal land, with the village and surrounds returned to the Aboriginal community via a land grant in the late 1980s, and the Booderee National Park and Botanic Gardens returned in 1995.[1]

12.66 Despite this, community members indicated feeling that they have no control and no say over how the PFAS contamination is managed.

12.67 It is critical that the community is intimately involved in developing and implementing solutions for managing PFAS contamination now, and into the future. Community members have a wealth of knowledge around land management and are well-placed to take a leading role in the monitoring and remediation efforts on their land, going forward.

12.68 It is unfortunate that it has taken so long for Defence to begin establishing a meaningful partnership with the community. In its interim report, the committee recommended that Defence and the Department of Infrastructure

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[1] For details, see the committee's *Interim report*, Appendix 2: Wreck Bay community visit, pp. 102–103.

work with WBACC and other stakeholders to improve signage, messaging and information provided to the community.

12.69 Since the committee's visit to Wreck Bay in January and the tabling of its interim report in March 2025, evidence suggests Defence has increased the frequency and quality of its engagement, is installing temporary signage, and has commenced work to develop better, permanent signage. Defence must continue to prioritise building a genuine partnership with the community, while supporting and empowering Wreck Bay people to manage and heal their land.

12.70 With critical sites of PFAS contamination, including Mary Creek and Mary Beach (Bullocks Hoof), located on Aboriginal land, the Commonwealth should seek to develop a formal agreement with Wreck Bay people for co-management of remediation and restoration in these areas.

Recommendation 18

12.71 The committee recommends that the Australian Government commences negotiation with the aim of formalising its partnership with the Wreck Bay Aboriginal community for ongoing remediation and restoration of PFAS-affected lands and waters at Wreck Bay. The agreement should be designed to provide self-determination for Wreck Bay people in managing and remediating PFAS contamination on their land.

12.72 The committee also reiterates its previous recommendation—Recommendation 3 in the committee's *Interim report*—which suggested the Parliament considers referring an inquiry to the Joint Standing Committee on the National Capital and External Territories which examines governance, representation, and service provision in the Jervis Bay Territory (including the Wreck Bay Aboriginal community settlement).

12.73 It is critical that the Commonwealth begins to speak with 'one voice' in its dealings with the Wreck Bay community, and better coordinates governance and service provision in the Jervis Bay Territory, to reduce the risk that community needs will fall through the cracks.

12.74 Finally, in relation to Wreck Bay, the committee understands that a pipeline is being built to bring cleaner drinking water to the people at Wreck Bay.

12.75 Despite the fact that PFAS levels in Wreck Bay's drinking water are well within guideline limits, the water is brown, and people understandably feel uncomfortable and unsafe drinking it, bathing in it, and using it around their homes.

12.76 The committee notes that some community members, including Elders, have been purchasing bottled water at significant personal expense.

12.77 The committee considers that the Commonwealth should provide immediate access to clean drinking water for community members as a stopgap measure.

This could be achieved through providing water tanks or by provision of bottled water.

Recommendation 19

12.78 The committee recommends that the Australian Government provides immediate access to clean drinking water for the community at Wreck Bay as a temporary measure until the pipeline connecting Wreck Bay to the Shoalhaven City Council water supply is completed and operational.

Australian government engagement with other impacted communities

12.79 While the timing of the 2025 Federal Election meant that the committee was unable to travel to any other First Nations communities during the inquiry, members of other First Nations communities have raised similar concerns about the impacts of PFAS, and the quality of Defence and other government agencies' engagement.

12.80 The National Aboriginal Community Controlled Health Organisation (NACCHO) highlighted the failure of Commonwealth PFAS management plans to consider the complex and disproportionate impact of PFAS contamination on First Nations communities, including impacts on food security, financial well-being, psychological and social health.

12.81 Despite the central role of contaminated lands and waters in their lives, Indigenous stakeholders have often been excluded from decision-making and have had to fight for recognition of what they have lost.

12.82 The committee was concerned to hear from Aboriginal Medical Services Alliance NT (AMSANT) and Wurli Wurlinjang Health Service that initial collaboration with Aboriginal stakeholders in Katherine does not appear to have fed into the creation of culturally appropriate warning materials and signage for local communities. This is a lost opportunity and must be rectified.

12.83 The committee notes evidence that some local people, as well as itinerant Aboriginal people who utilise the river for essential nutrition, may be exposed to PFAS at much higher than recommended levels through their continued consumption of fish and other bush foods. However, it is equally concerning that removing these sources of nutrition may leave already disadvantaged groups and individuals without access to previously reliable, healthy sources of food, contributing to an already high chronic disease burden.

12.84 As discussed in Chapter 11, the Commonwealth's approach to remediation has largely been environmentally focused, rather than focused on health and mental health impacts, or social and cultural impacts.

12.85 Compensation schemes—largely focused on landowners—have not accounted for the broader impacts of restrictions on fishing, gathering bush foods and medicinal plants, or cultural uses of the land by Aboriginal people (with the

exception of the settlement between the Commonwealth and Wreck Bay community).

12.86 First Nations submitters maintained that Commonwealth efforts must look beyond the initially apparent priorities of stopping further contamination and providing safe drinking water. Efforts in Katherine, for instance, should include direct support for food security, culturally appropriate health promotion, and engagement facilitated through genuine partnerships with Aboriginal community groups and community-controlled organisations.

12.87 Protecting individuals from the risk of PFAS exposure cannot come at the expense of access to healthy and culturally important food sources. Nor is it acceptable that communities be expected to simply abandon cultural practices such as fishing and gathering bushfoods.

12.88 The committee encourages Defence and other relevant governments and agencies to review their PFAS management plans to ensure these plans align with the *National Agreement on Closing the Gap* and the *United Nations Declaration on the Rights of Indigenous Peoples*.[2] PFAS management plans must incorporate actions to safeguard the cultural, social, nutritional, and economic wellbeing of First Nations people around Katherine and other areas impacted by significant PFAS contamination.

Recommendation 20

12.89 The committee recommends that Australian Government agencies involved in remediation efforts, including the Department of Defence, work together with local First Nations community and language groups, and Aboriginal Community Controlled Organisations, to review PFAS management plans and update them to incorporate actions to safeguard the cultural, social, nutritional, and economic wellbeing of First Nations people and communities that are significantly impacted by PFAS contamination.

12.90 PFAS management plans for sites with significant Aboriginal and Torres Strait Islander communities should be aligned with the priority reform areas in the *National Agreement on Closing the Gap* and the *United Nations Declaration on the Rights of Indigenous Peoples*.

[2] Relevant UNDRIP Articles include: Article 11, regarding the right to cultural practices; Article 24, regarding traditional medicines and highest standards for health and mental health; Article 28, regarding redress for damaged land; Article 29, regarding protection of their lands, including no hazardous substances and effective measures to monitor people's health; and Article 32, on self-determination over their land. See: Australian Human Rights Commission, *UN Declaration on the rights of Indigenous peoples*, Friday, 10 September 2021 (accessed 11 November 2025).

Recommendation 21

12.91 The committee recommends that the Australian Government urgently considers options to improve and maintain ongoing access to healthy and traditional food sources for Aboriginal communities around Katherine. This may include facilitating safer fishing, subsidising, and/or improving the supply of affordable uncontaminated seafood.

12.92 The Katherine focus groups held as part of the ANU PFAS Health Study in 2018 revealed fear and confusion among community members about PFAS. The researchers identified psychological stress and anxiety; worries about impacts on Country, culture, and traditional diets; and uncertainty about the future. As with Wreck Bay, communities around Katherine expressed a desire for clearer, more appropriate communications and more transparent information.

12.93 These communities were critical of Defence for relying on largely one-way communication, holding sporadic, often inaccessible community engagement sessions, and publishing material on its website that is dense, highly technical and lacks clarity. Researchers also noted a sense of distrust towards Defence and government more broadly that negatively impacted community engagement and collaboration.

12.94 The committee notes the ANU researchers recommended better engagement with Aboriginal communities through community visits and the provision of tailored, plain English information. Five years later, the Independent review made similar recommendations, suggesting that Defence has still not done enough.

12.95 For instance, committee members were concerned to read that—five years after the ANU PFAS study—the independent reviewer *again* observed a lack of understanding around PFAS exposure pathways among Aboriginal people in the Katherine area.

12.96 We note that the independent reviewer praised Defence for increasing its engagement capability through employing local Indigenous Liaison Officers. However, the success of this initiative appears to have varied by location, with First Nations communities around Williamtown seeming to have benefited the most.

12.97 The committee understands that Defence is making efforts to improve its engagement with First Nations stakeholders. Along with increased engagement with the community at Wreck Bay, the committee notes recent engagement activities held with the Kalano Aboriginal Community Board and a cultural activity held with members of the Binjai community to discuss PFAS contamination of the Katherine River. The committee is also encouraged to hear that Defence has surveyed the Wreck Bay community to better understand how community members use the land, waters, and biota.

12.98 Expanding and strengthening this work must be a priority for Defence.

12.99 For instance, if similar surveys have not been conducted with communities around Katherine, and other First Nations communities, this should be remedied.

12.100 The committee understands that engagement with communities around Katherine may be more complex than in other communities impacted by PFAS, because there are a number of distinct language groups involved. The committee would suggest that Defence increases its investments in Indigenous engagement across the board, with investment proportionate to the complexity of the engagement challenge.

Recommendation 22

12.101 The committee recommends that the new PFAS National Coordinating Body prioritises establishing community-based working groups, and/or other collaboration mechanisms, to facilitate the involvement of affected communities in decision-making processes relating to remediation efforts.

Recommendation 23

12.102 The committee recommends that the Australian Government, through the Department of Defence, reaches out to local health services, such as Wurli Wurjlinjang in Katherine, to codesign culturally appropriate and effective signage and educational material for Aboriginal communities impacted by the PFAS contamination of the Katherine River.

12.103 Finally, the committee notes First Nations research centres at La Trobe University submitted a proposal for government to support the development of Indigenous-led field-deployable PFAS detection technologies, which could enable faster environmental and health monitoring in Aboriginal communities impacted by PFAS contamination.

12.104 The committee did not have an opportunity to hear more about this proposal during the inquiry. However, committee members strongly support the direct involvement of First Nations people in monitoring and assessing PFAS contamination and remediation outcomes. As such, the committee encourages the government to investigate this proposal.

Recommendation 24

12.105 The committee recommends that the Australian Government investigates the proposal made by La Trobe University to develop Indigenous-led field-deployable PFAS detection technologies.

Remediation programs and technologies

12.106 This section provides the committee's views on the remediation programs being undertaken by Defence, Airservices and the Department of Infrastructure.

12.107 It then looks at how the Australian Government could better support the ongoing development of PFAS remediation technologies and techniques.

Defence program

12.108 The committee heard that Australia is a world leader in PFAS remediation—most notably, the remediation program undertaken by the Department of Defence. This billion-dollar program, established in 2015, utilises robust science and technology to detect, analyse, remove, and contain environmental PFAS contamination at sites all around Australia.

12.109 The program incorporates investigation and remediation at 28 Defence sites, and has made significant progress since commencement, with all projects now moving into the remediation phase, and remediation complete at two locations.

12.110 Nevertheless, the committee notes that the Joint Standing Committee on Foreign Affairs, Defence and Trade (JSCFADT) took evidence from members of communities impacted by contamination from these sites and found that many were angry and disillusioned with the slow pace of the program, limited scope of remediation, confusing and unsatisfactory communication, and ongoing impacts on their land and their lifestyles.

12.111 Parliamentary scrutiny by the JSCFADT between 2018 and 2022 contributed to improvements in the program over time. However, the committee notes the government has yet to formally respond to the JSCFADT final report, tabled in 2022, which made 8 recommendations.

12.112 The committee encourages the government to formally respond to that report and notes there are a number of recommendations in this report aimed at further improving Defence's engagement—which is essential to the success of Defence's remediation program going forward.

Airservices program

12.113 While Defence has commenced remediation at most or all of its program sites, Airservices' National PFAS Management Program—which commenced in 2009—is still largely at the detailed site investigation stage, with a limited range of preliminary management and remediation activities taking place across the airports involved.

12.114 The committee acknowledges the frustration felt by airport operators about the slow pace of this program and lack of clarity around who is responsible for costs.

12.115 North Queensland Airports Group provided a striking example of the slow pace of the program, saying that PFAS contamination of soil and groundwater was confirmed at Cairns Airport in 2008, but it was not until 2019 that Airservices conducted 'preliminary site investigations and targeted sampling'. The draft version of the detailed site investigation report for Cairns Airport was not received until 2024.

12.116 While it is the first program to commence, airport operators described the Airservices program as 'too little, too late'.

12.117 The committee acknowledges that PFAS testing and investigation is complex and resource intensive. However, it should not take 11 years between the initial detection of PFAS contamination and the commencement of *preliminary* site investigations, or five years to move from preliminary investigations to a final report and management plan. The committee also notes that Airservices is only just beginning the remediation part of its program, and only at a few sites.

12.118 The committee recommends that Airservices devotes more resources to this program in order to expedite the investigation phase and move more quickly to remediation and ongoing, long-term management of sites.

Recommendation 25

12.119 The committee recommends that Airservices devotes additional resources to its National PFAS Management Program to expedite the remediation phase of the program.

Department of Infrastructure program

12.120 Airservices' program focuses exclusively on PFAS within Airservices lease areas on airports. In contrast, the Australian Government PFAS Airports Investigation Program—which commenced following completion of a pilot program in June 2023—investigates the whole airport site for PFAS contamination, regardless of who is responsible.

12.121 The primary outcome of these investigations is the development of PFAS Management Plans, in collaboration with airports, which will outline an approach to managing and remediating PFAS pollution at relevant airports.

12.122 The committee notes the update provided by the Department of Infrastructure on 1 August 2025, which indicated that detailed site investigations and/or mass flux fieldworks are underway at 10 airports, with another 14 either commencing investigations or at the preliminary stage. The committee also notes a further seven airports may participate in the program, and six will not be participating or are included in another airport's program.

12.123 The committee is aware that some stakeholders, including the Australian Airports Association, are concerned that both the Airservices and Department of Infrastructure programs are too heavily focused on federally leased airports, leaving other airports to fall through the cracks.

12.124 The committee notes, however, that the Department of Infrastructure program encompasses more than the 21 existing federally leased airports, with a total of 37 airports 'in scope'. Regardless, this does not account for all of Australia's many small, regional, and general aviation airports. Depending on the historical use of PFAS at smaller, regional and general aviation airports, there may be a

need for Commonwealth coordination of a broader program, working with state, territory and local government entities, to identify and remediate impacted airports.

Recommendation 26

12.125 The committee recommends that the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts works with the Australian Airports Association, Airservices, and the Department of Defence to identify airports that may have been exposed to significant PFAS contamination which fall outside the scope of the three Commonwealth PFAS investigation and remediation programs.

12.126 Options for remediating these airports should then be considered by the Australian Government, in collaboration with the relevant state, territory, and local government authorities.

Need for national coordination

12.127 In 2024, the independent reviewer observed that Defence had taken a 'strong national leadership role' in PFAS investigation and remediation, as well as in its engagement with impacted communities. Nevertheless, Mr Varghese also argued for better national coordination of PFAS remediation.

12.128 The committee shares this view and sees the need for a coordinated national approach that applies to all contaminated sites, not just Defence facilities.

12.129 The committee was encouraged by its visit to Launceston Airport, where site remediation commenced in late 2024 and was completed in June 2025. The airport operator, Asia Pacific Airports (Launceston) praised the risk-based approach taken to the remediation project, which was led by Airservices in conjunction with the Department of Infrastructure and a number of other Commonwealth and state government bodies. However, nearby landowners were concerned that PFAS contamination has spread from the airport to their land and that these areas were not remediated.

12.130 Airservices argue they are not responsible for the pollution of this nearby land, with contamination originating from the Former Wastewater Treatment Ponds on Launceston Airport. This may be true. However, it does not leave nearby landowners with a satisfactory solution.

12.131 This example demonstrates the need for nationally coordinated, intergovernmental management of PFAS contamination and remediation. It echoes views expressed in Wreck Bay, where the committee heard that Defence's remediation activity 'stopped at the fence line'—unlike the PFAS contamination which moves freely through the water table and environment.

12.132 Landowners and communities should not be caught up in an endless argument between different government agencies around who is responsible. Nor should

contamination that falls just outside of the jurisdiction of a particular agency fail to be remediated because of a fence line or jurisdictional border. Governments must work together to remediate contaminated land and waterways as required, taking a risk-based approach.

12.133 National coordination of PFAS investigation and remediation should encompass all relevant Commonwealth agencies, state and territory governments, private landholders including airport operators, and—critically—local government organisations, in order to ensure a fairer, more consistent and more strategic approach to remediation.

12.134 The committee supports the recommendation from crcCARE that governments need to work together to take a more holistic approach to site assessment and remediation, with a view to remediating the highest risk areas as a priority and minimising long-term environmental impacts from contamination sources.

Recommendation 27

12.135 The committee recommends that the Australian Government works through the new PFAS National Coordinating Body, the Heads of Environmental Protection Authorities Australia and New Zealand, and other relevant bodies to:

- **conduct a national audit of PFAS contamination sites and remediation activity;**
- **develop a strategic, risk-based national remediation plan;**
- **develop a common national framework for remediation; and**
- **develop national standards for reporting on remediation activity and outcomes.**

Funding remediation

12.136 The Commonwealth Government has already committed over almost $900 million to investigation and remediation of Defence sites contaminated by PFAS-containing firefighting foams. A further $130 million has been committed for the Department of Infrastructure's PFAS Airports Investigation Program. The committee notes that remediation of these airports is not included in that figure and may be many millions more.

12.137 Considering Airservices has spent almost $130 million and is now seeking support from the Commonwealth to remediate individual airports, committee members note that the costs are likely to be significant and that the majority of this spending may not yet have been calculated or allocated.

12.138 The committee understands the frustration of airport operators, who argued that existing Commonwealth programs do not include a mechanism to prevent airport operators from shouldering the costs for contamination they did not

cause. However, we also observe that Australian taxpayers are currently shouldering the majority of the burden for PFAS removal.

Recommendation 28

12.139 The committee recommends that the Australian Government produces a detailed cost estimate for the remediation of Australia's airports impacted by PFAS contamination and works with stakeholders to develop a cost-sharing model.

12.140 The question of financial responsibility for cleaning up PFAS contamination is a complex one. Further discussion on the costs of PFAS remediation is included in a subsequent section of this chapter—'PFAS in water supplies'.

Remediation technologies

12.141 While PFAS treatment technologies have improved significantly over the past 10 years, destructive options remain limited and expensive. Most treatment technologies currently in use cannot destroy PFAS. Instead, they reduce the movement of PFAS into the environment by containing it; or remove PFAS from water or soil to below regulatory levels.

12.142 Non-destructive technologies, such as activated carbon filters and ion exchange resins, are well established and commercially available. These technologies are important to remove PFAS from the environment and water catchments, but they generate a concentrated PFAS waste stream that needs to be managed.

12.143 Destructive technologies do exist that can breakdown PFAS into small, naturally occurring molecules, such as the volatilisation technique employed at SOLVE. However, PFAS destruction technology like this is energy intensive and only available at a small number of facilities in Australia.

12.144 The committee agrees with crcCare and other witnesses who maintained that Australia requires a combination of technologies and techniques to achieve optimal remediation outcomes. This is likely to include on-site containment, established and novel removal and reduction technologies, along with hazardous waste storage and destruction.

12.145 The committee considered a number of technologies and techniques that may contribute to Australia's remediation challenge. Some of these are already in use and some were seeking support to undertake trials or pursuing government investment to become part of Australia's remediation 'toolbox'.

12.146 Technology providers argued there is a need for dedicated funding to support research and development of Australian solutions, along with adoption of a wider variety of PFAS treatment technologies in government remediation programs. Inquiry participants urged greater support for field trials, including support for research and development into innovative, nature-based PFAS remediation technologies, such as hemp.

12.147 Committee members are not experts and were not in a position to individually evaluate the remediation technologies presented during the inquiry. However, committee members agree that Australian government remediation programs should aim to support the development of a variety of local innovative technologies and techniques for PFAS remediation.

12.148 Committee members also encourage government agencies to assess remediation technologies on the basis of both cost and environmental impact; for instance, to take into consideration how many grams of PFAS are removed per dollar spent along with per unit of carbon dioxide emitted.

Recommendation 29

12.149 The committee recommends that the Australian Government establishes an interdisciplinary joint council, comprising regulators, industry experts, and researchers, to evaluate PFAS treatment and remediation technologies.

Recommendation 30

12.150 The committee recommends that the Australian Government continues to invest in a variety of PFAS remediation, removal and destruction technologies and techniques as part of its remediation programs. Where possible, Australian Government PFAS remediation programs should seek to support locally developed solutions and invest in environmentally responsible remediation technologies.

PFAS in water supplies

Revised Australian Drinking Water Guidelines

12.151 The committee considered a range of evidence on the adequacy of the new values in the Australian Drinking Water Guidelines. Critics primarily argued that the guidelines should be stricter, in accordance with international jurisdictions such as the United States. Other witnesses argued that the United States' regulatory PFAS levels were established based on a different scientific approach and could not be translated directly into an Australian context.

12.152 The committee notes that the new guidelines are consistent with the draft proposal, with the exception of PFOS. The draft guidelines proposed a level of 4 ng/L (nanograms per litre) for PFOS but eventually settled on 8ng/L. The committee notes this is still an almost tenfold reduction from the previous 2018 guideline value.

12.153 Some committee members believe the revised guideline values strike a good balance and represent a responsible precautionary approach to controlling PFAS in water supplies. However, some were concerned that there is no safe level of PFAS and therefore the revised values may not be sufficiently protective of human health.

12.154 Where senators have further comments on this matter, these are included in additional comments.

Implementation and testing

12.155 The committee notes that the Australian Drinking Water Guidelines are not enforceable unless and until they are incorporated into regulations in each jurisdiction.

12.156 Inquiry participants, including state and local governments, were concerned about increased costs in complying with the revised Drinking Water Guidelines, particularly given many water treatment facilities do not currently possess the appropriate infrastructure and testing regimes to meet the revised levels.

12.157 While a small number of water utilities routinely test for PFAS, testing has historically been completed only when there is a suspected PFAS source or 'hotspot'. The committee also notes that testing is generally limited to those PFAS types listed under the Guidelines.

12.158 Numerous submitters and witnesses were concerned about the piecemeal approach to water testing that currently exists. When testing has occurred, drinking water in Australia has generally been found to be compliant with PFAS levels prescribed in the Drinking Water Guidelines. However, the committee notes that testing has been limited, and some historic testing results would be higher than the revised guideline levels.

12.159 These inquiry participants advocated for a consistent national approach to PFAS water testing. They also questioned the transparency of reporting results, noting that Australia lacks an official, centralised database for water quality.

12.160 The committee observes that implementation of Recommendation 13 in this report would provide a potential solution for this issue, as a national PFAS contamination map could be used to report instances where PFAS is detected in water supplies.

12.161 The committee understands complying with the revised Australian Drinking Water Guidelines will require investment on the part of state and local governments and water service providers, and that the Australian Government will need to make consequential amendments to other PFAS regulations.

12.162 The committee encourages the Australian Government to be proactive in providing support and guidance to state and territory governments and water service providers to assist in implementing the revised guidelines.

12.163 The committee notes calls by water service providers for the National Water Initiative (NWI)—a national plan for water reform created in 2004—to be revised to incorporate a coordinated approach to pollutants and contaminants, including PFAS. The NWI is an intergovernmental framework designed to establish water sharing and water management plans. It is the committee's view that a better mechanism to achieve this would be the National Water Quality

Management Strategy (NWQMS), which provides a nationally agreed approach to managing water quality.

12.164 In addition, government should consider creating a taskforce comprising regulatory agencies and relevant peak industry bodies to deal with the management of PFAS and implementation of the revised water guidelines.

Recommendation 31

12.165 The committee recommends that the Australian Government amends the National Water Quality Management Strategy to incorporate a coordinated approach to pollutants and contaminants, including PFAS. As part of this initiative, governments should create a taskforce, comprising regulatory agencies and industry bodies, to:

- **plan and coordinate the management of PFAS in water supplies around Australia;**
- **develop standardised PFAS monitoring protocols and a national register of results; and**
- **progress the implementation of the revised Australian Drinking Water Guidelines.**

Costs and who pays for remediation and removal of PFAS

12.166 The committee is aware of media reports that have estimated the total cost of testing, cleaning up PFAS contamination, and removing PFAS from drinking water systems in the United States to be several billion dollars a year. In the United Kingdom, it is estimated that substantial remediation and removal costs will be incurred over the next 20 years.

12.167 The committee was unable to locate a similar estimate for Australia. However, the Water Services Association of Australia told the committee that the advanced water treatment infrastructure required could cost $100–200 million per facility and be energy intensive to run. Water service providers would have to recoup these costs through higher consumer costs and fees.

12.168 Acutely aware of these potential costs, state and local governments and water service providers advocated strongly for regulations to stem the 'flow' of PFAS contamination into water and waste systems in the first place—so-called, 'source control'.

12.169 The committee notes evidence that PFAS only costs around $150 per kilogram to buy, but costs somewhere between $4 and $25 million per of kilogram to treat in wastewater. Committee members agree that preventing PFAS entering Australia's environment is more effective and efficient than trying to remediate and remove it.

12.170 The committee supports calls by the water services sector for governments to assist with the cost of upgrading water testing and treatment and makes relevant recommendation in subsequent parts of this chapter.

Recommendation 32

12.171 The committee recommends that the Australian Government works with state and territory governments and the Water Services Association of Australia to develop funding mechanisms that will support water service providers to meet upgraded PFAS testing and removal.

12.172 Like airport operators, utilities urged the Commonwealth to consider partially funding PFAS removal and remediation by pursuing litigation against manufacturers and suppliers of firefighting foams containing PFAS. The committee notes that the PFAS Independent review also suggested legal actions by the Commonwealth against manufacturers of PFAS could help fund remediation.

12.173 The committee notes that the Department of Defence suggested the government is considering potential legal action against 3M, the manufacturer of most PFAS-containing firefighting foams historically used in Australia. We also note the New South Wales Environment Protection Authority (NSW EPA) recently ordered 3M Australia to address PFAS contamination at Brogans Creek Quarry.

12.174 The committee supports calls from the United Firefighters Union of Australia, water utilities, and others to pursue compensation from these companies on behalf of the Australian government and the Australian people.

Recommendation 33

12.175 The committee recommends that the Australian Government actively pursues legal action against 3M and any other manufacturer of PFAS-containing firefighting foams used in Australia, with any settlement used to help fund remediation of contaminated sites.

PFAS in consumer goods, waste streams, and agriculture

12.176 The committee understands PFAS are present in a broad range of consumer products. Common examples include everyday household items, personal care products, cleaning products, outdoor wear, cookware, grease-resistant food packaging, stain-resistant furniture and repellents, plastics and paint. However, it is not possible to quantify how many, and which consumer products contain PFAS.

12.177 Evidence to the inquiry was focused on: potential PFAS exposure pathways from consumer goods; the problem of PFAS ending up in waste streams; PFAS

in food packaging; managing PFAS in imported goods; and questions about regulation and labelling.

Exposure pathways

12.178 PFAS from consumer goods may enter our bodies through skin absorption, inhalation or ingestion, and enter the environment through water treatment facilities and waste management infrastructure. Research on pathways other than ingestion, such as dermal uptake, is relatively new. However, evidence indicates PFAS are absorbed through the skin.

12.179 The committee also heard that indoor exposure to PFAS from household dust is an underrecognized pathway, and that dust containing PFAS can also enter the environment and water supplies during rain events. Further research in these areas would be beneficial.

12.180 The committee notes that three of the nine studies funded under the Australian government's PFAS Targeted Call for Research Scheme include consideration of alternative pathways. The committee was also interested to hear about research recently commissioned by Fire Rescue Victoria to measure dermal absorption of PFAS from Firefighter Turnout Gear. While noting that the context in which firefighters wear this gear is extreme and results may not translate to the broader population, committee members eagerly anticipate the outcomes of this research, along with the outcomes of the Targeted Call for Research—most of which are expected to be published during 2025 and 2026.

12.181 Should research indicate that inhalation and/or dermal exposure are bigger contributors to overall PFAS exposure than Australia's regulators currently presume, the committee would encourage a review of Australia's PFAS health advice that reflects any new information.

12.182 The committee shares concerns raised by the Circular Textile Working Group Australia (WA) that PFAS are commonly used in textiles imported to Australia, and that the textiles sector is estimated to be the biggest contributor to PFAS pollution in Europe.

12.183 The growing availability and consumer preference for cheap 'fast fashion' exacerbates the problem of PFAS from textiles flooding global waste streams. The committee agrees that clothing, textiles and furnishings, including carpets, must be considered priority areas for addressing PFAS contamination in the environment and potential human exposure from consumer goods.

Recommendation 34

12.184 The committee recommends that the Australian Government works with stakeholders from the textiles, clothing, floor coverings, and furniture sectors, and other relevant stakeholders, to:

- **measure the scale and distribution of PFAS in clothing, textiles, floor coverings, and furniture across Australia;**
- **identify key sources of PFAS-contaminated clothing, textiles, carpets and furniture, including import pathways;**
- **develop strategies for reducing the import of PFAS-contaminated clothing, textiles, floor coverings, and furniture; and**
- **develop mechanisms for more safely disposing of legacy PFAS-contaminated textiles waste.**

Food packaging

12.185 Submitters were particularly concerned about the levels of PFAS in food contact packaging. In an effort to make food packaging more environmentally sustainable, manufacturers have moved from plastic to fibre-based packaging. However, many producers intentionally add PFAS to this packaging for its water-repellent qualities, which can migrate into food, and ultimately ends up in the waste stream.

12.186 The Australian Packaging Covenant Organisation (APCO) implemented an action plan between 2021 in 2023 to phase out PFAS in food contact packaging, which has had some success. The committee commends industry for taking this initiative. However, the committee is concerned that this voluntary plan has not removed all PFAS from food contact packaging—industry's own results suggest 10 per cent of food contact packaging still contains PFAS. As such, committee members believe that regulation is likely to be required.

12.187 The committee understands that Australia imports most of its packaging, so regulating PFAS in food packaging is largely a matter for the Commonwealth government. Committee members also note that the Department of Environment is working with industry to determine methods for identifying PFAS in packaging items and is considering regulatory options.

Recommendation 35

12.188 The committee recommends that the Australian Government fast-tracks regulatory reforms to remove PFAS from all food contact packaging imported into and/or used in Australia and considers encouraging the establishment of a domestic, toxic-free packaging industry.

Other imported goods

12.189 Submitters highlighted the unique challenge of PFAS in imported goods. While Australia has recently instituted an industrial ban on a number of PFAS

chemicals of concern (discussed further below), many importers are not aware whether the goods they import and sell in Australia contain PFAS. Moreover, there is no clear mechanism by which this information can be ascertained or made generally available.

12.190 Several local and state government entities echoed this concern, expressing frustration at the lack of national oversight and efforts to prevent the circulation of consumer goods that contain PFAS.

12.191 The committee appreciates that state and local governments face a disproportionate burden from PFAS, as they are required to manage disposal and regulation of PFAS-contaminated waste but cannot 'turn off the tap' of PFAS-containing products entering the country.

12.192 The committee notes a majority of inquiry participants argued for banning non-essential uses of PFAS in Australia and some argued for compulsory labelling of PFAS in consumer goods.

12.193 The committee supports calls from state and local governments and other submitters for the Commonwealth to take the lead in reducing the incidence of PFAS in imported products.

12.194 To support the recent industrial chemicals import ban, one option for reducing PFAS in imported consumer goods would be to introduce labelling requirements. The committee understands that some types of products are already covered by labelling requirements in Australia, such as cosmetics. However, there is no broad requirement for labelling of products containing PFAS, such as clothing, furniture, floor coverings, textiles, paint, and general household items.

12.195 While other Commonwealth entities suggested the Australian Competition and Consumer Commission (ACCC) enforces relevant labelling standards and may have a role in enforcing the recent ban, the committee was told that the ACCC does not undertake testing and surveillance to monitor imported consumer goods for the presence of PFAS or other chemicals, and would not have a role in enforcing an importation ban on consumer goods containing PFAS.

12.196 Compulsory labelling of PFAS in consumer products should be considered, particularly for those products with a higher risk of chemical leaching, such as personal care products. The committee agrees with proposals that mandatory labelling would discourage manufacturers from including PFAS variants of concern in their products, would help Australian importers to be compliant with Australia's PFAS regulations, and may help individuals make informed choices about the goods they purchase.

12.197 Australian government agencies, including the Department of Environment, Australian Border Force, and the ACCC, need to work together to develop

mechanisms for identifying imported products that contain PFAS, and restricting their import into Australia.

12.198 Further views on enforcing PFAS regulation are outlined below, under 'Policy and coordination'.

PFAS in waste streams

12.199 The committee notes compelling evidence that costs associated with PFAS removal and wastewater treatment are much greater than the costs required to produce PFAS chemicals and the products that contain them. Considering that many consumer products end up in waste streams, it is likely to be easier and cheaper to reduce the influx of PFAS-containing products, rather than dealing with them once they enter waste streams.

12.200 Preventing PFAS entering waste streams should be the priority. However, even if PFAS-containing products stopped entering the Australian economy immediately, there would still be a large amount of legacy PFAS-contaminated waste to be managed.

12.201 Submitters from the waste management sector explained that current approaches to managing PFAS contamination in waste streams involves setting 'end-of-pipe' guideline values for PFAS in soil, water, and biosolids.

12.202 Limits on PFAS in biosolids are recent, with allowable limits only stipulated in version three of the *PFAS National Environmental Management Plan* (NEMP 3.0), released in March 2025. Most states have not yet adopted regulatory limits for PFAS in biosolids. This was a concern for a number of submitters, who argued that reducing PFAS in biosolids and compost products should be a priority, and that government should consider imposing requirements to label these products when they contain PFAS (including the concentration).

12.203 State and local authorities also called for more resources to be provided by the Commonwealth to assist in managing the legacy PFAS burden and meeting stricter requirements for end-of-pipe management of PFAS waste.

Recommendation 36

12.204 The committee recommends that the Australian Government works with state and territory governments, local councils, and the waste management sector to develop a plan for dealing with legacy PFAS contamination in Australian waste streams, including consideration of funding, options to reduce disposal of PFAS contamination in landfill facilities, and cost-sharing mechanisms.

Agriculture

12.205 PFAS contamination directly affects some land that is or has been used for food production. In addition, the committee heard that the application of PFAS-contaminated biosolids to uncontaminated agricultural land poses significant risks for subsequent contamination of the food chain and the natural environment.

12.206 Committee members note that regulatory limits for PFAS in biosolids form part of the update to the latest version of the PFAS NEMP, discussed below.

12.207 Witnesses noted there are no regulatory limits for PFAS in stock water, meaning livestock may be drinking contaminated water. However, regulators argued that farming practices often minimise or reduce PFAS levels in stock, and that regulatory limits for stock water are not required.

12.208 The committee did not receive enough information to form a concrete view on this matter, but supports efforts to ensure livestock meant for consumption are not raised on heavily contaminated land.

12.209 We also note that a recommendation of the PFAS Independent Review was for the proposed national coordinating body to address risks associated with food production in the context of PFAS contamination, including by developing new Health Investigation Levels to inform risk assessments for the suitability of relevant land uses. The committee supports this recommendation and would support the development of further mechanisms to ensure that farmers and others who produce food from the land are informed of relevant PFAS contamination.

Recommendation 37

12.210 The committee recommends that the Australian Government fast-tracks the development and publication of new Health Investigation Levels to inform risk assessments for the suitability of PFAS contaminated land for agricultural purposes, and publishes advice on the threshold over which produce containing PFAS should not be sold.

Recommendation 38

12.211 The committee recommends that, in line with Recommendation 16, the Australian Government provides publicly available information identifying the presence of PFAS contamination on farming land, and proactively informs landholders.

12.212 Another issue related to PFAS and agriculture was around the presence of PFAS in pesticides. The committee received some evidence. However, this evidence was limited.

12.213 Some submitters claimed that PFAS may be used as an active ingredient in pesticides, may be included in packaging or containers, or that organofluorine

compounds used in pesticides (which do not meet the definition of PFAS) may nevertheless degrade into short-chain PFAS in the environment.

12.214 Other evidence disputed these suggestions. For instance, CropLife and the Australian Pesticides and Veterinary Medicines Authority insisted that pesticides used in Australia are rigorously assessed to ensure they are safe for humans, animals, and the environment.

12.215 The committee understands that Australia briefly had a scheme that required review and re-registration of agricultural and veterinary (agvet) chemicals, to ensure their ongoing safety. That scheme was repealed in 2014 by an incoming government, shortly after it was established.

12.216 Some committee members indicated support for reinstating this scheme.

12.217 Where senators have formed a view on this matter, it is included in their additional comments.

Policy and coordination

12.218 This section includes the committee's views on regulation of PFAS chemicals in Australia, including the recent Schedule 7 listing. It then discusses the PFAS National Environmental Management Plan (NEMP), including national coordination, funding and support. The section finishes by discussing PFAS research and policy development, and PFAS public information.

Regulating PFAS—individually or as a group?

12.219 Australia has recently instituted a ban on the import, industrial use and manufacture of a number of PFAS chemicals by listing these chemicals under the Industrial Chemicals Environmental Management Standard (IChEMS) Schedule 7. Schedule 7 contains the highest risk chemicals, which should be phased out, and can be subject to strict management conditions.

12.220 The Schedule 7 listing includes PFOA, PFOS and PFHxS (and related chemicals). Other PFAS variants are also being considered for listing. While PFAS variants may be *assessed* in groups, PFAS chemicals must still be *listed* (regulated) individually.

12.221 A number of inquiry participants argued that PFAS should be assessed and regulated as a group, rather than individually, to take a precautionary approach and speed up the process and reduce the likelihood that manufacturers will replace existing, restricted PFAS chemicals with new ones.

12.222 Many inquiry participants recommended phasing out, or banning the use of, all PFAS in Australia. However, others noted that there are many different kinds of PFAS chemicals, some may be less toxic than others, and a blanket ban would have unintended consequences.

12.223 Under existing processes, Australian regulators may test and consider PFAS in groups where they have similar characteristics. However, the committee was told it is unlikely that Australia would move to ban all PFAS as a group.

12.224 In fact, the committee notes advice from the Department of Environment that there are 'chemicals of lower concern' that can often be substituted for the PFAS that have been banned. Part of the role of the IChEMS is to provide a source of advice on safer alternative chemicals to those listed in the more heavily restricted schedules.

12.225 Committee members hold a variety of views on whether PFAS should be banned as a group or class of chemicals, or assessed and regulated individually, as they are now.

12.226 The views of individual senators on this matter are included in their additional comments.

12.227 That being acknowledged, committee members agree that chemical regulation is an increasingly complex field which may require additional resourcing for Australia's chemical regulators.

Recommendation 39

12.228 The committee recommends that the Australian Government provides additional resources to the Australian Industrial Chemical Introduction Scheme to fast-track chemical assessment, including for PFAS and other persistent organic pollutants (POPs) to ensure toxic chemicals are not allowed on the market.

Enforcing the Schedule 7 listing

12.229 The Schedule 7 listing allows the Minister to prohibit 'articles' (products) containing the specific PFAS that have been scheduled. However, the listing of PFOA, PFOS and PFHxS (and related chemicals) will not, by itself, stem the flow of PFAS into Australia.

12.230 Implementation of this ban requires adoption by states and territories, and enforcement of chemical regulation is generally considered to be a state and territory responsibility. However, as discussed above, states and territories note that they have limited capacity to prevent pollution resulting from imported products containing PFAS.

12.231 The committee notes that the IChEMS listing includes no detection or disclosure mechanisms, and there is not currently any legislation, policies or procedures in place to give effect to the ban at the border. Further, while the listing applies to articles (products), it is unclear how it would apply to 'individual imports'—products purchased by individuals from overseas online retailers.

12.232 Inquiry participants made a number of recommendations aimed at improving Australia's regulation of PFAS, including:

- better harmonisation of chemicals regulation at Commonwealth, state and territory levels;
- increased powers and resources for Commonwealth entities to enforce the ban on PFAS in imported products;
- consideration of mechanisms to reduce the instance of PFAS in products purchased online by individual Australians; and
- mandatory reporting on the importation, storage and use of PFAS.

12.233 The Department of Environment argued that interventions on PFAS must be risk-based, evidence-based, proportionate and pragmatic, and make efficient and effective use of available resources.

12.234 Committee members agree that the Schedule 7 listing is a good start, but needs to be supported by adequate, risk-based and proportionate detection, disclosure and enforcement mechanisms.

Recommendation 40

12.235 The committee recommends that the Australian Government prioritises work to develop legislative and policy mechanisms to enable the Schedule 7 listing of PFOA, PFOS and PFHxS (and related chemicals) to be effectively monitored and enforced, especially in relation to imported products.

12.236 Detection, disclosure and monitoring mechanisms should include internal assessments and self-reporting by businesses along with independent product testing where appropriate.

12.237 Enforcement mechanisms should be risk-based, focussing on industries and sectors where businesses may be unintentionally or unwittingly importing products containing restricted PFAS.

Recommendation 41

12.238 The committee recommends that, as a priority, the Australian Government works to enforce the PFAS ban in relation to cosmetics and personal care products, including period products.

Recommendation 42

12.239 The committee recommends that the Department of Climate Change, Energy, the Environment and Water works with the Department of Health, Disability and Ageing and the Australian Competition and Consumer Commission to develop a mandatory product labelling regime aimed at retailers, wholesalers, distributors, importers and manufacturers who import consumer products containing PFAS chemicals.

Ratification of the Stockholm Convention PFAS listings

12.240 Numerous submitters argued that Australia needs to urgently ratify the three Stockholm Convention PFAS listings.

12.241 The committee notes evidence from the Department of Environment that it is working on the necessary architecture to enable ratification, and that adoption of the IChEMS into state and territory regulations is the next step. The committee also notes, however, that departmental witnesses stated there is no timeframe for ratification, and the department has other pressing priorities, suggesting this may not be a core priority of the government.

12.242 The committee would suggest that ratification remains a priority for the government and that, if further resourcing is required in order to enable the Environment Department to continue this work, that resourcing be provided.

12.243 The committee was encouraged to hear that adoption of the IChEMS framework into state and territory regulatory regimes should enable a more efficient and streamlined process for ratifying future amendments to the Stockholm Convention.

Recommendation 43

12.244 The committee recommends that, as a priority, the Australian Government:

- **provides adequate resourcing for the development of legislation and associated regulations to give effect to the ban on PFAS;**
- **works with states and territories to encourage and support adoption of the Industrial Chemicals Environmental Management Standard (IChEMS) into state and territory chemical regulations;**
- **urgently progresses the treaty making process to enable the ratification of the Stockholm Convention listings of PFOS, PFOA and PFHxS; and**
- **works across government to develop a clear and simplified framework to enable faster ratification of future amendments to the Stockholm Convention and domestic implementation of toxic chemical bans.**

Recommendation 44

12.245 The committee recommends that the Australian Government develops a standardised approach to domestic chemical classification and regulatory changes for new hazard classifications made by the International Agency for Research on Cancer.

PFAS NEMP

12.246 The NEMP provides a highly detailed, evidence-based framework for the community, environmental regulators, governments and industry to address PFAS contamination.

12.247 The most recent version includes new guideline values for investigation and risk assessment; guidance around remediation of contaminated land; guidance on re-use of resource recovery products; and risk-based criteria for re-use of biosolids contaminated with PFAS.

12.248 Inquiry participants highlighted the critical role played by the NEMP in forming the basis of many state and territory policies and regulations, remediation practices, and environmental management approaches. However, some were concerned about the inconsistent application of the NEMP's standards and practices across different states and territories.

12.249 Inquiry participants argued that:

- thresholds and standards in the NEMP should be consistently applied in all jurisdictions;
- PFAS contamination should be monitored and publicly reported by an independent national body;
- jurisdictions should better share information and data in order to facilitate better coordination and more strategic, risk-based management of PFAS in the environment;
- a map of PFAS-contaminated sites, along with contamination data, should be publicly available and easy to use; and
- local governments should be better supported to incorporate new waste management standards and requirements into their practices, including being supported to remediate legacy PFAS contamination.

12.250 Committee members agree that states and territories should look to incorporate consistent standards, practices and regulatory limits as outlined in the NEMP. While this is a matter for states and territories, the Commonwealth has a role in providing encouragement and support.

12.251 Committee members believe states and territories are committed to the NEMP, including the latest iteration—NEMP 3.0. However, we note that a number of jurisdictions are calling for more resources and assistance from the Commonwealth to help interpret and incorporate the new requirements.

12.252 The committee was concerned by evidence from the Department of Environment that it does not monitor jurisdictional implementation, and that there are no departmental resources dedicated to overseeing or supporting the implementation of the NEMP.

12.253 As a minimum, the Commonwealth should support the NEMP, providing information, resources, and assisting with interpretation and integration into state and territory regulatory regimes.

Recommendation 45

12.254 The committee recommends that the Australian Government works through intergovernmental decision-making forums, such as National Cabinet and the Heads of Environmental Protection Authorities Australia and New Zealand, to encourage and support jurisdictions to incorporate the standards, practices and regulatory limits outlined in the PFAS National Environmental Management Plan (NEMP) into their own regulatory regimes, including new limits for biosolids.

12.255 The Australian Government should consider providing additional resourcing and support as jurisdictions implement NEMP 3.0, including by funding the Department of Climate Change, Energy, the Environment and Water to provide departmental staff to oversee and support the implementation.

Research and policy development

12.256 There is no doubt that research has a pivotal role to play in the approach taken by governments and regulatory agencies to the management of PFAS in Australia. The highly technical nature of the issue means that governments rely heavily on experts in a number of fields, including health, epidemiology and biology, chemical engineering, and waste management technologies.

12.257 Evidence considered throughout the inquiry demonstrated that progress in Australia's management of PFAS has been achieved through strong leadership and collaboration between governments, research organisations and industry.

12.258 A number of industries have an interest and a contribution to make to defining and measuring the problem, as well as designing and implementing solutions. However, governments need to be aware of the potential impact of conflicts of interest and put in place robust measures to manage these conflicts.

12.259 Investments in PFAS research should be focused on areas of highest need, where research outcomes will best serve the public interest. It is incumbent upon governments to provide leadership in this area, ensuring public funding is directed towards PFAS research that benefits the community.

12.260 Inquiry participants from all sectors acknowledged the critical role of scientific data and research in the development of PFAS policy and suggested future research needs to be better coordinated and focused, with a view to supporting a more strategic approach to managing the problem of PFAS in Australia.

12.261 The committee supports a number of suggestions made by inquiry participants, including that:

- governments should partner with research organisations, industry, and technology sectors to develop unified regulatory frameworks, provide better public information, and fast-track the development of remediation technologies;

- governments should prioritise supporting longitudinal studies; and
- government should work together to streamline ethics approval processes for critical PFAS research to ensure this research is not unnecessarily held up.

Recommendation 46

12.262 The committee recommends that the Australian Government works with: research organisations including the CSIRO, Australian Academy of Science and Australian Academy of Health and Medical Sciences; industry bodies; and independent research centres like crcCARE, to develop a strategic PFAS research strategy and roadmap.

12.263 A national PFAS research strategy should focus investments towards developing novel remediation technologies, supporting longitudinal research—particularly in relation to health and environmental impacts—and streamlining ethics approval for research involving multiple jurisdictions.

PFAS public information

12.264 Inquiry participants were critical of Australia's existing public information on PFAS. The Australian Government PFAS Taskforce website has been a primary source of information about PFAS until recently. This legacy website was inconsistently updated since the taskforce was disbanded in 2022 and appears to have now been replaced with a revised website, hosted by the Department of Environment.

12.265 While this is a positive step, the committee notes that the 'Contact us' page on the website still lists five separate Commonwealth departments and suggests that members of the public contact the 'relevant' Australian Government department 'directly', if they have a query. This is likely to be confusing to the average Australian seeking information about PFAS.

12.266 The committee supports calls from inquiry participants for the Commonwealth to coordinate the provision of a simple, easy to understand website, which functions as a single source of information on PFAS for the public. A revised PFAS website must provide a single point of contact for members of the public who are concerned about PFAS and should aim to eventually include a map of PFAS contamination 'hotspots', and information about remediation in these areas (as proposed in Recommendation 16).

Recommendation 47

12.267 The committee recommends that the Australian Government provides user–friendly, up-to-date public information on PFAS which incorporates:

- **a 'single source of truth' on PFAS, updated regularly according to the most recent evidence, with publication dates included on all pages;**

- **a single point of contact for members of the public to ask questions about PFAS; and**
- **in due course, a map showing PFAS contamination 'hotspots' and remediation activity (see Recommendation 16).**

12.268 This information could be provided on a new website or the existing website hosted by the Department of Climate Change, Energy, the Environment and Water (pfas.gov.au).

Senator Lidia Thorpe
Chair

Additional comments from Senator Thorpe

Introduction

1.1 In August 2024, I initiated this Select Committee and inquiry, after having become aware of the ever-increasing health and environmental impacts of PFAS chemicals. I found it particularly devastating to hear from members of the Wreck Bay Aboriginal Community about how PFAS have poisoned their lands, waters, totem, and people. This community has suffered a lot from the contamination resulting from PFAS-containing firefighting foams used at the nearby military base. It became clear to me that, as a country we do not yet sufficiently address the health and environmental impacts from these 'forever' chemicals, which threaten to be the 'asbestos of the 21st century'.

1.2 We need a well-considered and coordinated national approach to effectively support affected communities, undertake remediation of soils and water, and prevent these chemicals from causing even more harm.

1.3 I am grateful for the unanimous support of the Senate in establishing this committee and the work it has been able to undertake over the last year.

1.4 The committee collected a vast amount of evidence, completed eight public hearings and conducted three important site visits, gathering critical evidence for two substantial reports.

1.5 While there are further hearings we could have held and more communities I would like to have visited, the committee can be proud of the work we have done to dig deeper into this pressing issue.

1.6 Committee members come from across the political spectrum. We all acknowledge that PFAS is a complex issue, and we may not always agree on the way forward. In that context, I am pleased with what we were able to achieve as a committee and the report we are presenting as a result.

1.7 Committee members engaged in earnest with a substantial amount of evidence, considered a wide range of possible recommendations, and were able to achieve consensus in many areas.

1.8 Most of all, however, I would like to thank affected communities, groups and individuals who provided evidence and invited the committee to see and hear for themselves the impacts PFAS chemicals have had on them—something that can be very challenging to talk about. I would also like to thank the experts who gave evidence as part of this inquiry—all of which formed the basis for the extensive report and recommendations we are now able to present. I very much hope that the recommendations, at least to some extent, address your concerns and that they can result in real action.

1.9 If implemented, the recommendations in this report would improve Australia's response to PFAS and other hazardous chemicals and bring this country closer to world's best practice in PFAS regulation and response.

1.10 But there is more that can and should be done.

1.11 The committee received evidence to support a number of additional, important recommendations that were not included in the majority report; those recommendations are outlined here.

1.12 I sincerely hope that this and future governments will consider these and the main report's recommendations seriously and in an unbiased manner and do what is right for this country and its people.

PFAS are toxic to living things

1.13 The committee weighed up evidence from Australia and overseas on the science of PFAS and human health. Overwhelmingly, scientists—including toxicologists—told the committee sufficient evidence *already exists* to indicate with reasonable scientific certainty that PFAS are harmful to human health.

1.14 Scientists from Australia, the United States (US), and Denmark explained how PFAS impact the immune and reproductive systems, increase cholesterol levels, impact the endocrine system, are strongly associated with kidney and testicular cancer, and are implicated in numerous other cancers. PFAS build up in the body and are poisonous to living creatures, including human beings.

1.15 Early PFAS products like Teflon were hailed as miraculous and safe, echoing the way tobacco products were sold in the first half of the 20th Century. Meanwhile, chemical companies including DuPont and 3M had evidence that early types of PFAS—and later, PFOA and PFOS—were toxic *decades ago*, based on the results of their own animal studies and studies on their own workers. They chose to suppress that evidence, cherry-picked results, left adverse findings unpublished, and failed to conduct follow-up studies where evidence pointed to a problem.

1.16 Although some types of PFAS have been produced for over 70 years, the findings of independent research on their toxicity would not be published for 50 years. Despite this lag, there are now many thousands of high-quality studies establishing strong links between PFAS exposure and significant health impacts.

1.17 Australian governments have been very cautious in their acknowledgement of the health impacts of PFAS, and often inconsistent in their messaging around encouraging precaution while officially stating that there is no reason to worry about potential health impacts of PFAS. This advice is confusing to the public and has led to a lag in action to address the health impacts of PFAS, particularly in highly affected communities and professions.

1.18 It seems like governments have been scared of the implications acknowledging the health impacts of PFAS could have, but inaction based on this is unacceptable and neglects the government's duty of care towards the people.

1.19 Australian governments and authorities must take a precautionary approach to protecting people, as well as the environment, from these dangers. Australian regulators should be more consistent and definitive in their language:

- *PFAS are toxic to living things.*
- *PFAS are immunosuppressive.*
- *Most Australians have low levels of PFAS exposure.*
- *Exposure to PFAS may impact your health, especially higher levels of exposure.*
- *Pregnant women and young children are especially vulnerable.*

1.20 If people are concerned about their exposure to PFAS, blood tests can tell them their PFAS levels in relation to average or typical levels. There are options to reduce the amount of PFAS in a person's blood, such as through regular blood or plasma donations. And there are low-risk health interventions—from simple blood tests to more regular cancer screening—which may be of benefit to those with high exposure levels.

1.21 At the moment, this information and these options are only available to a small subset of those exposed (some firefighters), and only because they took the initiative to set it up for themselves. This is not fair and it is not right. The government insists that testing is not required, but without testing, it is hard to build a further evidence-base and for people to seek proactive healthcare. Having access to testing and blood and plasma donations has also shown to reduce people's anxiety levels as they feel less helpless and start taking the situation into their own hands.[1]

1.22 In the case of Wreck Bay, a small but highly affected Aboriginal community, it was clear that the health impacts on the community have been devastating, with many—even young—people passing away in recent years. The situation has been described as an obvious cancer cluster, yet due to the small size of the community, this is scientifically hard to prove. This argument has been used by governments to avoid providing much needed health screening and support to the community.

1.23 The Wreck Bay class action reached a settlement over cultural loss, and did not cover health impacts on the community, despite the community still dealing with the ongoing health impacts. It is clear that, despite the community crying out for help for years, government action has been lacking and that the health impacts on the Wreck Bay community urgently need to be addressed and publicly acknowledged so that healing can start to happen.

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[1] See for instance: Ms Jayne Newgreen, Private capacity, *Committee Hansard,* 4 June 2025, p. 3; Mr Christopher Howe, *Submission 91,* p. 6.

1.24 The committee made a number of recommendations designed to improve Australia's response to PFAS as a health hazard. The committee has recommended a national chemicals biomonitoring program, clearer health messaging, targeted longitudinal research, enhanced health monitoring, and increased cancer screening for heavily exposed cohorts.

1.25 I reiterate those recommendations and urge the government to take responsibility—and act *now*—for the relatively small number of people in this country who have been heavily exposed to PFAS.

1.26 I welcome the recent developments where the United Firefighters Union Aviation Branch achieved presumptive cancer workers compensation coverage for their members on Norfolk Island. This was one of the recommendations in their submission to this inquiry, and I hope this inquiry has been helpful in achieving this change, which will provide important cover for Norfolk Island firefighters, and should be the absolute minimum that can be done for people who have put their lives on the line to protect the wider community.

1.27 It is not good enough to tell the firefighters, residents of heavily contaminated areas, like Williamtown, Katherine and Wreck Bay, and others exposed to high levels of PFAS, that there is nothing that can be done for them.

1.28 In addition to the recommendations made by the committee, I therefore recommend the following:

Recommendation 1

1.29 That Food Standards Australia New Zealand urgently establishes regulatory limits on PFAS in food, taking into account a holistic quantification of population PFAS exposure and the presence of PFAS in takeaway and other food packaging.

Recommendation 2

1.30 That the Australian Government adds liver cancer to the list of cancers covered by the *Safety Rehabilitation and Compensation Act 1988* and other work health and safety legislation and works cooperatively with state and territory governments to facilitate the inclusion of liver cancer in their presumptive workers compensation legislation.

Recommendation 3

1.31 That the Australian Government:

- **extends eligibility for access to Medicare benefit item number 13750 for firefighters and others with PFAS levels in excess of 5ng/ml PFOS/PFOA and 2ng/ml PFHxS to access therapeutic plasma/blood treatment in order to reduce their PFAS blood levels; and**

- **works with the Norfolk Island Regional Council to facilitate and fund regular plasma donations for firefighters and community members who have experienced significant PFAS exposure on Norfolk Island.**

1.32 The committee has recommended that the Australian Government *considers* providing subsidised PFAS blood testing, enhanced health and cancer screening, and targeted mental health support for those people with the highest levels of PFAS exposure (Recommendation 3).

1.33 While I support this recommendation, it could be stronger. As such, I recommend:

Recommendation 4

1.34 That the Australian Government *urgently provides* subsidised PFAS blood testing, enhanced health and cancer screening, and targeted mental health support for those people with the highest levels of PFAS exposure, including some firefighters, people exposed at work, and residents of heavily contaminated areas (especially those with exposure to home-grown produce, contaminated seafood, plants and animals, river and creek waters, and/or bore water).

Recommendation 5

1.35 In addition to subsidising blood testing and health monitoring, the Australian Government should provide additional funding to the South Coast Medical Service Aboriginal Corporation to increase primary care access for members of the Wreck Bay Aboriginal community.

Industry interference led to delays

1.36 The fact that countries like Australia did not move to ban PFAS until 2025 is a direct result of the choices made by companies like DuPont and 3M to suppress and ignore early scientific evidence that their products were harmful.

1.37 The committee was privileged to hear from American attorney, Mr Robert Bilott, who fought for decades to expose the dangers of PFAS. Mr Bilott explained how legal action against DuPont eventually brought this hidden research to light. Courts then compelled DuPont to fund and participate in a large-scale, independent study of the impacts of PFAS on a heavily exposed population in West Virginia. Around 69 000 people participated in the study, which conclusively found in 2013 that exposure to PFOA in the water supply had probable links with six different diseases, including testicular and kidney cancer.

1.38 DuPont and related companies have since settled dozens of lawsuits, paying out billions in damages and compensation, including a 2023 settlement with water

providers for US$1.19 billion, and a recent 2025 settlement with the State of New Jersey for US$875 million.[2]

1.39 Along with the findings of the West Virginia study and other independent scientific studies, chemical company data and records were provided to American regulators who eventually set regulatory limits. Some states in the US have gone further than others, with the state of Maine passing the first national law (to take effect in 2030) that will prohibit intentionally added PFAS in products.

1.40 I share Mr Bilott's frustration that regulators in countries like Australia have been so slow to act, insisting on *Australian* data and *Australian* research, when masses of high-quality international evidence already exists.

Regulators were too slow to act

1.41 Action from Australian regulators has been patchy, slow and inconsistent. The Department of Defence may have known about the dangers of PFAS as early as the late 1980s when its own consultants' reports advised that PFAS were environmental hazards and should not be released into waterways.[3]

1.42 There is no doubt that the Australian Government had credible advice—including written warnings from US regulators—that PFAS may be dangerous to human health from at least the year 2000. As outlined in the committee's report, the forerunner to the Australian Industrial Chemicals Introduction Scheme (AICIS), the National Industrial Chemicals Notification and Assessment Scheme, called for governments to cease using PFAS-containing firefighting foams in 2003. Yet action was slow and way too little.

1.43 Regulators in some states took *years* to pass on this warning to their fire services, allowing millions more litres of toxic firefighting foam to flow into Australia's environment and waterways. Airservices continued using these foams until 2010 and, while Defence has worked to phase these foams out over a number of years, it still uses them in a limited number of circumstances, causing further health and environmental impacts. The committee also heard that a significant proportion of fixed firefighting infrastructure—including at airports—is still loaded with PFAS-containing foams.

1.44 This must be addressed before these legacy stores end up in the environment and water supply.

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2 Ben Casselman, Ivan Penn and Matthew Goldstein, *'Three "Forever Chemicals" Makers Settle Public Water Lawsuits'*, *The New York Times*, 2 June 2023; CHEMTrust, *'DuPont, Chemours and Corteva to Pay $875 Million to New Jersey over PFAS Pollution Claims'*, 14 August 2025 (accessed 6 November 2025).

3 Christopher Knaus, 'Australian defence force warned about toxic firefighting foam 30 years ago', *The Guardian Australia*, 9 October 2017 (accessed 6 November 2025).

1.45 Even more concerning are the delays between when government first detected significant PFAS contamination around Defence bases and when it began notifying impacted residents.

1.46 We know Defence started phasing out these firefighting foams in 2004 and conducted various early environmental tests in subsequent years. Previous parliamentary inquiries into PFAS reveal that Defence began routinely testing for PFAS contamination around its bases in 2011, and that it detected contamination around RAAF BASE Williamtown in 2012.[4]

1.47 Defence wrote to a number of stakeholders about this detection in 2012, including local water service providers. However, impacted residents were not informed until *three years later*. That is irresponsible and unacceptable.

1.48 In 2015, the New South Wales Environment Protection Authority (NSW EPA) notified Defence that it had decided to take a precautionary approach by informing local residents and issuing precautionary advice. The NSW EPA advised locals to 'not drink bore water and to not eat fish caught in the nearby area or eggs from backyard chickens that have been drinking bore water in the area'. The EPA also temporarily closed commercial and recreational fisheries, pending further investigations.[5]

1.49 Defence has publicly admitted that it should have told the community in 2012.[6]

1.50 If the NSW EPA had not acted, how long would the Department of Defence have taken to inform local residents?

1.51 We see the same thing in other parts of Australia, including Wreck Bay, where contamination was detected in 2016, but health warnings were not issued until 2018—and even then, not by the Commonwealth. When the committee visited in January this year, it was obvious that public signage and warnings were still inadequate and that the community had many questions that remained unanswered.

1.52 In fact, all around Australia, we see that First Nations communities were often the last to know about the contamination, despite being more heavily exposed due to traditional diets, fishing, hunting, swimming and consumption of bush foods.

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4 Senate Foreign Affairs, Defence and Trade References Committee, *Inquiry into firefighting foam contamination: Part A—RAAF Base Williamtown*, February 2016, p. 6 (accessed 6 November 2025).

5 Senate Foreign Affairs, Defence and Trade References Committee, *Inquiry into firefighting foam contamination: Part A—RAAF Base Williamtown*, February 2016, pp. 8–14.

6 Linton Besser, Lisa McGregor and Jeanavive McGregor, 'Defence admits three-year delay in warning people about toxic foam danger', *ABC News online*, 9 October 2017 (accessed 6 November 2025).

Another injustice for First Peoples

1.53 One of the most eye-opening and important parts of this inquiry was the committee's trip to Wreck Bay and its public hearing in Nowra.

1.54 I am immensely grateful to the Wreck Bay community, including the Elders and Traditional Owners who welcomed me and the other committee members onto their beautiful land. It was a privilege to learn a little bit about Wreck Bay's history and culture and see some of the significant sites that have been damaged by this contamination.

1.55 I was heartbroken to hear the stories of loss and suffering and see for myself how the water has been poisoned and the animals (totems) are suffering. Nothing can make up for what Wreck Bay people have endured, certainly not a few thousand dollars of compensation.

1.56 At the same time, I was struck by the strength and resilience of the community and impressed by the knowledge and dedication of the Bherwerre Rangers, who continue caring for Country despite the devastating impacts of PFAS leaching onto the land and into the water from nearby Defence facilities.

1.57 Community members described finding out about the PFAS, and the restrictions it would suddenly place on their lifestyle and culture, as an abrupt and profound shock, causing deep pain. Even more distressing was being told that this poison is *forever*.

1.58 Wreck Bay people will never again be able to use their lands and waters in the ways they have done for thousands of years. It is no longer safe to eat many of the traditional foods, gather plants for medicine and cultural purposes, for children to swim in local creeks and rock pools, or for women to birth on Country in sacred waters.

1.59 Thousands of years of cultural practice, customs and traditions were stopped, practically overnight, with little recognition or acknowledgement from the authorities responsible for this disaster.

1.60 This failure of the Commonwealth is disappointingly typical and a symptom of the continued cultural genocide on First Peoples, violating their inherent rights.

The rights of Indigenous peoples

1.61 As First Peoples, we have suffered from historic injustices as a direct result of colonisation and dispossession of our lands and resources. The United Nations (UN) recognises these injustices have prevented Indigenous peoples from exercising their right to development in accordance with their own needs and interests.

The right to practice culture and maintain health

1.62 Recognising this history of dispossession and injustice, the UN *Declaration on the Rights of Indigenous Peoples* (UNDRIP), adopted by the UN General Assembly on

13 September 2007, declares that First Peoples have a protected right to practise their culture and customs. Article 11 states that Indigenous peoples have the right to 'practise and revitalize their cultural traditions and customs', including 'past, present and future manifestations of their cultures'.[7]

1.63 Related to this, Article 25 outlines the right of Indigenous peoples to:

> … maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard.[8]

1.64 Article 24 states that Indigenous peoples 'have the right to their traditional medicines and to maintain their health practices', as well as the right to access all social and health services without discrimination. Article 24 compels states to 'take the necessary steps' to ensure Indigenous individuals are able to enjoy 'the highest attainable standards of physical and mental health'.[9]

1.65 Defence and other Commonwealth agencies, along with state health and environment protection authorities, have issued precautionary advice that substantively interferes with First Nations communities' right to practice their culture and customs in PFAS-contaminated areas. Traditional food sources have been suddenly prohibited, with no alternative provided, and no compensation paid. Access to lands, waters, flora and fauna, integral to traditional and cultural practices have been severely restricted.

1.66 First Peoples have not received an acknowledgement, an apology, or compensation from the Commonwealth or any other government for these injustices, nor has sufficient action been taken to address their substantive nature.

1.67 The majority of litigated and non-litigated claims for damages against the Commonwealth relating to PFAS have been limited to landowners in the affected communities. These claims have been paid on the basis of diminution of property values, perceived degradation of land quality, and loss of 'enjoyment' of land (considered a 'nuisance-style' claim in the courts).

1.68 The Wreck Bay class action settlement was unique among PFAS class actions in Australia because the claim was commenced on behalf of the Aboriginal community and sought damages for *cultural loss*—the first case of its kind in Australia.

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7 United Nations declaration on the rights of indigenous peoples, resolution adopted by the General assembly on 13 September 2007, p. 11 (accessed 6 November 2025).

8 *United Nations declaration on the rights of indigenous peoples*, 2007, p. 19.

9 *United Nations declaration on the rights of indigenous peoples*, 2007, p. 18.

1.69 It may have been a first, but it was also disappointing and disheartening for many in the community.

1.70 As the committee heard in Nowra, Australia's colonial legal system has no way of measuring, valuing, or fairly compensating First Peoples for the loss of culture and traditions caused by chemical contamination of their lands and waters.

1.71 Lawyers told the committee that, in their view, the $22 million settlement was the best that could be achieved in a legal system that has no precedent or mechanism to measure or value cultural loss.

1.72 If this is right, then the law needs to change.

1.73 Most community members received a few thousand dollars in compensation for what amounts to a permanent, profound disruption to their culture, traditions, food supply, and use of the land. This is grossly inadequate.

1.74 Along with culture and traditions, First Peoples have the right to maintain health practices and enjoy the highest standards of physical and mental health. Like non-Indigenous people, First Peoples in PFAS-affected areas—including Wreck Bay Aboriginal people, and Jawoyn, Dagoman, Wardaman and other First Peoples around the Katherine River—have been denied that right. Their health has been impacted in numerous ways, with governments failing to acknowledge those impacts, or provide compensation.

1.75 I was deeply concerned to hear, for example, about the failure of government agencies to take into account how restrictions on fishing are impacting the diets of Aboriginal people around the Katherine River. What might be regarded as small, administrative changes by the authorities has real impacts on peoples' lives, their health and their ability to practice culture.

1.76 The committee's recommendations—including Recommendations 18 to 24, which deal with specific impacts on First Nations communities—aim to address some of the damage that has been done to the physical and mental health of people in areas heavily affected by PFAS contamination, including First Peoples.

1.77 I also note advice from Shine Lawyers that it remains open for community members to raise health-related personal injury claims in the future.

1.78 People whose lives have been turned upside down by PFAS deserve acknowledgement, support and compensation. That said, it is expensive and stressful to go through these legal processes, and people should not have to take the government to court to be compensated for the health impacts of chemical contamination, such as PFAS.

The right to conserve and protect the environment

1.79 Globally, many Indigenous peoples feel connected in a profound way to their lands, waters, and the environment. Environmental destruction and

contamination are a continuation of the violence of dispossession and colonisation.

1.80 Article 29 of the UNDRIP states that Indigenous peoples 'have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources'. It commits states to 'take effective measures to ensure that no storage or disposal of hazardous materials shall take place on the lands or territories of indigenous peoples without their free, prior and informed consent'.[10]

1.81 All of Australia's Defence bases are on stolen land. The First Peoples Clans and Nations impacted by these bases did not choose for these facilities to be built on their land and have no say in the activities that take place on these bases, including the use of toxic chemicals, even though, according to the UNDRIP, they should have the right to Free, Prior and Informed Consent (see next section for further detail) on what impacts their lands and waters.

1.82 The Australian Government and the Department of Defence failed to take effective measures to ensure that PFAS were not stored, used, or disposed of on these lands. PFAS, and many other hazardous substances, have been allowed to contaminate Defence sites all over this country—and surrounding lands and waters—taking away the right of First Peoples to conserve and protect their environments.

1.83 Australia's current environmental laws exclude First Peoples from decision-making and disrespect their connection to the land. Protection of First Peoples' Country and cultures, and their right to Free, Prior and Informed Consent, must be embedded in Australia's environmental legislation, and all laws relating to the management of pollution, including PFAS.

1.84 In the absence of environmental laws that protect First Peoples' rights, the committee's recommendations urge the Commonwealth to form meaningful, formal relationships with First Nations communities which empower those communities to make decisions about the future management of their lands and waters.

The right to make decisions on the development and use of lands and waters

1.85 Article 32 declares that Indigenous peoples 'have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources'. It commits states to 'consult and cooperate in good faith' with First Peoples, to 'obtain their free and informed consent' before approving any project affecting their lands, and to provide 'just and fair redress' for such incursions. Critically, the declaration also states that 'appropriate

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[10] *United Nations declaration on the rights of indigenous peoples*, 2007, p. 21.

measures shall be taken to mitigate adverse environmental, economic, social, cultural or spiritual impact'.[11]

1.86 The tokenistic communication and consultation efforts of Commonwealth agencies, such as Defence, have not met the government's responsibility to *consult and cooperate in good faith* or provide *just and fair redress* for permanently damaging culturally significant lands and waters.

1.87 After the committee's visit to Wreck Bay in January 2025, it appears that the Department of Defence immediately increased its consultation efforts and acted on the inadequate signage that had been in place for many years.

1.88 It is unfortunate that it took the visit of a parliamentary committee to motivate Defence to improve its response in Wreck Bay. It is also unfortunate that the Wreck Bay Aboriginal community had to take the government to court to get the small amount of redress that it got, while other Aboriginal communities whose land has been poisoned by PFAS have not received any compensation for cultural loss.

1.89 These failures represent a broader system of injustice that touches every aspect of First People's lives in this country. Addressing these systemic issues may have been outside the scope of this inquiry, however, implementation of the committee's recommendations would go some way to restoring the right to self-determination for First Peoples whose land is impacted by PFAS.

1.90 In addition to the recommendations made in the majority report, evidence from the Wreck Bay Aboriginal Community Council (WBACC) (discussed in the committee's interim report) indicated there may be an opportunity to review the Wreck Bay land claim in light of the PFAS contamination. Noting that this contamination was not understood at the time of the original land claim, there may be scope for a review, and an updated agreement which takes into account the damage caused by PFAS.

1.91 WBACC also suggested consideration could be given to providing uncontaminated land on which the community could build new housing for community members who no longer wish to live in Wreck Bay Village.

1.92 The government should seriously consider these suggestions and engage in good faith with WBACC and the community. I recommend:

Recommendation 6

1.93 That the Australian Government consults with the Wreck Bay Aboriginal Community Council and community members on:

- **reviewing and updating the Wreck Bay land claim in light of the impacts of PFAS contamination; and**

[11] *United Nations declaration on the rights of indigenous peoples*, 2007, p. 23.

- **providing uncontaminated land on which the community could build new housing for community members.**

Recommendation 7

1.94 That the Australian Government, in any development or implementation of legislation affecting land and waters, adheres to First Peoples rights as outlined in the *United Nations Declaration on the Rights of Indigenous Peoples*, including their right to Free, Prior and Informed Consent.

Stronger environmental management of PFAS

1.95 The committee made a number of recommendations designed to improve the way in which PFAS as an environmental contaminant is managed. However, over the course of the inquiry, the committee received some additional suggestions which warrant consideration.

1.96 For example, the Environmental Defenders Office suggested reforming the National Environment Protection Measures Framework to better regulate PFAS and recommended development of a water quality national environment protection measure.

1.97 These recommendations merit serious consideration by the government.

1.98 I note that proposed changes to Australia's national environmental laws are currently being debated in the Parliament and may impact on the applicability of these recommendations as drafted. Nevertheless, I recommend:

Recommendation 8

1.99 That the Australian Government:

- **reforms relevant national environment protection measures to better regulate PFAS; and**
- **prioritises the development of a water quality national environment protection measure which establishes enforceable water quality standards, objectives and goals to protect our water systems from PFAS and other contaminants.**

1.100 The committee heard evidence that Australia's PFAS National Environmental Management Plan (NEMP 3.0) was once a groundbreaking document but would benefit from being reviewed.

1.101 Experts on the NEMP argued that it should undergo an independent review to ensure it remains risk-proportionate, clear and actionable. As such, I recommend:

Recommendation 9

1.102 The Australian Government leads a review of the PFAS National Environmental Management Plan to ensure that the guidance it provides around remediation of contaminated land, re-use of resource recovery products, and criteria for re-use of biosolids, as well as the guideline values for investigation and risk assessment, are risk-proportionate, clear and actionable.

Landfill disposal of PFAS

1.103 It was concerning to hear that landfill disposal is a common practice for PFAS contaminated waste. While acknowledging that currently available destructive technologies are expensive and energy intensive, simply moving PFAS contamination off-site and into landfill is not a long-term solution.

1.104 Recommendations 29 and 30 of the committee's report are designed to increase the availability of a variety of different remediation technologies, including more environmentally sustainable options, and reduce Australia's dependence on landfill disposal of PFAS-contaminated waste. In addition, I recommend:

Recommendation 10

1.105 That the Australian Government pursues a coordinated approach to phasing out PFAS landfill disposal as a routine practice and focuses on developing a greater range of destructive technologies and supporting the development of innovative emerging destruction methods.

The problem of artificial turf

1.106 Evidence received by the committee about artificial, or synthetic, turf indicates that it is ubiquitous around Australia and poorly regulated. NSW alone has over 200 synthetic turf fields. Concerningly, artificial turf is also often used on school grounds, where children have daily contact with it.

1.107 It was disturbing to hear that research from the University of Technology Sydney indicates a single artificial turf field can lose from 800kg to 3200kg of PFAS-contaminated particulate directly into the environment.

1.108 As these artificial turf fields reach their 'end of life', there are potentially hundreds of thousands of kilograms of PFAS-contaminated pollutants that will be left to enter the environment, contaminating soil and leaching into waterways for decades to come.

1.109 To reduce this damage, I recommend:

Recommendation 11

1.110 That the Australian Government works with states and territories to progress national regulation that would ban PFAS in synthetic turf, artificial ground

coverings and associated products, and responsibly manage the impacts of PFAS contamination from legacy artificial turf products.

PFAS in pesticides

1.111 Inquiry participants, including Dr Matt Landos and Dr Mariann Lloyd-Smith highlighted concerns with Australia's regulatory regime for pesticides and the risks PFAS in pesticides might pose to the food chain.

1.112 Dr Landos revealed that the Australian Pesticides and Veterinary Medicines Authority (APVMA) often relies on manufacturers' claims about what is in their products, rather than conducting tests. This approach is flawed.

1.113 We have seen that manufacturers cannot be blindly trusted to do the right thing when it comes to disclosing PFAS in their products. In fact, the committee heard from Victorian firefighters that firefighting foams which manufacturers claimed were PFAS free, did in fact contain PFAS, as discovered when the firefighters undertook independent testing.

1.114 It is the Australian Government's responsibility to ensure that chemicals released on the Australian market are safe to humans and the environment. This responsibility cannot be passed on to manufacturers with little to no oversight.

1.115 In line with the Schedule 7 listing of several PFAS, and in anticipation of the listing of many more, I recommend:

Recommendation 12

1.116 That the Australian Pesticides and Veterinary Medicines Authority (AVPMA) bans the use of existing and new pesticides which contain PFAS.

1.117 Dr Landos also pointed out that Australia has no re-registration scheme for pesticides. A pesticides re-registration scheme would require periodic examination (every seven to 15 years) of active constituents and products in pesticides to ensure safety, based on consideration of current science.

1.118 This need was previously recognised when a re-registration scheme for agricultural and veterinary chemicals was introduced in 2013. Unfortunately, it was reversed just a year later.

1.119 However, it is important that pesticide products that were thought to be safe at the time they were approved for use in Australia, need to be reviewed periodically to ensure they do not contain *emerging* contaminants.

1.120 When we know better, we must do better. As such, I recommend:

Recommendation 13

1.121 That the Australian Government legislates a re-registration scheme for pesticides, requiring the Australian Pesticides and Veterinary Medicines Authority (AVPMA) to review pesticide products approved for use in

Australia periodically, to ensure they remain safe and free from hazardous chemicals.

1.122 The legislated review periods should be risk-based and developed in conjunction with independent scientific and environmental experts.

PFAS on farming land

1.123 While the committee made recommendations designed to improve public access to information about areas where PFAS contamination exists and remediation activity is occurring, I am concerned about the environmental impacts of contamination remaining unaddressed. Additionally, in the absence of any suitable alternatives or compensation, farmers are put under significant financial and ethical pressure, while contaminated foods risk being released onto the market. I recommend:

Recommendation 14

1.124 That the Department of Agriculture, Fisheries and Forestry establishes a compensation scheme for farmers whose land and produce is affected by PFAS contamination.

Better, faster chemical regulation

1.125 The committee made a number of recommendations that, if implemented, would vastly improve Australia's chemical regulation. Recommendations 39 to 44 address regulator resourcing issues, enforcing the Schedule 7 listing of PFAS, mandatory product labelling, and faster domestic integration of international chemical conventions.

1.126 In addition to these critical recommendations, I recommend:

Recommendation 15

1.127 That, given the growing evidence of long-term harm to the environment and human health, the Environment Minister takes a precautionary approach, using their discretion under Schedule 7 of the Industrial Chemicals Environmental Management Standard (IChEMS) to make a scheduling decision to include *all PFAS* chemicals—including new and short-chain PFAS chemicals—in Schedule 7 of the IChEMS register, and, as a consequence, progresses a general ban on the import, export, manufacture, and use of PFAS chemicals, with the exception of 'essential uses' (see Chair's Recommendation 12).

'Essential use' framework

1.128 I acknowledge that there may be *some* essential uses for PFAS in Australia.

1.129 The committee heard, for instance, that some medical devices and medications require the addition of PFAS to be effective, and that effective fire-retardant

coatings for protective clothing worn by firefighters has not yet been produced without PFAS.

1.130 That said, I believe the chemical industry vastly inflates the essentiality of PFAS in most products and has used this argument to oppose wider phasing out of PFAS chemicals.

1.131 Australia should move to ban all PFAS as a default position and establish an independent, scientifically rigorous mechanism for determining *true* essential uses—something that was supported by a large number of inquiry participants. I recommend:

Recommendation 16

1.132 That the Australian Government works with experts to develop an 'essentiality framework' for PFAS applications, with an independent scientific body being responsible for evaluating what constitutes an 'essential' use.

Evidence required to bring chemicals to market

1.133 As discussed in the majority report, the way in which Australia regulates chemicals puts the burden of proof for evidence of harm onto regulators, academic researchers and environmental bodies, instead of chemical manufacturers.

1.134 Chemical manufacturers should instead have to *demonstrate safety* before bringing new chemicals into the market in the same way pharmaceutical companies do before introducing new drugs. I recommend:

Recommendation 17

1.135 That the Australian Industrial Chemicals Introduction Scheme (AICIS) requires complete toxicological data before allowing chemicals to come to market.

Product labelling

1.136 In its report, the committee recommended that the Environment and Health Departments work with the Australian Competition and Consumer Commission (ACCC) to develop mandatory product labelling.

1.137 The ACCC has a role to play in enforcing Australia's PFAS ban and stemming the flow of products containing PFAS into Australia. As Australia's consumer protection and product safety regulator, the ACCC can recommend that the Minister makes an information standard in relation to goods of a particular kind (that is, the Minister propose product labelling requirements) and should do so in relation to PFAS.

1.138 The committee wrote to ACCC Chair, Ms Gina Cass-Gottlieb, on 5 November 2025 to encourage the ACCC to work with the government to actively explore options for giving effect to the Schedule 7 listing of PFAS, including the option of mandatory product labelling.

1.139 In addition to the recommendation on product labelling included in the majority report, I recommend:

Recommendation 18

1.140 That the Australian Government introduces a requirement for manufacturers to make publicly available a full list of product ingredients for each product, including packaging, and that the government develops a public register for this purpose.

Safe, clean, accessible drinking water

1.141 The right to safe, clean drinking water is an internationally recognised human right which derives from the right to an adequate standard of living under Article 11(1) of the *International Covenant on Economic, Social and Cultural Rights*.[12]

1.142 It is well-established that First Nations communities in Australia are significantly less likely to have access to good quality drinking water. PFAS contamination has predominantly affected drinking water in rural and remote communities and has disproportionately impacted First Peoples.

1.143 All people deserve access to sufficient, safe, acceptable, physically accessible, and affordable water, including drinking water.

1.144 While acknowledging that the provision of drinking water is currently a state and territory responsibility, there is a role for the Commonwealth to take leadership in ensuring equality of access across the nation. Also, as the entity responsible for much of the PFAS contamination that impacts drinking water supplies, the Commonwealth cannot shirk its responsibility in this area.

1.145 As such, in addition to the recommendations around drinking water made in the majority report, I recommend:

Recommendation 19

1.146 That all drinking water sources be regularly tested for PFAS and other hazardous chemical contamination.

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12 United Nations, *About water and sanitation*, undated (accessed 7 November 2025).

Recommendation 20

1.147 That the National Health and Medical Research Council establishes guidelines and limits for the much wider variety of PFAS chemicals which are already found in drinking water in Australia.

Recommendation 21

1.148 That the National Health and Medical Research Council reviews and updates the Australian Drinking Water Guidelines every three years to ensure they capture emerging scientific findings on potentially harmful substances in drinking water.

1.149 The committee heard a range of views on the management of drinking water in Australia. In short, a dispersed system of regulation and governance has led to inconsistent results, where some states and territories are ahead of others in terms of water quality monitoring and testing for PFAS.

1.150 Dr Stuart Khan from the University of Sydney argued that the best way to achieve national consistency in managing water quality and addressing the challenges of PFAS would be for the Commonwealth to take a more active role in setting drinking water quality and risk management requirements.

1.151 Specifically, Dr Khan proposed the development of an Australian Safe Drinking Water Act. A national safe drinking water act would enable the Commonwealth to mandate best practices for managing drinking water quality, as defined by the Australian Drinking Water Guidelines.

1.152 State and territory management of drinking water has led to inequality, inconsistency, and poor outcomes in rural and remote communities, including First Nations communities. As such, I recommend:

Recommendation 22

1.153 That the Senate establishes an inquiry into safe drinking water, including access to and management of drinking water, water security, contaminants and other relevant matters.

Recommendation 23

1.154 That, pending the findings of a Senate inquiry into safe drinking water (Recommendation 22), the Australian Government introduces an Australian Safe Drinking Water Act to enable the Commonwealth to set consistent standards for safe drinking water around the nation.

Make the polluters pay

1.155 Cleaning up and dealing with the damage and pollution caused by the use of PFAS-containing firefighting foams in Australia has already cost taxpayers over $1 billion, not even taking into account contamination resulting from a wide range of other PFAS-containing products.

1.156 In the US, companies responsible for producing and selling PFAS—*even when they knew it was hazardous*—have paid out billions to settle legal actions. A number of these claims have been brought by water utility providers and state governments.

1.157 Recently, in Australia, a small number of PFAS-related actions have been launched—most notably, a consumer-led PFAS class action against 3M Australia Pty Ltd by Qenos Olefins Pty Ltd, filed in the Victorian Supreme Court in December 2024.[13]

1.158 Evidence heard by the committee suggested that the Department of Defence may be actively considering legal action. It is surprising that it has taken this long, given there is no advantage for governments here to foot the large bills for contamination these private companies have caused.

1.159 Why have Australian authorities been so slow to act to hold 3M and other chemical companies to account?

1.160 The committee recognised that this injustice must be addressed and recommended that the Commonwealth government explores avenues for remediation costs to be recovered through litigation.

1.161 It is critical that 3M, and other producers and retailers of PFAS-containing products, be held to account for the harm their products have caused to firefighters, communities, and the environment.

1.162 Many of these companies *knowingly* produced harmful PFAS-containing products for decades, while suppressing adverse scientific evidence and falsely marketing these products as safe. As such, I recommend:

Recommendation 24

1.163 That the Australian Government launches litigation against 3M and any other relevant chemical company *as soon as possible*, seeking restitution on behalf of the Australian people for the misleading and deceptive conduct of these companies, breaching their duty of care, and causing damage to communities, culture, heritage, food sources, lifestyles, and the environment.

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[13] Amanda Beattie, Zoe Jones and Nick Salagaras, *PFAS litigation: A deep dive into the rise of consumer-led claims and its implications*, Wotton Kearney, 12 March 2024 (accessed 10 November 2025).

Concluding comments

1.164 I would like to sincerely thank my fellow committee members—including former committee members—for their time and commitment to this inquiry.

1.165 It was a privilege to conduct this inquiry, and I sincerely thank every witness who made a submission or appeared at a hearing.

1.166 Again, I thank the community at Wreck Bay for graciously hosting the committee. Our visit there is an experience I will always remember, for sharing your experiences and showing us your beautiful Country.

1.167 I also thank Enviropacific for showing the committee around the SOLVE hazardous waste facility, and Airservices and Australia Pacific Airports for the tour of the remediation site at Launceston Airport.

1.168 This report contains critical evidence about PFAS from a vast array of different sources, and I would encourage all who are involved in regulation and/or remediation of PFAS, the provision of water and other services to regional and remote communities, and anyone with an interest in chemical contamination to read it. As such, I recommend:

Recommendation 25

1.169 That the Australian Government reports the findings of this inquiry and publishes the committee's report on the PFAS website (www.pfas.gov.au).

1.170 In closing, this country has been inactive and silent about PFAS chemicals for too long. It is time for governments on all levels to take this seriously and actively implement the important recommendations of this report, for the sake of human health and the health of our lands and waters. There can be no more excuses, no more delay. We owe it to current and future generations to act.

Senator Lidia Thorpe
Chair

Australian Greens additional comments

1.1 PFAS chemicals, or 'forever chemicals', build up in the environment and our bodies, causing serious health risks. Australia lags behind other countries in banning these harmful substances, risking our nation becoming a dumping ground for dangerous chemicals.

1.2 Urgent national action is needed to protect people, food systems, and the environment from PFAS, or 'forever' chemicals.

1.3 The recommendations made in this report are extensive and the Australian Greens support the recommendations listed in the committee's report.

1.4 While the Greens support the recommendations made in the report as positive steps towards limiting the ongoing impact of PFAS and forever chemicals, the Australian Greens believe action should be more significant.

1.5 The Greens ultimately believe the Federal Government should take a leadership role through the Environment Minister's meeting, or at an executive level through National Cabinet, to coordinate national action across federal and state jurisdictions and support the phase-out of all non-essential PFAS uses.

1.6 The Australian Greens would like to also acknowledge the work of our NSW Greens colleague Cate Faerhmann MLC, who chaired the NSW Parliament's recent Select Committee on PFAS Contamination in Waterways and Drinking Water Supplies Throughout New South Wales. This Select Committee handed down its final report on 11 September 2025 and provided a number of important recommendations for state and federal parliaments to act on to reduce health and environmental harm from PFAS and forever chemicals.

1.7 In addition to this report and the recommendations contained within it, and our stated position that urgent government intervention is needed to minimise the current and future impacts of PFAS, the Australian Greens would like to highlight that in the lead up to the May 2025 federal election, the Greens took a comprehensive plan to the Australian public aimed at effective intervention on PFAS and forever chemicals.

1.8 The Australian Greens' May 2025 federal election plan to tackle PFAS and forever chemicals included the following commitments:

- Ban all types of PFAS across all uses, including in consumer packaging, agrichemicals, and cosmetic products.
- Adopt a design-first approach by regulating harmful chemicals and contaminants out of packaging to prevent pollution at the source.
- Harmonise national frameworks for managing Persistent Organic Pollutants (POPs), including PFAS, in the production of organic compost.

- Develop a timeline for eliminating contaminants from compostable food packaging to support food waste recycling and ease the burden on the waste and resource recovery sector.

1.9 We acknowledge that across this inquiry some witnesses and submitters have provided evidence and testimony that there are some essential uses of PFAS. However, these are highly specific and the Greens believe much stronger regulation and oversight must be enacted to monitor when and how these chemicals are used. This would provide greater transparency to the public, who rightly have concerns about the health and environmental impacts of PFAS and forever chemicals.

1.10 The Australian public can be assured the Greens will continue to advocate strongly for urgent action on PFAS and forever chemicals across all levels of government.

Senator Peter Whish-Wilson
Senator for Tasmania
Australian Greens Spokesperson for Waste and Recycling

Dissenting report from Labor Senators

Introduction

1.1 The Senate Select Committee on PFAS (per and polyfluoroalkyl substances) (Committee) was appointed on 22 August 2024 by the 47th Australian Parliament and reappointed by the 48th Australian Parliament on 28 July 2025. The appointment and conduct of the inquiry are set out in Chapter 1 of the committee's report.

1.2 Labor Senators would like to thank all submitters and witnesses who provided evidence during the inquiry, including those who provided personal testimony.

1.3 We thank the Wreck Bay Aboriginal community, Enviropacific, Australia Pacific Airports (Launceston), and Airservices Australia for hosting the committee as we conducted informative site visits. We also thank Assistant Chief Fire Officer (ACFO) Mick Tisbury and Commander Dave Hamilton for travelling to Canberra to present the findings of decades of work to the committee.

1.4 Labor Senators note the wide scope of this inquiry's terms of reference and the depth and breadth of submissions and oral testimony received. We acknowledge the depth of feeling and the personal experiences of those who have been exposed to PFAS at higher levels, including firefighters and others with occupational or environmental exposure.

1.5 The assessment and regulation of chemicals is a complex and highly technical area, involving expert scientific research in environmental science, toxicology, epidemiology, and other disciplines.

1.6 Governments and regulatory agencies are required to manage a variety of potential hazards, including hazardous chemicals. There are also other persistent organic pollutants that governments must manage. Authorities must take a careful, responsible, and risk-based approach to managing all environmental contaminants, including PFAS.

1.7 Labor Senators greatly appreciate the volume of evidence and the discussion in the committee's report, and support several of its recommendations (although some in amended form). Across Chapters 2 to 10, the committee's report primarily represents the evidence received throughout the inquiry. However, Labor Senators have reservations about some of the conclusions that have been reached from this evidence, and with some of the recommendations that have been made in Chapters 11 and 12.

1.8 The issues raised by the use and presence of PFAS in Australia and its impact on human health and the environment are complex and far-reaching. The evidence makes clear the significant community and scientific concern about the

presence and impact of PFAS in Australia and these concerns need to be addressed in a holistic, coherent, evidence-based, and logical way.

1.9 Further, there is a growing body of research, literature, and evidence in Australia and around the world about the potential impacts of PFAS on human health and the natural environment and biota and ways to manage the PFAS-related problems.

1.10 The matters considered by this dissenting report are based on submissions and evidence received by the inquiry, which necessarily reflects information and scientific guidance that is available now. As further information or evidence becomes available, existing policies, guidance, and regulations must respond and adapt.

1.11 Labor Senators' views on the evidence and our recommendations are outlined below.

Size and complexity of PFAS (and persistent pollutant) problem

1.12 The per- and polyfluoroalkyl substances (PFAS) encompass a family of synthetic chemicals with carbon-fluorine bonds, which give them characteristics (including resistance to heat, water, and other substances) that have led to their use in a range of different contexts including firefighting foams, cookware, furniture, food packaging, clothing, electronics, agriculture, pharmaceuticals, and medical devices.[1]

1.13 PFAS are near ubiquitous in the environment. The persistence and mobility of PFAS mean that most people will encounter PFAS in their lives, are likely to have PFAS in their bodies, and PFAS is thought to be present all over the world.[2]

1.14 There are thousands of different chemical compounds within the PFAS classification.[3] The term 'PFAS' itself does not inform as to the level of risk or harm that a particular compound may present. Rather, it communicates that the compounds under this term share the same trait for having a fully fluorinated methyl or methylene carbon atom.[4]

1.15 The differences in the chemical character of PFAS mean that different compounds tend to have different characteristics and present different levels of

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1 Australian Academy of Technological Sciences and Engineering, *Submission 18*, p 1; Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 3.

2 CSIRO, *Submission 22*, p. 8; Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 3.

3 Chemistry Australia, *Submission 101*, p. 1.

4 Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100*, p. 3.

risk.[5] PFAS are sometimes classified as long-chain or short-chain compounds. Long-chain PFAS are thought to have higher potential risk.[6]

1.16 PFAS have been extensively used for a wide range of different purposes and have varying degrees of necessity depending on the use case. PFAS are considered critical or essential to the efficacy of some products or processes for which where there are no known viable or safer substitutes, including in the semiconductors industry as well as in the medical, pharmaceutical, and agricultural industries.[7]

1.17 The widespread presence of PFAS in the environment, as well as the range of risk profiles and use cases, make the development of appropriate and effective regulation a complex and layered public policy problem.

1.18 The inquiry heard differing views about the appropriateness of broad-based bans on the use, manufacture, and import of PFAS. Concerns were raised that chemical innovation has often outpaced regulation from a safety perspective and that the risk assessment process for managing chemicals is slow and time consuming.[8] Concerns were also raised that broad-based banning of PFAS as a class would prevent their use in essential cases, including the production of certain vital medical devices and pharmaceutical products.[9]

1.19 In assessing the impact of PFAS on human health, the picture is no less complicated. There is a growing body of research, literature and evidence regarding potential health risks associated with PFAS exposure, and this had led to justified concerns about the long-term impacts on public health.[10] There is evidence that exposure to types of PFAS is associated with a number of health

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5 Crop Life, *Submission 88*, p. 3.

6 Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 3. Long-chain PFAS are defined as perfluorosulfonates with six or more carbons, perfluorocarboxylic acids with seven or more carbons, and their precursors. Short-chain PFAS are defined as perfluorosulfonates with less than six carbons, perfluorocarboxylic acids with six or less carbons, and their precursors. *National PFAS Position Statement*, 21 October 2019, p. 2. Australian Industrial Chemicals Introduction Scheme, *Submission 65*, p. 4.

7 CSIRO, *Submission 22*, pp. 9–11; Chemistry Australia, *Submission 101*, p. 2.

8 Dr Bradley Clarke, Associate Professor in Analytical Chemistry and Environmental Science, University of Melbourne, *Committee Hansard,* 4 June 2025, p. 58.

9 Professor Oliver Jones, Professor of Chemistry, RMIT University, Australian Academy of Science, *Committee Hansard,* 10 June 2025, p. 10; Dr Nathan Kilah, Senior Lecturer in Chemistry, University of Tasmania, Australian Academy of Science, *Committee Hansard,* 10 June 2025, p. 11; Chemistry Australia, *Submission 101*, p. 2; Professor Denis Michael O'Carroll, Professor, University of New South Wales, *Committee Hansard,* 13 November 2024, p. 22.

10 Australian Academy of Technological Sciences and Engineering, *Submission 18*, p 1; Cancer Council, *Submission 62*, pp. 3 and 5.

impacts.[11] However, a causative relationship between health effects and PFAS exposure has not been definitively established to date.[12]

1.20 A number of other issues emerged from the evidence and submissions to the inquiry, including:

(a) the evolving and developing 'best practice' approaches to quarantining and remediation of PFAS-contaminated land and water;
(b) the effectiveness and sustainability of destructive and non-destructive remediation methods and technologies; and
(c) the availability, effectiveness and safety of PFAS replacements or substitutes for firefighting and other critical uses (such as medical treatment).

1.21 A further challenge was the acknowledgement that there were gaps in knowledge, research and data about PFAS, particularly in Australia.[13]

Principles and methods of evaluation

1.22 The level of complexity and concern make it particularly important to be rigorous in developing holistic, coherent, practical, and evidence-based responses to the impact of PFAS in Australia.

1.23 In a complex and evolving landscape, such policy responses inevitably involve trade-offs and create risks associated with unintended consequences and adverse impacts that may flow from even well-intentioned policy interventions.

1.24 The Department of Climate Change, Energy, the Environment and Water submitted that policy and regulatory interventions to address PFAS must be proportionate to the risk, be pragmatic, and make efficient and effective use of available resources.[14]

1.25 Similarly, the Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination seeks to protect the environment and human health through actions that are effective, implementable, financially and logistically sustainable, proportionate to risk, and support economic stability.[15]

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[11] Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100*, p. 5; Minderoo Foundation, *Submission 115*, p. 5; Cancer Council, *Submission 62*, pp. 3 and 5; Queensland Alliance of Environmental Health Sciences, *Submission 112*, p. 1.

[12] Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100*, p. 6; Per- and Polyfluoalkyl Substances. enHealth, *Per- and Polyfluoroalkyl Substances (PFAS) enHealth Guidance Statement*, updated February 2024, p. 4 (accessed 18 November 2025).

[13] CSIRO, *Submission 22*, pp. 4, 6 and 9.

[14] Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 9.

[15] Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 4.

1.26 However, it was noted that there may be net adverse outcomes and unintended consequences of ill-considered policy interventions.[16] For example, scientifically inaccurate or one-size-fits-all regulatory approaches may divert scarce resources to low-risk substances (which is inefficient and less effective at reducing harm) and unnecessarily increase the complexity and cost of regulatory activities.[17]

1.27 In guiding interventions, the benefits and challenges of using risk assessments in the context of PFAS were canvassed. Such risk assessments require risk mitigation measures or remediation actions when the level of the chemical in the environment is expected to be greater than the level that is considered likely to cause harm.[18]

1.28 Many witnesses advocated, sensibly, for some application of the precautionary principle or a precautionary approach to dealing with PFAS.[19] That is, for instance, if there is a reasonable suspicion a chemical could cause harm, then a lack of scientific certainty should not be used to prevent action.[20] Yet, other witnesses also highlighted some of the challenges of taking a precautionary approach to PFAS in broad or general terms.[21]

1.29 In the absence of an accepted evaluative framework or methodology, there are significant challenges to weighing and relying upon technical or scientific evidence across multiple fields (particularly in the context of differing and contradictory views from experts).

1.30 Without technical expertise and given the complexity of many of the issues and trade-offs involved and the ongoing development and evolution of the research and data in this field, Labor Senators are cautious about recommending prescriptive policy interventions that may not be supported by evidence when properly considered or may have unintended and undesirable consequences. That caution informs this dissenting report's recommendations.

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16 Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 9.

17 Chemistry Australia, *Submission 101*, p. 2; Environmental Risk Sciences Pty Ltd, *Submission 19*, p. 1.

18 Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 6.

19 See, for example: Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100*, p. 5.

20 Dr Bradley Clarke, Associate Professor in Analytical Chemistry and Environmental Science, University of Melbourne, *Committee Hansard,* 4 June 2025, p. 59.

21 Professor Bernard Stewart, Member, Occupational and Environmental Cancer Committee, Cancer Council Australia, *Committee Hansard,* 10 June 2025, p. 30.

Regulatory environment and existing PFAS programs and policies

1.31 The use and presence of PFAS chemicals in the environment presents national and global issues that require a coordinated framework and approach.[22] There are a number of international agreements and initiatives that apply to the regulation and management of PFAS.[23]

1.32 A range of Commonwealth and state regulatory and health policy frameworks apply to the management of PFAS in Australia.[24] An outline of PFAS-related policy, regulation, agencies, and coordination mechanisms in Australia is set out in Chapter 10 of the committee's report.

1.33 The approach to PFAS management in Australia is underpinned by various laws, agreements, regulatory instruments, and management plans, including the:

(a) *Industrial Chemicals Act 2019* (Cth);
(b) *Environment Protection and Biodiversity Conservation Act 1999* (Cth);
(c) *Food Standards Australia New Zealand Act 1991* (Cth);
(d) *Intergovernmental Agreement on the Environment 1992* (COAG);
(e) *Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination* (2020) (COAG);
(f) *National PFAS Position Statement*;
(g) *PFAS National Environmental Management Plan 3.0* (2025) (PFAS NEMP) (Environment Ministers of Australia);
(h) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as varied in 2013);
(i) Industrial Chemicals Environmental Management Standard (IChEMS);
(j) *Australian and New Zealand guidelines for fresh and marine water quality* (Water Quality Guidelines);
(k) *Australian Drinking Water Guidelines*, established by the National Health and Medical Research (NHMRC); and
(l) *National Standard for Environmental Risk Management of Industrial Chemicals*.

1.34 There are a number of Commonwealth departments, agencies, and bodies involved in the development and implement of regulation and management of PFAS in Australia, including the:

(a) Department of Climate Change, Energy, the Environment and Water;
(b) Department of Health, Disability and Ageing;
(c) Department of Defence;

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22 CSIRO, *Submission 22*, p. 4.

23 Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 5.

24 Department of Infrastructure, Transport, Regional Development, Communications and the Arts, *Submission 2*, p. 4; crcCARE, *Submission 36*, p. 13.

(d) Australian Industrial Chemicals Introduction Scheme (which regulates the import and manufacture of industrial chemicals such as PFAS in Australia);
(e) Environmental Health Standing Committee (enHealth) of the Australian Health Protection Committee;
(f) Australian Health Protection Committee;
(g) Australian Pesticides and Veterinary Medicines Authority (APVMA) (which regulates chemicals sought to be registered and used as insecticides, fungicide, and herbicides in Australia);
(h) National Health and Medical Research Council (NHRMC) (which is responsible for the development of PFAS guidelines for drinking and recreational water);
(i) Food Standards Australia and New Zealand (FSANZ) (which is responsible for the development of PFAS guidelines for food); and
(j) the Therapeutic Goods Association (which regulates pharmaceutical and therapeutic products).[25]

1.35 The regulatory framework that applies to PFAS, and the different agencies involved in managing the impact of PFAS in Australia, endeavour to manage and reduce the impact of PFAS in Australia and to reduce potential harm to human health and the environment.[26] Further, Australia has a trusted and capable complement of agencies that are responsible for public health advice and environmental protection, and Australia's chemical regulatory agencies are amongst the best in the world.[27]

1.36 Nevertheless, these agencies must adapt, and frameworks must be updated, to reflect any new developments in research and guidance about the impact and management of PFAS.

PFAS and human health

PFAS Health Advice

1.37 The committee's report outlines Australia's existing health-related advice, while acknowledging evolving global standards, and emerging research in this field. As outlined in Chapter 2 of the committee's report, high-quality Australian research, undertaken by the National Centre for Epidemiology and Population Health at the Australian National University from 2016–2021, found limited evidence for adverse health outcomes associated with significant PFAS

25 CSIRO, *Submission 22*, p. 8.

26 See, for example: Australian Industrial Chemicals Introduction Scheme, *Submission 65*, p. 5.

27 Chemistry Australia, *Submission 101*, p. 3.

exposure, other than psychological distress and higher cholesterol levels.[28] Specific PFAS may contribute to other health effects, but research has not yet established causation, and research has not identified strong links with any disease.

1.38 Understanding the relationship between environmental exposure and health outcomes is complicated. Research can be slow and yield mixed results, which can be frustrating, however it is essential to support high quality systematic research, rather than drawing conclusions from inconclusive data.

1.39 Labor Senators acknowledge emerging international research outlined in the committee's report, including the International Agency for Research on Cancer's (IARC) finding that perfluorooctanoic acid (PFOA) is carcinogenic to humans. We also acknowledge community concern around the potential health impacts of PFAS.

1.40 The field of health policy relies heavily on technical and scientific evidence, and the use of robust evidence-to-decision frameworks, when translating scientific evidence into policy solutions and regulatory action. As outlined in Chapter 7 of the committee's report, Australia's health policy—including policies relating to PFAS—is developed using best practice models which are also used in numerous other countries around the world.[29]

1.41 The Environmental Health Standing Committee (enHealth) and the Australian Health Protection Committee have developed guidance statements on key health issues in relation to PFAS contamination.[30] The enHealth PFAS Guidance Statement provides evidence-based advice on the risks associated with PFAS exposure. The current version was published in February 2024.

1.42 As a precaution, enHealth continues to recommend exposure to PFAS be minimised wherever possible. This precautionary advice considers the current scientific evidence, including the lack of causation data on human health effects and the ability of these chemicals to persist in humans and in the environment.[31]

1.43 In light of the IARC advice, the revised Australian Drinking Water Guidelines, and other developments since February 2024, enHealth is currently conducting a thorough review of new international evidence on PFAS, which will feed into the formulation of revised enHealth guidance on PFAS. This revised guidance

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[28] Professor Martyn Kirk, Dr Kayla Smurthwaite and Ms Susan Trevenar, *Submission 85* (47th Parliament), pp. 1–2.

[29] Department of Health, Disability and Ageing, response to written questions from Senator Thorpe (received 23 September 2025), [p. 1].

[30] Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100*, p. 6.

[31] Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100*, p. 5.

will be based on expert analysis of the most up-to-date evidence, will be carefully considered, and will be risk-based.[32]

1.44 Australian regulators will also continue to monitor international trends and remain informed regarding any emerging evidence. Should new evidence indicate Australia's official advice needs to change, it will be updated through these processes. As a result, Labor Senators do not support Recommendations 1, 2 or 5 in the committee's report, which pre-empt the findings of the current review.

1.45 However, Labor Senators agree that there may be scope for FSANZ to more regularly review Tolerable Daily Intakes for PFAS and other chemicals of concern, and we recommend:

Recommendation 1

1.46 That the Australian Government considers the need to establish periodic reviews of the Tolerable Daily Intakes for PFAS and other chemicals of concern.

Monitoring PFAS levels in the population

1.47 Monitoring levels of PFAS and other potentially hazardous substances in the population helps regulators understand the scale and distribution of contamination, as well as to track the results of regulatory interventions.

1.48 Labor Senators note results from the Australian Bureau of Statistics' *National Health Measures Survey 2022–2025*, which tested for 11 types of PFAS in people aged 12 and over. While the three most common PFAS were detected in the blood of most of the test subjects (over 85 per cent), levels were generally lower than in comparable countries and are reducing over time.[33]

1.49 This research should be repeated to track the bioaccumulation of PFAS, and other chemical contaminates, in the Australian population, over time.

1.50 Labor Senators recommend:

Recommendation 2

1.51 That the Australian Government considers commissioning future research to assess long-term contamination levels and trends in any potential health impacts of PFAS, and improves data sharing and coordination between

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[32] Department of Health, Disability and Ageing, response to written questions from Senator Thorpe—blood testing and enHealth guidance (received 6 August 2025), p. 1.

[33] Australian Bureau of Statistics, *Per- and polyfluoroalkyl substances, Data download: Information on serum levels of per- and polyfluoroalkyl substances (PFAS) for people aged 12 years and over*, 27 May 2025 (accessed 17 November 2025).

Commonwealth, state and territory, and local entities, and enhances public access to PFAS contamination data and information.

Health interventions and blood testing

1.52 Labor Senators acknowledge the evidence provided by firefighters and others with occupational exposure to PFAS. We share concerns raised by firefighters, including ACFO Mick Tisbury and Commander Dave Hamilton, about historic high levels of PFAS exposure among firefighters and others in the field.

1.53 We acknowledge the fear and uncertainty experienced by those with especially high levels of PFAS exposure, and the evidence these witnesses provided on the perceived benefits of PFAS blood testing and PFAS serum reduction methods, such as blood or plasma donations.

1.54 Labor Senators acknowledge evidence that blood and/or plasma donations may reduce a person's PFAS blood levels, over time. However, we also note the expert view of the enHealth committee that there is currently no evidence to support the clinical usefulness of PFAS blood testing or serum level reduction. Without clear evidence that PFAS exposure leads to any particular disease, there is no framework to guide clinicians in administering PFAS blood testing, PFAS serum reduction, or any related health interventions.[34]

1.55 Evidence does not currently exist to support PFAS blood testing, PFAS serum level reduction, or specific health interventions based on PFAS blood levels. As a result, Labor Senators are unable to support Recommendations 3, 6 and 7. Should the current or any future review of Australia's PFAS health advice determine that widespread testing should be undertaken, a holistic and consistent approach should be developed by the enHealth committee or another appropriate agency.

1.56 Labor Senators do agree there is a need for further research, and we recommend:

Recommendation 3

1.57 That the Australian Government increases its investment in PFAS research and development, including in relation to epidemiological research in the general population and in specific groups at high risk of exposure, such as firefighters.

Workplace Exposure

1.58 Labor Senators support mechanisms to eliminate unnecessary and harmful workplace exposure to PFAS. A precautionary approach must be taken in relation to PFAS in all workplaces and high-risk sectors should have in place comprehensive procedures to avoid exposure and support employees. In

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[34] enHealth, *Per- and Polyfluoroalkyl Substances (PFAS) enHealth Guidance Statement*, updated February 2024, pp. 5–6 (accessed 18 November 2025).

principle, Labor Senators support measures which aim to ensure consistent hazard reduction policies across all jurisdictions and support employers and employees.

1.59 Labor Senators recommend:

Recommendation 4

1.60 That the Australian Government:

- **works with states and territories to ensure that workers are protected from unnecessary and harmful exposure to contaminants, such as PFAS, in all states and territories; and**
- **reviews relevant Commonwealth work health and safety legislation, regulations, and official advice with the aim of ensuring a consistent approach to occupational PFAS exposure.**

Environmental impacts

1.61 Chapter 4 of the committee's report considers how PFAS contamination may affect ecological environments. Labor Senators note evidence from the CSIRO and others that research on precise impacts is limited, and further work is required. We also note evidence that suggests PFAS may have negative impacts on animal life. The government is supporting this work through targeted research grants and ongoing support of Australia's scientific research organisations, including the CSIRO.

1.62 Labor Senators recognise that PFAS contamination is also impacting perceptions of ecosystems and consider that there are potential benefits of clearer public information and guidance in this area.

1.63 Labor Senators support proposals for a more strategic approach to further research, monitoring and testing of PFAS in the environment, and note evidence provided by Australian scientific organisations on the potential benefits of a national monitoring program.

1.64 These proposals merit consideration by the government, as such, we recommend:

Recommendation 5

1.65 That the Australian Government considers ways to improve and accelerate the integration, mapping, and presentation of Australian data about PFAS (including establishing anthropogenic baseline levels for PFAS in Australia), to enable improvements in human and environmental risk assessments and facilitate informed and effective PFAS management decisions at local and regional levels.

Recommendation 6

1.66 In addition to Recommendation 5, the Australian Government should:

- **support longitudinal research which examines the effects of PFAS on aquatic and terrestrial biota across their lifetimes; and**
- **implement a standardised national framework with consistent data requirements for PFAS monitoring and measurement.**

Engagement with affected communities

1.67 People living in PFAS-affected communities are more likely to experience psychological distress, due to a range of factors.[35] The mental health toll of PFAS exposure may be very significant for individuals.[36] It is vital that information and assistance that is place-based and culturally appropriate is provided to communities in a timely manner.[37] More generally, transparent, up-to-date and reliable risk information should be communicated to the Australian public on PFAS contamination and associated risks.[38]

1.68 Communities also face higher costs associated with managing PFAS contaminated water sources, reduction in property and housing values, reputation harm and income loss (for instance, difficulties in selling or exporting agricultural products).[39]

1.69 First Nations communities, including those at Wreck Bay and Katherine, can feel a disconnection to Country, uncertainty around long-term health outcomes, and loss of access to culturally significant sites, waters, and foods.[40]

1.70 Chapter 5 of the committee's report presents valuable evidence on the disproportionate impact that PFAS contamination and associated restrictions are having on First Nations communities.

1.71 Labor Senators acknowledge the devastating impacts described by First Nations communities in Wreck Bay and Katherine and sincerely thank the individuals and community organisations who gave evidence—your testimony helped the committee to better understand these impacts.

1.72 We were concerned to hear that precautionary advice for communities to limit their dietary intake of seafood and bushfoods is having unintended

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35 Cancer Council, *Submission 62*, p. 7; Australian Academic of Science, *Submission 63*, p. 3.

36 Queensland Alliance of Environmental Health Sciences, *Submission 112*, p. 2.

37 Cancer Council, *Submission 62*, p. 7; Australian Academy of Science, *Submission 63,* p. 3.

38 Australian Academy of Science, *Submission 63,* p. 3; Professor Oliver Jones, Professor of Chemistry, RMIT University, Australian Academy of Science, *Committee Hansard,* 10 June 2025, p. 13.

39 CSIRO, *Submission 22*, p. 9; crcCARE, *Submission 36*, p. 8.

40 CSIRO, *Submission 22*, p. 9; crcCARE, *Submission 36*, p. 8.

consequences for some communities, where it is ultimately leading to unhealthy changes to people's diets. These impacts warrant further investigation and illustrate the need to take a responsible, evidence-based approach to managing PFAS contamination, based on a holistic view of environmental and human health.

1.73 Evidence in Chapter 5 of the committee's report demonstrates the need for better engagement and consultation with all communities impacted by PFAS contamination, including First Nations communities.

1.74 Australian government agencies, including the Department of Defence, have been working to improve consultation with affected communities for some time now. For instance, we note evidence that the Department of Defence has increased its engagement with First Nations communities and is conducting surveys to increase its understanding of contamination in local soil, surface water, groundwater, and biota, and is working to improve the availability of culturally appropriate information materials.

1.75 In relation to Wreck Bay, we note evidence from the Department of Defence that it has established a partnership with the community to enable community members to conduct PFAS monitoring and is working with the community on new, permanent precautionary signage.

1.76 Noting this evidence, Labor Senators agree that PFAS management should incorporate actions to safeguard the cultural, social, nutritional, and economic well-being of First Nations people and communities.

1.77 We agree that the Australian government should consider options to improve and maintain ongoing access to healthy and traditional food sources for Aboriginal communities around Katherine (Recommendation 21). We also agree that the Department of Defence should establish partnerships with local health services, and other Aboriginal organisations, to codesign culturally appropriate signage and educational material for Aboriginal communities impacted by PFAS contamination (Recommendation 23).

1.78 In addition, Labor Senators note actions arising from the recent PFAS Independent review.

1.79 *The Independent Review of land uses around key Defence bases impacted by PFAS contamination* (PFAS Independent review) highlighted a need for better coordination across the Commonwealth, states and territories, and local governments, in managing PFAS contamination. In addition, it recommended mechanisms be developed to improve engagement and collaboration with affected communities, including First Nations communities.[41] The Government

[41] Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [p. 4] (accessed 17 November 2025).

is acting in this area, having set up the National Coordinating Body and Williamtown working group over the last 12 months.

Remediation technologies

1.80 In relation to remediation, discussed in Chapter 6 of the committee's report, Labor Senators acknowledge evidence presented on the importance of further developing remediation technologies—including emerging technologies.

1.81 Evidence received throughout the course of the inquiry suggested emerging technologies show promise, however, it is critical that remediation techniques are rigorously evaluated.

1.82 Labor Senators agree there is a role for the Commonwealth, as a major PFAS remediator in Australia, to help facilitate testing and evaluation of new and emerging technologies. Labor Senators support the intent of Recommendations 29 and 30, but do not want to be prescriptive about the best mechanism to support remediation technology development.

PFAS in water supplies

1.83 Evidence indicates the new PFAS guideline values established in the revised Australian Drinking Water Guidelines are responsible and proportionate. In addition, most of Australia's water supplies already meet the revised guidelines.[42]

1.84 Labor Senators note that the supply of drinking water is a state and territory responsibility, and that most water service providers are owned by state and territory governments. The Australian Government is actively encouraging national implementation of the revised guidelines.

1.85 Labor Senators note that construction is underway on a major water infrastructure project to deliver a new water source to the Jervis Bay Territory. The project will deliver a water pipeline connecting the Shoalhaven City Council-owned Vincentia Reservoir to the Stoney Creak Reservoir in the Jervis Bay Territory, ensuring the community has access to high-quality drinking water and modern infrastructure that meets current and future demand. Construction commenced on the New South Wales side of the border at the end of August and is now under way with the Jervis Bay Territory, with expected completion early in early 2026.

1.86 Labor Senators also note that the Australian Government has consulted with the community and local stakeholders throughout the pipeline project, including the Wreck Bay Aboriginal Community Council and the Booderee National Park Board of Management to ensure it aligns with community needs and environmental standards.

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42 See also: *Committee Hansard*, 4 June 2025, p 38.

Agricultural impacts

1.87 Chapter 9 of the committee's report considers PFAS in waste streams and agricultural impacts, including PFAS in pesticides.

1.88 Labor Senators acknowledge concerns raised by some inquiry participants about potential impacts of PFAS on agriculture and the need for clear and consistent messaging. However, PFAS contamination in Australia's food supply is *very low*.[43]

1.89 It is important that regulators take a measured and appropriate response to any risks associated with PFAS contamination of agricultural land—for instance, where biosolids or pesticides applied to land may contain traces of PFAS.

1.90 The PFAS Independent review recommended several measures designed to reduce the risks associated with contamination on land used for food production. The government agreed, or agreed in principle, with these recommendations and stated that it will work with states and territories—through the National Coordinating Body—to address the need for improved policy guidance on PFAS and food production.[44]

1.91 Labor Senators note concerns from some inquiry participants about PFAS in pesticides. However, evidence from the Australian Pesticides and Veterinary Medicines Authority revealed that, out of around 9700 agricultural chemical products in Australia, fewer than ten contain ingredients that meet the United States Environmental Protection Agency (US EPA) PFAS definition.[45]

Chemical regulations

1.92 Labor Senators note evidence on PFAS in consumer goods, presented in Chapter 8 of the committee's report and evidence on chemical regulation, presented in Chapter 10.

1.93 PFAS are not manufactured in Australia, and it is now prohibited for Australian manufacturers and retailers to import, export, manufacture, or use certain PFAS chemicals (PFOA, perfluorooctane sulfonate (PFOS), and perfluorohexane sulfonate (PFHxS), and related substances).

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43 Food Standards Australia New Zealand, *Submission 70* (47th Parliament), p. 3. See also: Department of Health and Aged Care interim Australian Centre for Disease Control, *Submission 100* (47th Parliament), p. 4.

44 Department of Defence, *Independent Review: Government response to the Independent Review of land uses around key Defence bases impacted by PFAS contamination,* December 2024, [p. 12].

45 Australian Pesticides and Veterinary Medicines Authority (APVMA), response to written questions on notice from Senator Thorpe (received 3 December 2024), [p. 4].

1.94 The new standards for the three groups of PFAS listed on the Stockholm Convention (PFOS, PFOA and PFHxS) were created in December 2023, including bans on their import, manufacture and use that came into effect on 1 July 2025 and now apply to around 500 PFAS.[46]

1.95 In addition, higher risk new PFAS chemicals not listed on the Australian Inventory of Industrial Chemicals require AICIS assessment and authorisation prior to introduction into Australia.[47]

1.96 Australia's regulatory approach—contained in the Industrial Chemicals Environmental Management Standard (IChEMS) Minimum Standards—establishes baseline requirements for the environmental management of industrial chemicals. The Minimum Standards place the responsibility on businesses to:

(a) obtain, share, and use information on the environmental risks of PFAS and other Schedule 7 listed chemicals;
(b) identify potential risks and apply practicable control measures;
(c) store and contain these chemicals in an environmentally safe manner;
(d) plan for and respond effectively and promptly to industrial chemical incidents; and
(e) implement responsible waste management.[48]

1.97 Labor Senators understand that these regulations also apply to 'articles', including consumer products containing these PFAS (with some exceptions, including articles already in the market).

1.98 Labor Senators note the recent Schedule 7 listing of PFOA, PFOS, and PFHxS, and evidence that the government is currently developing mechanisms to enforce the ban.

1.99 At this stage, Labor Senators do not consider that all PFAS should be banned 'as a class', noting this could lead to unintended consequences. Such a ban may make essential products unavailable in Australia, may lead to the substitution of PFAS for other harmful chemicals, or may result in the use of greater volumes of other, unregulated chemicals to achieve the same effect.

1.100 However, Labor Senators note that several jurisdictions around the world have begun to implement restrictions, bans, or phase outs of the use of types of

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46 CSIRO, *Submission 22*, p. 7.

47 Australian Industrial Chemicals Introduction Scheme, *Submission 65*, pp. 4–5.

48 Department of Climate Change, Energy, the Environment and Water, *The IChEMS Minimum Standards*, last updated 05 December 2024 (accessed 14 November 2025).

PFAS.[49] It is important that Australia keeps pace with the evolving regulatory landscape internationally to avoid becoming an export destination for goods containing high concern PFAS.[50]

1.101 We also note evidence from CSIRO indicated that there are consumer products that contain PFAS, but where PFAS may be readily replaced while maintaining desired properties.[51]

1.102 As a result, Labor Senators recommend:

Recommendation 7

1.103 That the Australian Government considers restricting or phasing out uses of PFAS in consumer products where PFAS is not essential to the product and is readily replaceable. Regulation facilitating these restrictions or phase outs should also consider and endeavour to mitigate against the risk of substitutions for other PFAS-like chemicals or potentially hazardous alternatives.

1.104 Further, Labor Senators note evidence, outlined in Chapter 10, that the government is working to develop further mechanisms to assist industry to identify and avoid importing consumer products containing PFAS.

Funding remediation

1.105 Persistent organic pollutants, including PFAS, can negatively impact the Australian environment and pose a potential risk to human health.

1.106 In line with the precautionary approach, Australian governments have invested hundreds of millions of dollars testing and remediating environments that were contaminated through the historic use, by Australian government entities, of PFAS-containing firefighting foams.

1.107 The cost of remediation should be sought to be recovered in accordance with the principles set out in the PFAS NEMP, including that:

(a) polluter pays; that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement; and
(b) the users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.

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49 CSIRO, *Submission 22*, pp. 13–14; Australian Academy of Health and Medical Sciences, *Submission 35*, pp. 3–4. See also: crcCARE, *Submission 36*, pp. 19–20; Minderoo Foundation, *Submission 115*, p. 6.

50 Department of Climate Change, Energy, the Environment and Water, *Submission 33*, p. 9.

51 CSIRO, *Submission 22*, p. 4.

1.108 Labor Senators note that governments in the United States and other jurisdictions have used legal action to recover some of these costs from manufacturers of PFAS.

Senator Varun Ghosh
Deputy Chair

Senator Ellie Whiteaker
Member

Appendix 1
Launceston Airport site inspection

1.1 On Tuesday 12 March 2025, a sub-committee comprising PFAS Committee Chair, Senator Lidia Thorpe, and Deputy Chair, Senator Varun Ghosh, conducted an inspection of the PFAS remediation site at Launceston Airport in Tasmania.

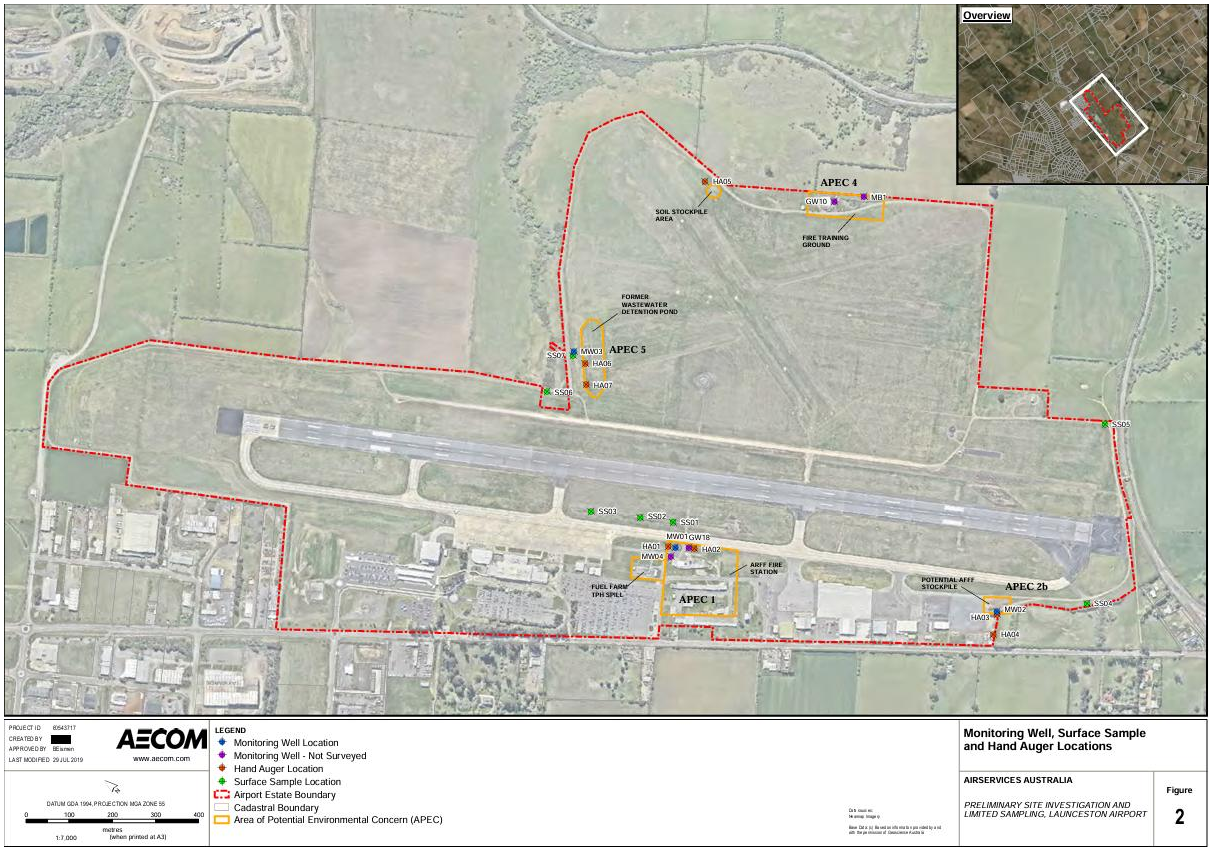
1.2 Officials from both Australia Pacific Airports (Launceston) (APAL), a subsidiary of Australia Pacific Airports Corporation, and Airservices Australia (Airservices), welcomed the Chair and Deputy Chair and gave a short presentation on the history of Launceston Airport and the contaminated site.

1.3 Officials explained that the per- and polyfluoroalkyl substances (PFAS) contamination at Launceston airport was caused by firefighting foam containing PFAS that had been used for firefighting and fire training exercises prior to 2010.

1.4 There was discussion of a map of Launceston airport and the key areas of PFAS contamination, namely:

- The Aviation Rescue Fire Fighting Fire Station (built in the 1960s).
- The Aviation Rescue Fire Fighting area.
- The former Fire Training Ground.

Figure 1.1 Launceston Airport Monitoring Well, Surface Sample and Hand Auger Locations 2019



Source: Airservices Australia (prepared by AECOM Australia), Preliminary Site Investigation and Limited Sampling, Launceston Airport, 2019, [p. 65] (accessed 10 November 2025).

1.5 While environments such as the former Fire Training Ground and the Fire Station were directly impacted by PFAS contamination, the committee was told that lower levels of PFAS have been detected across the wider airport estate and also in drainage lines and creeks that subsequently cross agricultural properties.

1.6 APAL and Airservices explained to the committee that they have been working to remediate the former Fire Training Ground at the northern end of the airport's premises.

1.7 Airservices is required to undertake this remediation work in order to meet requirements under the Airports (Environment Protection) Regulations 1997, administered by the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts (the department). After investigations spanning several years, the department issued Airservices with an Environmental Remediation Order in 2023, as Airservices were found to have caused PFAS pollution of soil and groundwater at the former Fire Training Ground and surrounding area.

1.8 Committee members had an opportunity to ask questions and were given a safety briefing prior to conducting the site inspection. Committee members and

officials then took a bus to the former Fire Training Ground remediation site via Kelly's Creek.

1.9 Officials from Airservices explained that the PFAS remediation works at the former Fire Training Ground began in January 2025 and are scheduled to finish in June 2025. The remediation work is priced at $20 million, with another $5 million for the pre-works.

Figure 1.2 Committee site inspection at Launceston Airport



Source: Secretariat photograph.

Senator Lidia Thorpe, Senator Varun Ghosh, and staff from Airservices Australia, APAC and the department.

1.10 Officials from Airservices explained the on-site remediation process. It is estimated the entire works will involve removing 19 000 cubic meters of contaminated soil and rocks (approximately 18 to 20 Olympic swimming pools).

1.11 However, before any digging could begin, the entire surface area was divided into a grid pattern with samples taken from each grid to test for PFAS concentrations (if the PFAS concentrations in samples from certain grids are too high, remediation of soil from those squares cannot occur onsite).

1.12 Officials emphasised that the machinery used for excavation is relatively small because precision and appropriate care is more important than speed. Importantly, all machinery is fully sealed, and full-face breathing and dust masks are provided.

1.13 Approximately 500 cubic metres of soil and rock is excavated each day to a depth of 1.6m. While base rock has been hit in places before a depth of 1.6 metres has been reached, testing has revealed that the base rock did not contain

detectable levels of PFAS. In other words, the base rock acted as a low permeability barrier.

1.14 Once the soil has been dug up, it is placed into 100 cubic metre stockpiles on a treatment pad. Then, 2 per cent powdered activated carbon (a binding agent) is added to each 100 cubic metres of soil to ensure a consistent mix and good results. The carbon powder is stored under cover in a large onsite shed.

Figure 1.3 Exposed bedrock after contaminated soil was removed from part of the site



Source: Secretariat photograph.

1.15 Next, the remediated soil is put back in the hole on a layer of clean fill. Only one layer is put back at a time and each layer is compacted. Officials advised that no membrane is needed because the carbon binding treatment means that the PFAS in the soil is no longer as mobile and any leaching is greatly reduced.

1.16 The treated soil is then topped with clean fill and compacted to render it almost impervious to rain as a further safety measure. At the time of the committee's visit in early March, officials explained that there had been very little rain at the remediation site in 2025 which made the work easier. However, in the event of a big rain, the hole would need pumping out.

1.17 New access roads, a large storage shed, and the reorganisation of security were all required to facilitate the remediation works. Airservices employed AECOM as the main contractor with minor works being completed by Ternary Group,

an Indigenous, family-owned company that has experience with civil works and environmental remediation. At the time of the visit, Ternary Group had four trainees from the Torres Strait Islands.

Figure 1.4 Extent of PFAS removal works



Source: Secretariat photograph.

1.18 Finally, officials noted that some highly PFAS contaminated soil is being sent to the facility at Altona in Victoria where it undergoes thermal destruction (see Appendix 2, SOLVE Altona site inspection).

1.19 Airservices told the committee that it is using the learnings from the Launceston Airport project to guide planning for remediation works at Canberra and Rockhampton airports.

1.20 On behalf of the committee, Senators Thorpe and Ghosh thank officials from APAL and Airservices for hosting the site inspection.

Appendix 2
SOLVE Altona site inspection

1.1 On Tuesday 3 June 2025, a sub-committee comprising PFAS Committee Chair, Senator Lidia Thorpe, and committee member, Senator Perin Davey conducted a site inspection at SOLVE Altona—one of Australia's largest hazardous waste treatment facilities. Committee members heard that SOLVE is one of only three sites in Australia where PFAS-contaminated soil can be remediated on an industrial scale, using thermal treatment technologies.

1.2 The SOLVE thermal desorption plant at Altona, Victoria, is run by Australian environmental remediation and hazardous waste management company, Enviropacific. Committee members met at the site and were welcomed by CEO and Managing Director of Enviropacific, Mr David Tucker; Manager of SOLVE, Mr Dino Adikaram; and General Manager—Resource Recovery, Mr Brayden Rees.

1.3 Committee members received a presentation on SOLVE's operations, had an opportunity to ask questions, and were given a safety briefing and equipment prior to conducting a site inspection.

Figure 2.1 Committee members conducting an inspection of the SOLVE thermal desorption plant



Source: Chair's photograph, 3 June 2025. Left to right: Dino Adikaram, David Tucker, Senator Lidia Thorpe, Senator Perin Davey, Brayden Rees.

Background—Enviropacific

1.4 Mr Tucker introduced Enviropacific, an environmental remediation company which was established in Sydney's inner-west in 2001. With over 360 employees, Enviropacific now operates in all parts of Australia, with offices in Sydney, Brisbane, Melbourne, Adelaide, Perth, Darwin, Hobart and Newcastle.[1]

1.5 Mr Tucker explained that Enviropacific has three divisions and around 250 projects on the go at any one time. According to Mr Tucker, government contracts represent around 60 per cent of Enviropacific's work. Enviropacific is involved in remediation projects at many PFAS-contaminated Defence sites, including RAAF Base Tindal, RAAF Base Darwin, and Defence sites in the Shoalhaven. Enviropacific is also providing remediation services to airport operators, such as Australia Pacific Airports (Melbourne), for civil rehabilitation works at the Arundel Creek dams, among other projects.[2]

1.6 Enviropacific also handles remediation work for water service utilities, local councils, state government entities, etc., with about one third of its work allocated to PFAS remediation, and the other two thirds focused on removing asbestos, hydrocarbons, heavy metals and other environmental contaminants.

1.7 Enviropacific is contracted to manage, stabilise, treat, and/or dispose of PFAS, and other hazardous substances. Around three quarters of Enviropacific's work relates to on-site remediation around Australia with destruction of PFAS at SOLVE only representing around 10 per cent of Enviropacific's work.

1.8 Enviropacific has been successfully treating PFAS-contaminated waste for more than 10 years, including operating Australia's first plant destroying PFAS molecules in soil utilising thermal desorption. Treatment technologies for solid PFAS waste include:

- Chemical Immobilisation
- Thermal Desorption
- Soil Washing
- Sludge Dewatering
- Design and construct of containment cells and repositories.[3]

Thermal desorption of PFAS at SOLVE

1.9 SOLVE was established in 2018 and is segregated into two distinct processing streams—thermal desorption, and non-destructive digging (NDD). SOLVE has received material from across Australia, with over 370 000 tonnes thermally

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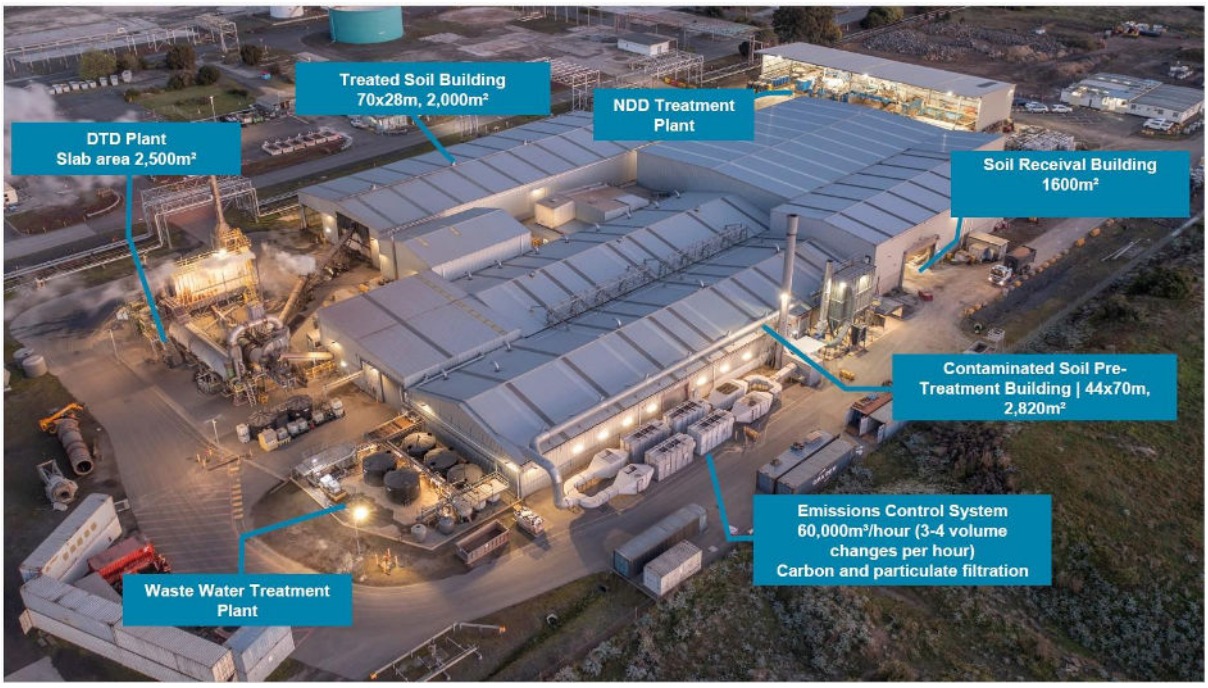
1 Enviropacific, 'Our story', Company website (accessed 10 November 2025).

2 Enviropacific, 'Dam stabilisation and remediation—APAM', Company website (accessed 10 November 2025).

3 Enviropacific, 'PFAS treatment', Company website (accessed 10 November 2025).

destroyed and 100 000 tonnes of NDD spoil remediated via segregation and chemical treatment.

Figure 2.2 SOLVE thermal desorption plant, Altona, VIC



Source: SOLVE presentation, June 2025.

1.10 Thermal desorption is a destructive PFAS remediation technique that is only employed for the most heavily contaminated waste. It is effective in completely removing and destroying PFAS, leaving a soil-like product which can be safely used in a number of applications. The process utilises controlled high-temperature treatment to ensure complete PFAS destruction, using natural gas for permanent contamination removal. Material that is treated at SOLVE is transported from remediation sites across Australia, where local destruction is unavailable.

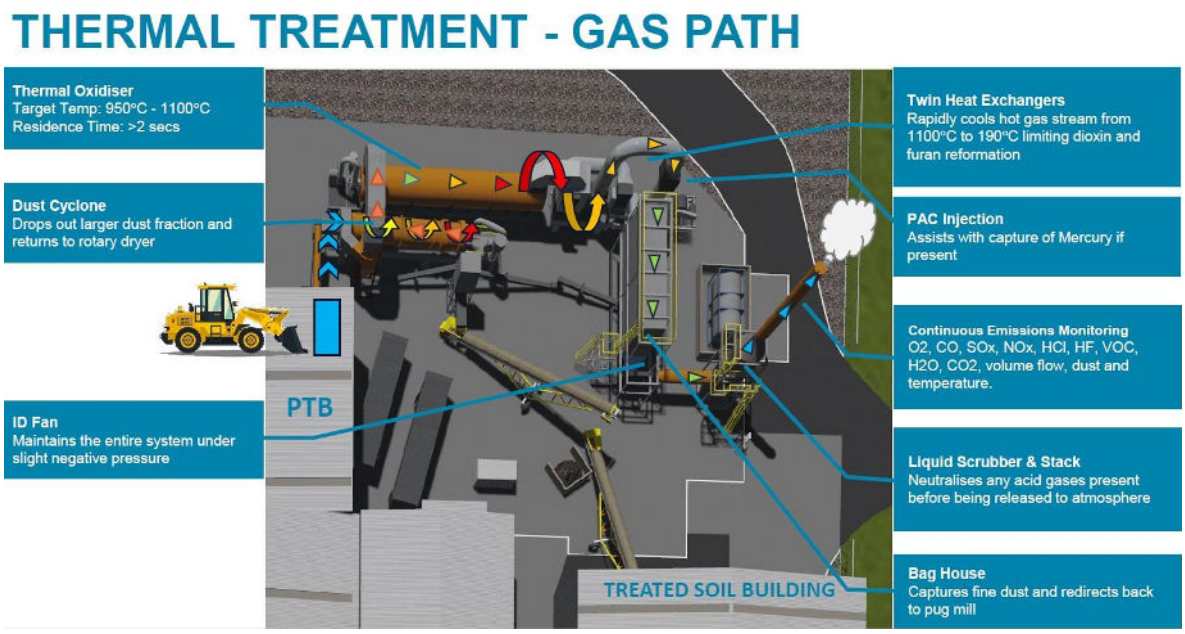
1.11 The committee noted that, while effective, the process is energy intensive, requiring large amounts of gas to be burned to produce extremely high temperatures and some material to be transported thousands of kilometres to be remediated.

1.12 Transporting PFAS-contaminated waste is potentially hazardous and follows established logistics protocols using standard truck and rail transport methods. The transport process allows contaminated material to be moved to SOLVE's facility for permanent destruction, removing the PFAS problem from source locations. SOLVE operates with transporters licensed by state and territory environmental protection authorities, and with Commonwealth and state approvals, maintaining strict chain of custody throughout. It is ultimately able to issue a Certificate of Destruction, helping remediators to meet their responsibilities in relation to PFAS contamination and remediation.

Thermal treatment of soil

1.13 Heavily PFAS-contaminated soil is put through a Rotary Dryer, at a rate of up to 35 tonnes per hour. The temperature inside the Rotary Dryer heats soil up to 550°C for approximately 15 minutes, which volatilises PFAS, and any other organic compounds, in the soil. *Volatilise* means to turn substances into a gaseous form. The solids are then cooled with recycled water to a temperature around 80°C, while gases released during the volatilisation process are treated in the thermal oxidiser, which reaches temperatures between 950°C and 1100°C, breaking down harmful gases into their harmless base elements.

Figure 2.3 Thermal treatment of soil



Source: SOLVE presentation, June 2025.

1.14 Treated soil can be used for landfill rehabilitation and capping, structural fill for VicRoads and industrial developments, and bulking material for crushed products. Enviropacific is working with regulators to try to identify more uses for this material and has, for instance, successfully grown native plants in a mix of this material with added compost.

Figure 2.4 Remediated product



Source: Chair's photograph, 3 June 2025.

NDD process

1.15 The NDD plant treats PFAS-contaminated sludge and other materials using a two-part treatment system, consisting of the following:

- A pre-treatment system first separates the liquid from the NDD solids volume from the incoming loads via CDE's plant; segregation of NDD material into the following components aggregates (>5mm), sand (5mm–65µm) and clay (<65µm).
- A second water treatment system then treats the separated liquids via Enviropacific's designed Water Treatment Plant.

1.16 Enviropacific's processes are highly efficient—for instance, making maximum use of reclaimed water—and environmentally responsible, with continuous emissions monitoring, batch testing, and strict safety protocols.

Acknowledgement

1.17 Committee members were grateful to Mr Tucker, Mr Adikaram, Mr Rees and other staff members at SOLVE for supporting the committee's visit and providing an informative and interesting tour.

Figure 2.5 SOLVE tour



Source: Chair's photograph, 3 June 2025.

Appendix 3
Submissions and additional information

Evidence received in the 47th Parliament:

Submissions

1 Professor Denis O'Carroll
- Attachment 1

2 Department of Infrastructure, Transport, Regional Development, Communications and the Arts

3 Dr Mariann Lloyd-Smith

4 Council for the Human Future

5 Mr Greg Peak

6 Mr Norvan Vogt

7 Hemp Farms Australia

8 Name Withheld

9 Fire Rescue Victoria

10 No Incinerator for Western Sydney

11 Professor Miriam K. Forbes, Dr Robin Gasiorowski, Professor Mark Patrick Taylor

12 Dr Cheng Zhang

13 Climate Action Merri-Bek

14 Mr George Bury

15 Mr Simon Wood

16 Mr Robert Heron

17 Laundry Association Australia

18 Australian Academy of Technological Sciences and Engineering

19 Environmental Risk Sciences Pty Ltd

20 NSW Premier's Department

21 Professor Deborah Glass

22 CSIRO

23 Westmark Pty Ltd

24 Australian Landfill Owners Association
- Attachment 1
- Attachment 2
- Attachment 3

25 The Australian Furniture Association and the Australian Furnishing Industry Stewardship Council

26 Name Withheld

27 Organisation for Economic Cooperation and Development

28 Ms Joanna Pickford

29 North Queensland Airports Group
30 Concerned Waterways Alliance
31 Mr Russell Jennings
32 Ms Lynda Newnam
33 Department of Climate Change, Energy, the Environment and Water
34 Local Government NSW
35 Australian Academy of Health and Medical Sciences
- 35.1 Supplementary to submission 35

36 crcCARE
37 Oakey Creek Groundwater Management Association
38 National Asthma Council Australia
- Attachment 1

39 Australian Airports Association
40 Waste Management and Resource Recovery Association
41 SciDev Limited
42 Australian Organics Recycling Association
43 Capital Airport Group
44 Clean Ocean Foundation
45 Australian Bedding Stewardship Council
46 Friends of the Earth Australia
47 Refrigerants Australia and AREMA
48 Ms Carole Stanford
49 Dr Cameron Shearer
50 Ms Amelie Bachir
51 Dr. Philippe Grandjean
52 Field & Game Australia
53 Australia & New Zealand Biosolids Partnership
54 World Wide Fund for Nature—Australia and the Australian Marine Conservation Society
55 Environmental Defenders Office
56 Water Services Association of Australia
57 National Health and Medical Research Council
58 Veolia Australia and New Zealand
59 JJ's Waste & Recycling
60 Dr Matthew Askeland and Mr Andrew Mitchell
61 Loop Organics
62 Cancer Council Australia
63 Australian Academy of Science
64 Riverina Water County Council
65 Australian Industrial Chemicals Introduction Scheme
66 Department of Defence
- 66.1 Supplementary to submission 66

67 APCO
- Attachment 1

68 Northern Territory Department of Lands, Planning and Environment

69 Airservices Australia

70 Food Standards Australia New Zealand

71 3M Company *[Note: this was corrected from '3M Corporate' following the publication of the Committee's interim report]*

72 Toxics Free Australia
- 72.1 Supplementary to submission 72
- Attachment 1

73 Tasmanian Government

74 Dr Daniel Deere

75 Professor Bernard Stewart

76 STOP PFAS Blue Mountains

77 Mr David Arthur

78 Lotsearch Pty Ltd

79 Natural Turf Alliance

80 Australian Pesticides and Veterinary Medicines Authority

81 Ms Heidi Fagan

82 Ms Erin Levee

83 Tellus
- Attachment 1

84 Professor Susan Wilson
- 84.1 Supplementary to submission 84

85 Professor Martyn Kirk, Dr Kayla Smurthwaite and Ms Susan Trevenar, National Centre for Epidemiology and Population Health, Australian National University

86 Ms Dianne Priddle and Mr William Jefferis

87 3M Australia

88 CropLife

89 Dr Kate Hughes

90 Queensland Water Directorate

91 Mr Christopher Howe

92 Ms Jayne Newgreen

93 Pacific Biotechnologies

94 Organic Operators Australia

95 Name Withheld

96 Mr Geoff Warham

97 Name Withheld

98 Name Withheld

99 Mr Alastair and Mrs Kellie-Jo McLaren

100 Department of Health and Aged Care interim Australian Centre for Disease Control
101 Chemistry Australia
102 Dr Ian Wright
103 Name Withheld
104 United Firefighters Union of Australia
- 104.1 Supplementary to submission 104

105 Dr Anne Smith
106 Mr Ian McDonald
107 Joint submission from Fytolutions, Earth+, and C-Biotech
108 Catholic Women's League Australia Inc.
109 Ms Louise Keats
110 Name Withheld
111 Soil Science Australia
112 Queensland Alliance for Environmental Health Sciences
113 United Firefighters Union of Australia Aviation Branch
114 Mr Bob King
115 Minderoo Foundation
116 Confidential
117 Confidential
118 Australian Advocacy Group
119 Mr Steven Daicos
120 Icon Water
121 Peak Oil Company
122 Pesticide Action Australia
123 Mr Lance Quintal
124 Mr Paul Adam
125 Ms Caroline Masters
126 Fire and Test Australasia
127 Launceston Airport
128 Ms Tracey Anton
129 Mr Richard Nankin
- Attachment 1

130 Confidential
131 Friends of Callan Park
132 Kate Tucker and David Hughes
133 Dr Melanie Wells and Professor Mary-Anne Lea
134 Ms Lynette LaBlack
135 Mr Jim Mustica
136 Mr Gary Blaschke OAM
137 Local Government Association of Queensland
138 Ms Carmel McCallum
- Attachment 1

139 Mr Roger Hart
140 Mr Robert Tonks
141 Retired Firefighters' Group—AFS
142 Enviropacific
143 Brisbane City Council
144 Community and Public Sector Union
145 Bygen
146 Circular Textile Working Group Western Australia
147 Professor Oliver Jones
148 Robert Masters & Associates

Additional Information

1 Dr Mariann Lloyd-Smith, IPEN, preliminary briefing submission (received 4 November 2024)
2 Department of Climate Change, Energy, the Environment and Water, preliminary briefing submission (received 4 November 2024)
3 Briefing material for Professor Martyn Kirk and Dr Kayla Smurthwaite, the National Centre for Epidemiology and Population Health (received 4 November 2024)
4 Professor Susan C Wilson, preliminary briefing submission (received 4 November 2024)
5 Professor Jochen Mueller, Queensland Alliance for Environmental Health Sciences, preliminary briefing submission (received 4 November 2024)
6 Australian Industrial Chemicals Introduction Scheme, preliminary submission (received 7 November 2024)
7 Society of Environmental Toxicology and Chemistry, Selection of academic journal articles on the environmental and human health impacts of PFAS (received 21 October 2024)
8 Department of Defence, clarification of evidence, public hearing 13 November 2024 (received 2 December 2024)
9 Professor Stuart Khan, Head of School of Civil Engineering, Sydney University, briefing material for public hearing 22 January 2025 (received 21 January 2025)
10 Chart detailing the relative concentrations of PFAS in consumer products, drinking water guidelines and biosolids, provided by the Water Services Association of Australia as briefing material for public hearing on the 22 January 2025 (received 21 January 2025)
11 Waste Dive media article, published November 2024, provided by Colin J Bosworth (received 26 November 2024)
12 Dr Matt Landos, Selection of academic journal articles on the environmental impacts of PFAS (received 26 February 2025)
13 TasWater, additional evidence relating to Launceston public hearing on 12 March 2025 (received 13 March 2025)

14 Professor Brad Clarke, papers provided for public hearing 4 June 2025 (provided 28 May 2025)
15 Dr Linda Birnbaum, documents provided in support of appearance at public hearing in Canberra, on 10 June 2025 (received 6 June 2025)
16 Hemp Farms Australia, evidence supporting remediation of PFAS using hemp crops (received 12 June 2025)
17 Tracey Anton, documents provided in support of appearance at public hearing in Melbourne, on 4 June 2025 (received 3 June 2025)
18 Dr Linda Birnbaum, opening statement, public hearing 10 June 2025 (received 10 June 2025)
19 Professor Oliver Jones, information provided ahead of public hearing appearance, 10 June 2025 (received 9 June 2025)
20 Professor Charlotte Kroløkke, information provided ahead of public hearing appearance, 10 June 2025 (received 10 June 2025)
21 Hemp Farms Australia, presentation outlining Fytolutions C-Biotech's soil enzyme product in conjunction with industrial hemp (received 13 June 2025)
22 Belgian hemp trials show promise in extracting chemicals, metals from polluted soil, article provided by Hemp Fams Australia (received 18 June 2025)
23 Australian Industrial Chemicals Introduction Scheme, clarification of AICIS' obligations (received 30 June 2025)
24 Department of Climate Change, Energy, the Environment and Water, Additional information sought by the Committee Secretariat—IChEMS (received 21 July 2025)

Answers to Questions on Notice

1 Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from committee (received 29 October 2024)
2 Professor Denis O'Carroll, response to written question from Senator Thorpe (received 14 November 2024)
3 Professor Deborah Glass, response to written questions from Senator Thorpe (received 28 November 2024)
4 CSIRO, response to written questions from Senator Thorpe (received 2 December 2024)
5 Australian Pesticides and Veterinary Medicines Authority (APVMA), response to written questions on notice from Senator Thorpe (received 3 December 2024)
6 Professor Jochen Mueller, response to written question on notice from Senator Thorpe (received 4 December 2024)
7 Professor Jochen Mueller, answer to question taken on notice at a public hearing on 13 November 2024 (received 4 December 2024)

8 Department of Climate Change, Energy, the Environment and Water, response to written questions on notice from Senator Thorpe (received 4 December 2024)

9 Department of Climate Change, Energy, the Environment and Water, answers to questions taken on notice at a public hearing on 13 November 2024 (received 4 December 2024)

10 National Centre for Epidemiology & Population Health, Australian National University, responses to written questions on notice from Senator Thorpe (received 4 December)

11 National Health and Medical Research Council, response to written questions from Senator Thorpe (received 6 December 2024)

12 National Health and Medical Research Council, response to written question from Senator Thorpe (received 9 December 2024)

13 Australian Industrial Chemicals Introduction Scheme, responses to written questions from Senator Thorpe (received 9 December 2024)

14 Department of Defence, response to written questions from Senator Thorpe (firefighting foams and bottled water) (received 12 December 2024)

15 Department of Defence, response to written questions from Senator Thorpe (update on Defence actions) (received 12 December 2024)

16 National Health and Medical Research Council, response to written question from Senator Thorpe (received 13 December 2024)

17 Australian Industrial Chemicals Introduction Scheme, response to written question from Senator Thorpe (received 12 December 2024)

18 Professor Martyn Kirk, Dr Kayla Smurthwaite and Ms Susan Trevenar, National Centre for Epidemiology and Population Health, Australian National University, answer to question taken on notice at public hearing on 13 November 2024 (received 19 December 2024)

19 NSW EPA, response to written questions from Senator Thorpe (received 5 February 2025)

20 NSW EPA, answer to question taken on notice at public hearing on 22 January 2025 (received 5 February 2025)

21 Sydney Water, response to written questions from Senator Thorpe (received 7 February 2025)

22 Sydney Water, answer to question taken on notice at public hearing on 22 January 2025 (received 7 February 2025)

23 Water Services Association of Australia, response to written questions from Senator Thorpe (received 11 February 2025)

24 Dr Nicholas Chartres, response to written questions from Senator Thorpe (received 11 February 2025)

25 Craig Allsopp and Shine Lawyers, response to written questions on notice from Senator Thorpe (received 7 February 2025)

26 Shine Lawyers, response to questions taken on notice, public hearing 21 January 2025 (received 7 February 2025)

27 Department of Defence, response to questions on notice, public hearing 21 January 2025 (received 11 February 2025)

28 Department of Health and Aged Care, response to questions on notice, public hearing 22 January 2025 (received 11 February 2025)

29 Department of Defence, response to written questions on notice from Senator Thorpe (received 17 February 2025)

30 Professor Stuart Khan, Head of School of Civil Engineering at the University of Sydney, responses to written questions on notice from Senator Thorpe (received 26 February 2025)

31 Infrastructure, Transport, Regional Development, Communications and the Arts, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 28 March 2025)

32 Environmental Protection Authority Tasmania, response to written questions from Senator Thorpe (received 1 April 2025)

33 Launceston Airport, response to question taken on notice, public hearing, 12 March 2025 and written questions from Senator Thorpe (received 2 April 2025)

34 Tasmanian Department of Health, response to written questions from Senator Thorpe (received 2 April 2025)

35 Minderoo Foundation, responses to questions taken on notice, public hearing, 12 March 2025 (received 2 April 2025)

36 Department of Natural Resources and Environment Tasmania, response to questions on notice, public hearing 12 March 2025 (received 1 April 2025)

37 Food Standards Australia New Zealand, response to written question from Senator Thorpe (received 4 April 2025)

38 Toxics Free Australia, response to written questions from Senator Thorpe (received 2 May 2025)

39 Airservices Australia, response to written questions from Senator Thorpe (received 6 June 2025)

40 Professor Philippe Grandjean, Response to written questions from Senator Thorpe (received 11 June 2025)

41 Fire Rescue Victoria, Response to written questions from Senator Thorpe (received 12 June 2025)

42 Anthony Amis—Friends of the Earth, Response to written questions from Senator Thorpe and one question taken on notice, public hearing 4 June 2025 (received 13 June 2025)

43 Barwon Water, response to questions on notice, public hearing 4 June 2025 (received 23 June 2025)

44 Barwon Water, response to written question from Senator Thorpe (received 23 June 2025)

45 SciDev, response to questions on notice, public hearing 4 June 2025 and written questions from Senator Thorpe (received 23 of June 2025)

46 Tracey Anton, response to written questions from Senator Thorpe (received 23 June 2025)

47 Charlotte Kroløkke, response to written questions from Senator Thorpe (received 24 of June 2025)

48 Linda S. Birnbaum, response to written questions from Senator Thorpe (received 24 of June 2025)

49 Bogdan Długogórski, response to written questions from Senator Thorpe (received 23 June 2025)

50 Melbourne Water, response to question on notice, public hearing 4 June 2025 (received 23 June 2025)

51 Melbourne Water, response to written questions from Senator Thorpe (received 23 June 2025)

52 United Firefighters Union of Australia, response to written questions from Senator Thorpe—questions 3 and 4 (received 24 June 2025)

53 Robert Bilott, response to written questions from Senator Thorpe (received 27 June 2025)

54 Cancer Council, response to written questions from Senator Thorpe (received 30 June 2025)

55 Australian Academy of Science, response to written questions from Senator Thorpe (received 30 June 2025)

56 EPA Victoria, response to questions on notice, public hearing 4 June 2025 (received 27 June 2025)

57 EPA Victoria, response to written questions from Senator Thorpe (received 27 June 2025)

58 Jamie DeWitt, response to written questions from Senator Thorpe (received 1 July 2025)

59 Gippsland Water, response to questions on notice, public hearing 4 June 2025 and written questions from Senator Thorpe (received 23 June 2025)

60 WorkSafe Victoria, response to written questions from Senator Thorpe (received 30 June 2025)

61 WorkSafe Victoria, response to questions taken on notice, public hearing 4 June 2025 (received 30 June 2025)

62 Department of Health, Disability and Ageing, response to questions taken on notice, public hearing 10 June 2025 (received 9 July 2025)

63 Food Standards Australia and New Zealand, response to written questions from Senator Thorpe (received 11 July 2025)

64 Australian Competition & Consumer Commission, response to written questions from Senator Thorpe (received 21 July 2025)

65 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 21 July 2025)

66 Department of Health, Disability and Ageing, response questions taken on notice, public hearing 10 June 2025 (received 18 July 2025)

67 Department of Defence, response to written questions from Senator Thorpe—questions transferred from DCCEEW (received 17 July 2025)

68 Department of Defence, response to written questions from Senator Thorpe—questions to Defence (received 17 July 2025)

Evidence received in the 48th Parliament

Submissions

1 Pact Renewables Pty Ltd

2 Name Withheld

3 Ms Juliet Vrakas

4 Name Withheld

5 Dr Alexander Waller

6 Confidential

7 Regenerative Organic Waste Solutions

8 Name Withheld

9 Ms Sophie Barrett

10 Fire and Test Australia

11 Dr John Schooneveldt

12 Ms Kylie Jones

13 Aboriginal Medical Services Alliance Northern Territory and Wurli Wurlijang Aboriginal Health Corporation

14 Ms Annie Hare

15 Australian Pesticide Research Network

16 La Trobe University

17 National Aboriginal Community Controlled Health Organisation

18 Ms Lynette LaBlack

- Attachment 1
- Attachment 2

19 Lotsearch Pty Ltd

20 Kayla Peperkamp, Innovation Approach Oz Pty Ltd

21 Mrs Paula Thurston

22 Mr Andrew McGlashan

Additional Information

1 Mick Tisbury and David Hamilton—Presentation Slides—PFAS Committee (received 5 September 2025)

2 Fire Rescue Victoria, PFAS Clinician's Advice, provided by ACFO Tisbury and Commander Hamilton (received 10 September 2025)

3 Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts, approval of Comcare Scheme Guidance—disease provisions relating to firefighters in Norfolk Island,

provided by United Firefighters Union Aviation Branch (received 22 October 2025)

4 Department of Climate Change, Energy, the Environment and Water, correction to evidence provided at public hearing, 5 September 2025 (received 25 September 2025)

5 Petition—Childhood Cancer and Chemical Safety, submitted by Sophie Barrett (30 September 2025)

Answer to Question on Notice

1 Department of Health, Disability and Ageing, response to written question from Senator Thorpe—dermal exposure (received 22 July 2025)

2 Department of Health, Disability and Ageing, response to question taken on notice, public hearing 10 June 2025—health screening for Wreck Bay (received 22 July 2025)

3 Department of Health, Disability and Ageing, response to written question from Senator Thorpe—revised drinking water guidelines values (received 22 July 2025)

4 Department of Health, Disability and Ageing, response to written question from Senator Thorpe—fluorinated pharmaceuticals (received 24 July 2025)

5 Department of Health, Disability and Ageing, responses to written questions from Senator Thorpe—science and regulations (received 28 July 2025)

6 Department of Health, Disability and Ageing, responses to written questions from Senator Thorpe—firefighters (received 28 July 2025)

7 WorkSafe Victoria, response to written questions from Senator Thorpe (received 30 June 2025)

8 WorkSafe Victoria, response to questions taken on notice, public hearing 4 June 2025 (received 30 June 2025)

9 Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts, response to written questions from Senator Thorpe (received 1 August 2025)

10 United Firefighters Union of Australia Aviation Branch, response to written questions from Senator Thorpe (received 23 June 2025)

11 Airservices, right of reply to the United Firefighters Union of Australia Aviation Branch (received 22 July 2025)

12 Department of Health, Disability and Ageing, response to written questions from Senator Thorpe—blood testing and enHealth guidance (received 6 August 2025)

13 Department of Health, Disability and Ageing, response to written questions from Senator Thorpe—chemicals regulation (received 11 August 2025)

14 Department of Health, Disability and Ageing, response to written question from Senator Thorpe—incidence of cancer at Wreck Bay (received 21 August 2025)

15 Department of Health, Disability and Ageing, response to written question from Senator Thorpe—Commonwealth Government support (received 27 August 2025)

16 Airservices Australia, response to written questions from Senator Thorpe (received 5 September 2025)

17 Australian Competition and Consumer Commission, response to written questions from Senator Thorpe (received 10 September 2025)

18 Department of Defence, response to question on notice, public hearing 5 September—PFAS litigation payouts (received 24 September 2025)

19 Department of Health, Disability and Ageing, response to written questions from Senator Thorpe (received 23 September 2025)

20 Department of Health, Disability and Ageing, response to question on notice, public hearing 5 September—new firefighting chemicals (received 23 September 2025)

21 Department of Climate Change, Energy, the Environment and Water, response to written questions from Senator Thorpe (received 24 September 2025)

22 Department of Climate Change, Energy, the Environment and Water, response to questions on notice, public hearing 5 September (received 24 September 2025)

23 Department of Defence, response to questions on notice, public hearing 5 September (received 24 September 2025)

24 Department of Defence, response to written questions from Senator Thorpe (received 24 September 2025)

25 Department of Health, Disability and Ageing, response to written question from Senator Thorpe (received 24 September 2025)

26 Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts, response to question on notice, public hearing 5 September 2025 (received 25 September 2025)

27 Department of Health, Disability and Ageing, response to written question from Senator Thorpe—chemical regulation (received 26 September 2025)

28 Department of Health, Disability and Ageing, response to written questions from Senator Thorpe (received 8 October 2025)

29 Fire Rescue Victoria, response to written questions from Senator Thorpe (received 9 October 2025)

30 Department of Defence, response to written questions from Senator Thorpe—revised response (received 24 October 2025)

31 Airservices Australia, response to written questions from Senator Pocock (received 6 November 2025)

32 Department of Health, Disability and Ageing, response to written questions from Senator Pocock—FSANZ (received 7 November 2025)

33 Department of Health, Disability and Ageing, response to questions on notice from Senator Pocock—NHMRC (received 7 November 2025)

Correspondence

1 Correspondence between Committee and Australian Competition and Consumer Commission Chair, Ms Gina Cass-Gottlieb (received 14 November 2025)

Appendix 4
Public hearings and witnesses

Public hearings held in the 47th Parliament

Wednesday 13 November 2024
2S1 Parliament House, Canberra

CSIRO

- Dr Peter Mayfield, Executive Director, Environment Energy and Resources
- Dr Jason Kirby, Group Leader, Environment Business Unit
- Dr Jens Blotevogel, Team Leader, Environment Research Unit
- Dr Liam Hall, Team Leader, Quantum Biotechnology, Manufacturing
- Dr David Beale, Senior Research Scientist, Environment Research Unit

Department of Climate Change, Energy, the Environment and Water

- Ms Kate Lynch, Division Head, Circular Economy Division
- Ms Rachel Burgess, Branch Head, Chemicals and Atmosphere Branch, Circular Economy Division
- Ms Kate Elliot, Branch Head, Wildlife, Waste and Environmental Permits Branch

Department of Defence (PFAS Investigation and Management Program)

- Ms Celia Perkins, Deputy Secretary, Security and Estate
- Ms Kathleen Leane, Assistant Secretary, PFAS Investigations and Management

Department of Infrastructure, Transport, Regional Development, Communication and the Arts (PFAS Airports Investigation Program)

- Ms Marisa Purvis-Smith, Deputy Secretary, Transport Group
- Ms Sarah Nattey, Acting First Assistant Secretary, Domestic Aviation and Reform Division
- Ms Tori Wright, Assistant Secretary, Airport Environment Branch

Australian Industrial Chemicals Introduction Scheme

- Mr Graeme Barden, Executive Director

Panel of PFAS contamination and remediation experts

- Professor Denis Michael O'Carroll, University of New South Wales
- Professor Susan C Wilson, Professor in Environmental Pollution, University of New England

Panel of PFAS human health experts

- Professor Martyn Kirk, National Centre for Epidemiology and Population Health, Australian National University
- Dr Kayla Smurthwaite, Research Fellow, The National Centre for Epidemiology and Population Health, Australian National University
- Professor Deborah Glass, Private capacity
- Professor Jochen Mueller, Theme Leader, Emerging Environmental Health Risks, Queensland Alliance for Environmental Health Sciences, University of Queensland

Tuesday 21 January 2025

Nowra School of Arts
11 Berry Street, Nowra

Wreck Bay Community members and representatives

- Ms Annette Brown, Chairperson, Wreck Bay Aboriginal Community Council
- Mrs Tamara Mitchell, Chief Executive Officer, Wreck Bay Aboriginal Community Council
- Mrs Coral Ardler Yuke, Private capacity
- Mr Keiran Assheton, Private capacity
- Mr Darren Brown, Private capacity
- Mr Keiron Brown, Private capacity
- Ms Maxine Brown, Private capacity
- Mr Clive Freeman, Private capacity
- Mr Gavin McLeod, Private capacity
- Mr Henry (Sonny) Simms, Private capacity
- Mr Matt Simms, Private capacity
- Mr Darryn Sturgeon, Private capacity
- Ms Donya Whaddy, Private capacity

Dr David Goldberg, Private capacity

Shine Lawyers

- Mr Craig Allsopp, Joint Head of Class Actions

Associate Professor Nicholas Osborne, Private capacity

Department of Defence

- Ms Celia Perkins, Acting Associate Secretary
- Mr Pat Sowry, Acting Deputy Secretary Security and Estate Group

Wednesday 22 January 2025

Hornseywood Hall
Penrith RSL

8 Tindale Street, Penrith

Roundtable discussion

- Mr Jon Dee, Stop PFAS
- Ms Joanna Pickford, Private capacity
- Mr Alastair McLaren, Private capacity
- Dr Stuart Khan, Professor and Head of School Civil Engineering, University of Sydney
- Dr Ian Wright, Associate Professor, School of Science, Western Sydney University
- Dr Nicholas Chartres, Senior Research Fellow, School of Pharmacy, Faculty of Medicine and Health, University of Sydney

Water Services Association of Australia

- Mr Adam Lovell, Executive Director

WaterNSW

- Mrs Fiona Smith, Executive Manager—Strategy and Performance
- Mr Ronan Magaharan, Executive Manager—Operations

Sydney Water Corporation

- Mr Paul Plowman, Executive General Manager, Water and Environment Services
- Dr Kaye Power, Principal Water and Public Health Advisor

NSW Environmental Protection Authority

- Mr Tony Chappel, Chief Executive Officer
- Mr Stephen Beaman, Executive Director, Regulatory Practice and Services

National Health and Medical Research Council

- Mr Alan Singh, Executive Director, Research Quality Branch
- Dr Kristal Jackson, Director, Environmental Health Section

Wednesday 12 March 2025

Cataract Suite, Sebel Hotel Launceston
12-14 St John Street
Launceston

Dr Matt Landos, Private capacity

Ms Jane Bremmer, Private capacity

Australia Pacific Airports (Launceston) (APAL)

- Mr Shane O'Hare, Chief Executive Officer

Australia Pacific Airports (Launceston) (APAL)

- Mr Ilya Brucksch, Head of Planning, Development and Customer

Australia Pacific Airports (Launceston) (APAL)

- Mr Ben Moore, Senior Environment Advisor, Melbourne and Launceston Airports

TasWater

- Mr Graham Hawke, Chief Scientist

Department of Natural Resources and Environment Tasmania

- Ms Holly Mackey, CEO, Tasmanian Waste and Resource Recovery Board

Minderoo Foundation

- Professor (Emeritus) Sarah Dunlop, Head, Plastics and Human Health

Minderoo Foundation

- Dr Manuel Brunner, Principal Sustainable Material Innovation and Investments

Airservices Australia

- Mr Paul Stoddart, Chief Customer & External Relations Officer
- Ms Michelle Peterson, Chief Aerodromes Officer

Department of Infrastructure, Transport, Regional Development, Communications and the Arts

- Ms Jennifer Stace, Acting First Assistant Secretary, Domestic Aviation and Reform
- Ms Tori Wright, Assistant Secretary, Airport Environment

Airservices Australia

- Mr James Comley, PFAS Technical Lead

Wednesday 4 June 2025

Chancellor 2
Hotel Grand Chancellor Melbourne
131 Lonsdale St, Melbourne

Mr Christopher Howe, Private capacity

Ms Jayne Newgreen, Private capacity

Friends of the Earth Australia

- Mr Anthony Amis, Land Use Researcher

Community over mining

- Ms Tracey Anton

Field & Game Australia

- Mr Lucas Cooke, Chief Executive Officer
- Mr Gary Howard OAM, Volunteer Manager

United Firefighters Union of Australia

- Mr Greg McConville, National Secretary
- Mr Elijiah Smith, National Industrial Research Officer

United Firefighters Union of Australia Aviation Branch

- Mr Wesley Garrett, Branch Secretary UFU Aviation Branch Secretary
- Mr Jay Aspros, Health and Safety Representative, Aviation Rescue and Fire Fighting Service, Avalon Airport

Fire Rescue Victoria

- Mr Mick Tisbury, Assistant Chief Fire Officer
- Commander Dave Hamilton, Commander

Professor Bogdan Dlugogorski, Private capacity

Dr Vinuthaa Murthy, Private capacity

Work Safe Victoria

- Mr Sam Jenkin, Executive Director Health and Safety
- Mr Halil Ahmet, Principal Occupational Hygienist

Gippsland Water

- Mr Simon Aquilina, General Manager Commercial Business
- Mr Chris Wood, General Manager Operations

Melbourne Water - via teleconference

- Dr Nerina Di Lorenzo, Managing Director
- Dr Daryl Stevens, Senior Scientist - Sewage Strategy and Policy
- Ms Lauren Mittiga, Senior Manager - One Water

Barwon Water - via teleconference

- Mr Shaun Cumming, Managing Director
- Dr William Buchanan, Chief Scientist

Hemp Farms Australia

- Mr Lauchlan Grout, Co-Founder & CEO

SciDev Limited - via teleconference

- Mr Steven Becker, Technical Director - Water Technologies, via teleconference

Fire and Test Australasia

- Mr Robert Lancaster, Director of Sales and Marketing

Victorian EPA

- Dr Jen Martin, Interim Chief Environmental Scientist
- Mr Matt d'Abbs, Acting Executive Director Strategy

Associate Professor Brad Clarke, Private capacity

Tuesday 10 June 2025

2S1 Parliament House
Canberra

Dr Jamie DeWitt (by videoconference from the United States), Private capacity

Australian Academy of Science Panel

- Dr Hayley Teasdale, Head, Science Policy and Advice
- Professor Oliver Jones, Professor of Chemistry at RMIT University (by videoconference)
- Dr Nathan Kilah, Senior Lecturer in Chemistry, University of Tasmania (by videoconference)

Australian Academy of Health and Medical Sciences Panel (via videoconference)

- Professor Peter Sly, AO FAHMS, Fellow (by videoconference)

Australian Red Cross Lifeblood (via videoconference)

- Dr Joanne Pink, Chief Medical Officer and Executive Director Pathology and Clinical Governance (by videoconference)

Professor Miri Forbes (by videoconference), Private capacity

Cancer Council Australia

- Professor Bernard Stewart, Member, Occupational and Environmental Cancer Committee (by videoconference)

crcCARE (via videoconference)

- Laureate Professor Ravi Naidu, Managing Director & Chief Executive Officer (by videoconference)

Department of Health, Disability and Ageing

- Mr Stephen Bouwhuis, Assistant Secretary

Dr Phillipe Grandjean (by videoconference from Denmark), Private capacity

Professor Charlotte Kroløkke, University of Southern Denmark (by videoconference from Denmark), Private capacity

Wednesday 11 June 2025
Committee room 2S1
Parliament House
Canberra

Mr Robert Bilott, Private capacity

Public hearings held in the 48th Parliament

Friday 5 September 2025
Committee Room 2S1
Parliament House
Canberra

Department of Climate Change, Energy, the Environment and Water (Submission 33)

- Mr James Tregurtha, Acting Deputy Secretary
- Ms Rachel Burgess, Acting Division Head, Circular Economy Division

Department of Health, Disability and Ageing (Submission 100)

- Mr Stephen Bouwhuis, Assistant Secretary

Department of Defence (Submission 66)

- Ms Celia Perkins, Deputy Secretary Security and Estate
- Ms Kathleen Leane, Assistant Secretary PFAS Investigations and Management

Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts (Submission 2)

- Ms Stephanie Werner, First Assistant Secretary, Domestic Aviation and Reform Division
- Ms Tori Wright, Assistant Secretary, Airport Environment Branch, Domestic Aviation and Reform Division
- Ms Rebecca Rush, Assistant Secretary, Norfolk Island and Mainland Territories Branch, Territories Division
- Ms Kim Forbes, First Assistant Secretary, Territories Division

Airservices Australia (Submission 69)

- Mr Rob Sharp, Chief Executive Officer
- Mr James Comley, PFAS Technical Lead

National Health and Medical Research Council (Submission 57)

- Mr Alan Singh, Executive Director – Research Quality Branch

Food Standards Australia and New Zealand (Submission 70)

- Dr Matthew O'Mullane, General Manager, Food Safety Branch