

Remediation management and investment

- 3.1 The first Defence sites to undergo investigation for PFAS contamination were the RAAF Base Williamtown in NSW, the Oakey Army Aviation Centre in Queensland, and RAAF Base Tindal in Katherine in the Northern Territory.
- 3.2 In its inquiry last Parliament the JSCFADT convened public hearings in these locations to hear firsthand about the progress of this work. At the time, while Defence reported that investigations were reaching completion at the Williamtown and Oakey sites, some residents in these communities considered that the work being progressed was not evident or too slow. There were also concerns that the risks of PFAS contamination were not being communicated to local governments, with continued use of PFAS contaminated bore water in Katherine town parks a case in point.¹
- 3.3 In *Recommendation 2* the JSCFADT report called on Government to 'upscale' investment in its remediation of PFAS contamination on Defence bases, to report publicly on results, and to ensure consistency of this approach on non-Commonwealth-owned sites, in collaboration with the States and Territories.
- 3.4 This chapter of the report considers the Government's response to the Committee's second recommendation which aimed to give practical effect to a nationally consistent and accountable remediation response.

¹'Committee comment,' JSCFADT, *Inquiry into management of PFAS contamination in and around Defence bases*, December 2018, pp. 51-52.

Recommendations for best practice remediation

- 3.5 The JSCFADT had envisioned that *Recommendations 1* and *2* of the report together would provide a cohesive framework and action plan for a best practice nationally consistent remediation program, under the strategic direction of a PFAS Coordinator-General.
- 3.6 *Recommendation 2* proposed that the Government should increase investment in the containment of PFAS contamination plumes and its remediation of land and water sources, and that the Coordinator-General should:
- publish draft remediation and management plans and seek public input before implementing them;
 - continue to invest in research and deployment of international expertise in remediation technology;
 - with the states and territories, review regulation and advice on use of contaminated bore water in irrigation; and
 - ensure consistency in approach outside Commonwealth sites, in consultation with state, territory and local governments.²
- 3.7 The Government ‘agreed in part’ with the practical intent of *Recommendation 2* but, as discussed in Chapter 2, believed the Coordinator-General’s supervision to be redundant.
- 3.8 The Government’s response to the second recommendation, in summary, indicated confidence in the current structures and policy trajectory for PFAS remediation. It also cited significant progress being made under PFAS Management Area Plans (PMAPs) on Defence bases and adjoining airfields,³ noting:

The Australian Government continues to invest in the development and implementation of evidence-based solutions to contain PFAS contamination plumes, and the remediation of contaminated land and water sources. Responsible

² *Recommendation 2*, JSCFADT, *Inquiry into management of PFAS contamination in and around Defence bases*, December 2018, pp. 52–53.

³ Australian Government, *Whole of Australian Government response to the report of the JSCFADT: inquiry into the management of PFAS contamination in and around Defence bases*, Department of Agriculture, Water and Environment (DAWE), 20 February 2020 (hereafter Government response), *Recommendation 2*, pp. 6–10.

Commonwealth agencies are leading site management and remediation, reporting publicly on these activities, cooperating with state and territory regulators and each other, and engaging with international regulators and other stakeholders to ensure the best outcomes for affected communities and the environment. Communication, cooperation, and information sharing are further facilitated by the activities of the PFAS Taskforce.⁴

Progress under the National Program

- 3.9 The Sub-committee's focus in this review is to evaluate the Government's response based on evidence taken to date on the National PFAS Investment and Management Program.
- 3.10 The Department of Defence's progress in PFAS containment and remediation on affected sites under its National Program was discussed at a public hearing on 2 December 2019.
- 3.11 The Sub-committee's first report, reviewing this evidence, welcomed the Department's progress at 28 sites noting technological advances enabling PFAS contaminated water and soils to be effectively cleaned.⁵ Defence also referred to partnerships with state and regional authorities to deliver alternative water sources to affected communities, such as in the reticulated water supply system in the Oakey management area.⁶
- 3.12 In regards to the specific requirements in the first and second recommendations for sharing of information with stakeholders more broadly, the Department of Defence had reported:

We have productive working relations with various jurisdictional authorities and share all of our investigation findings with them, and we also brief them to the communities involved. That includes sampling results in reports to facilitate those authorities to formulate and release any community based advisories that they consider necessary.⁷

⁴ Government response, *Recommendation 2*, p. 6.

⁵ JSCFADT PFAS Sub-committee, *Inquiry into PFAS remediation in and around Defence Bases – First report*, December 2019, Chapter 3, [hereafter *First report*, December 2019], pp. 25–26; 31–32.

⁶ JSCFADT, *First report*, December 2019, Chapter 3 (in summary), pp. 34–35.

⁷ Mr Steven Grzeskowiak, Deputy Secretary, Estate and Infrastructure, Department of Defence,

- 3.13 The Sub-committee, in its report, had also noted and commended the Department for its comprehensive PFAS Investigation and Management website. The site provided up-to-date and detailed advice about contracted works and consultations at management sites, and also included information on the monitoring of PFAS levels in treated water and soils over time.⁸
- 3.14 As discussed in the previous chapter, these measures are complemented by the recent redesign of the PFAS website which now functions as the central repository of up-to-date information it was intended to be.

Prioritising investment

- 3.15 *Recommendation 2* of the JSCFADT 2018 report had called on Government to continue and 'upscale' investment in its PFAS containment and remediation efforts, including on research and deployment of international expertise.⁹
- 3.16 The Committee in its first report for the current review had identified a need for more information about Defence's investment in PFAS remediation work, research, on contract arrangements and progress.¹⁰
- 3.17 In in answer to questions on notice (AQoN) in March 2020, the Department of Defence indicated that:
- Over 2017–18 \$104.7 million and in 2018–19 \$133.7 million was expended on the PFAS Investigation and Management program from within the existing Defence budget. This covered the conduct of site investigations, planning and delivery of remediation activities, provision of alternative drinking water support and the management and administration of the national program.
 - In 2017–18 \$35 million and \$3.8 million in 2018–19 was provided by Defence to other Commonwealth agencies for PFAS-related programs. This included \$13.7 million to the Department of Health for the

Committee Hansard, 2 December 2020, p. 1.

⁸ JSCFADT, *First report*, December 2019, p. 42.

⁹ Government response, *Recommendation 2*, p. 6.

¹⁰ JSCFADT, *First report*, December 2019, Chair's Forward, p. *vi*, and see discussion p. 42.

voluntary blood testing program, mental health counselling and support for the ANU's epidemiological PFAS Health study.¹¹

- 3.18 The Government response states that Defence has spent around \$400 million in total on investigations, providing support to affected communities, funding research and implementing remediation initiatives, including alternative water supplies, soil excavation from on-base drains, and implementation of groundwater and surface water treatment technologies.¹²
- 3.19 The response also highlights coordination of this work on federally leased airports by Airservices Australia¹³ and the Federal Department of Infrastructure, Transport, Cities and Regional Development (Infrastructure). It reports that Airservices Australia has committed \$30 million to PFAS-related work since 2006. This has included funds for research with university and industry partners, and identification of 22 PFAS affected airfield sites for possible remediation. Two of the sites are joint user facilities with Defence.¹⁴
- 3.20 Further, the Department of Infrastructure will use information from this work with that acquired from state and territory environmental protection agencies (EPAs) to develop 'a whole-of-precinct approach to site assessment and management at airports' around Australia.¹⁵

Progress and reportage on PMAPs

- 3.21 The first action point in the JSCFADT's second recommendation specifically calls on Government to publish its draft remediation and

¹¹ Department of Defence, *Submission 1 – AQoN*, Question 3, pp. [6-7].

¹² Government response, *Recommendation 2*, p. 7.

¹³ Airservices Australia is responsible for Australia's airspace management, aeronautical information, aviation communications, radio navigation aids, and aviation rescue firefighting services. See 'About Us', Airservices Australia www.airservicesaustralia.com/about/ viewed 6 July 2020.

¹⁴ Government response, *Recommendation 2*, p. 7.

¹⁴ Government response, *Recommendation 2*, pp. 7-8.

¹⁵ Government response, *Recommendation 2*, p. 8.

management plans for each investigation area, and to consult the public on these plans prior to their finalisation.

- 3.22 PFAS investigations are a three-phased process involving a Preliminary Site Investigation, a Detailed Site Investigation and, if found to be necessary, a Human Health and Ecological Risk Assessment. Once the investigation is completed a PFAS Management Area Plan (PMAP) is tailored to address the specific conditions on the site.¹⁶
- 3.23 The Government advised in its response that the recommended process of publication and community review of PMAPs had been partially adopted, subject to expert consideration in approval of the final plan:

When developing PMAPs, Defence takes into consideration community feedback received throughout the investigation. Due to the complexity and evolving scientific understanding of PFAS characteristics, the PMAP recommendations are primarily determined by expert advice from Defence's environmental consultants. When implementing PMAP recommendations Defence consults with all affected stakeholders including any affected members of the community, and state and territory regulators. Defence has committed to reviewing PMAPs annually, or more frequently if required to respond to any new information or technology that has the potential to impact the PMAP objectives.¹⁷

- 3.24 The response also advised that both Defence and Airservices Australia have committed to publishing PMAPs on their websites. At 31 October 2019, Defence had published PMAPs for 17 sites and made commitments to publish site investigation results and an Ongoing Monitoring Report for all sites on the website.¹⁸ This, it was expected:

...will help Defence and the community to understand whether the controls in place are effective, need to be adapted, or if further action might be required.¹⁹

¹⁶ *Department of Defence Annual Report 2018–19*, p. 138, and see JSCFADT, *First report*, December 2019, p. 24.

¹⁷ Government response, *Recommendation 2*, pp. 8–9.

¹⁸ Government response, *Recommendation 2*, pp. 8–9.

¹⁹ Government response, *Recommendation 2*, p. 9.

- 3.25 Subsequent to the Sub-committee's hearings in December 2019, Defence was asked for specific information about the timeframes of work under PMAPs, in particular to gauge this against community perceptions. In an answer to a written question on notice Defence advised that the Investigation phase averages between 18 months and two years, with the PMAP delivered at the end of the investigation process.²⁰
- 3.26 Asked about the prioritisation of work on sites and monitoring and reportage on the results under a PMAP, the Department noted that remedial actions vary by base but generally there are two to five actions in each PMAP: 'These actions are defined by location for surface water, groundwater, soil and Sewage Treatment Plants, and therefore will be able to be monitored individually'.²¹
- 3.27 The Sub-committee also asked about progress at Williamstown where a PMAP review was expected in late 2019, following a recent revision in May 2019. Defence in its response indicated a PMAP could be subject to regular revision and review depending on the specific geography of a site and other factors including:
- Progress in risk management and the effectiveness of specific response actions;
 - Data from the Ongoing Monitoring Plan;
 - Changes of land use;
 - Changes in legislation, strategy, policy and guidelines/standards;
 - Outcomes of new research or development of management/remediation technologies; and
 - Any other new information that has the potential to impact the outcomes of the PMAP.²²
- 3.28 Defence advised that at Williamstown, for instance, there were two characteristics that made remediation more difficult than at other sites:
- The Base is built on sand dunes, which facilitates the fast transport of PFAS from a source area to beyond the Base via the groundwater; and
 - The groundwater is very shallow, intermixing with surface water features. Surface water and groundwater are capable of contaminating each other rather than being discrete layers.²³

²⁰ Department of Defence, *Submission 2-AQoN*, p. [1].

²¹ Department of Defence, *Submission 2-AQoN*, p. [1].

²² Department of Defence, *Submission 2-AQoN*, no.4, p. [8].

- 3.29 Questions were also asked about the 'interim' status of the water treatment plant at Lake Cochrane, near Williamstown, and its PMAP.²⁴
- 3.30 Defence reported that further investigation had revealed that PFAS affected runoff into the lake was not the problem originally considered. In fact, the lake acts as a buffer to surface flows except in an extreme storm event. The focus is now on the treatment of ground water flows at the plant near the former firefighting training area, and on buffers and other measures to reduce surface flows during rain events. Hence the interim water treatment plant may now be redundant.²⁵
- 3.31 Asked about the assurances that might be provided about the safety and consistency of PMAP work given Defence does not have an environmental health regulatory role, the Director of the PFAS Taskforce Ms Nicola Powell advised that:

It's probably important to go back to the premise of remediation first, to say that at the moment there isn't any kind of known effective way of remediating PFAS on sites. So, it does have to be assessed on a site-by-site basis. There is a lot of research underway, which is funded through the Commonwealth and out of the Defence portfolio, with a number of academic institutions working on different ways of remediating PFAS effectively. It's important to characterise that as a work in progress. But when it comes to the assessment of contamination at sites, then people are following the guidance provided in the PFAS NEMP and also in the National Environment Protection (Assessment of Site Contamination) Measure.²⁶

²³ Department of Defence, *Submission 2-AQoN*, no. 4, p. [9].

²⁴ Department of Defence, *Submission 2-AQoN*, no. 4, p. [9].

²⁵ Department of Defence, *Submission 2-AQoN*, no. 4, p. [9].

²⁶ Ms Nicola Powell, Director, PFAS Taskforce, Chemicals Management Branch, Department of Agriculture, Water and the Environment (DAWE), *Committee Hansard*, Canberra, 10 February 2020, pp. 4-5.

Concerns about PMAPs and adjoining land

- 3.32 *Recommendation 2*, at the last action point, called for consistency in management of PFAS contamination on non-Commonwealth sites, in consultation with state, territory and local governments.
- 3.33 Discussion about the containment of PFAS plumes last Parliament had raised issues about the assessment and identification of PFAS affected land in proximity to management sites, about the changing boundaries and status of these sites,²⁷ and the ongoing ramifications for adjoining local communities and state and local regulatory authorities.
- 3.34 In December 2019 Mr Steve Grzeskowiak, Defence's Deputy Secretary of Estate and Infrastructure, referred to the process of ongoing review and assessment at Williamstown to indicate how the parameters of a PFAS managed site may grow or shrink:
- Some of the sites are more complex, and that's about the environmental interaction, the hydrogeology et cetera, and the use that people living in the area might have been making of groundwater or surface water that had PFAS contamination...the initial investigation area is just our best estimate of where we need to look, and if we need to go further, we go further. Also, as we go to investigations, there are trigger points in that whole process about whether or not a human health risk assessment needs to be done or not. In some of our sites, we haven't had to do that, because there are no obvious exposure pathways that would require it. So the investigations are of different scale in different places.²⁸
- 3.35 The Sub-committee's investigation of this matter elicited an acknowledgement that more needs to be done to clarify the clearance status of investigated land in the process of PMAP review.²⁹
- 3.36 Evidence later received by the Sub-committee suggests that there are questions still to be answered about the responsibilities for PFAS affected communities contiguous with but outside the parameters of a PMAP, and off the Defence base on non-Commonwealth-owned sites.

²⁷ JSCFADT, *Inquiry into management of PFAS contamination in and around Defence bases*, December 2018, pp. 50–51.

²⁸ Mr Grzeskowiak, Department of Defence, *Committee Hansard*, 2 December 2020, p. 6.

²⁹ *First report*, December 2019, Chapter 3, see discussion, pp. 40–42.

3.37 Two submissions to the inquiry contended that the Department of Defence is reluctant to review evidence of contamination off-base, leaving affected communities without supports or hope of remediation under a PMAP. The Hawkesbury Environment Network (HEN), in *Submission 3*, refers to the Government response's failure to acknowledge this problem as follows:

We believe the area surrounding Richmond RAAF Base has not been fully considered in the response. There are farms on the Lowlands known to be high in PFAS and we know that Defence have no plans to remediate this land. Western Sydney University testing demonstrated that areas of the Lowlands around Bakers Lagoon have PFAS readings of 300 parts per million, with other nearby areas also being contaminated. This area is still growing beef, sheep, chickens, vegetables and turf. These are all probably being sold locally and through other markets...If Defence has done any testing of beef or other produce from the Lowlands, we are unaware of it.³⁰

3.38 Having noted the Government's contention in its response that it has in place nationally coordinated structures to address PFAS issues and mitigate PFAS contamination, HEN concluded:

What is evident to us is that their response is fractured and not nationwide, in fact it appears that Defence is using data from only three sites and then disseminating that information at other locations assuming it is relevant across Australia.³¹

3.39 The Fullerton Cove Residents Action Group, *Submission 4*, similarly reports from the coast near Williamstown, that:

There is a great deal of frustration within our community due to the major restrictions placed on us as a result of the declared contamination zones...

This frustration is highlighted by no off Base clean-up activity what soever. The Red Line on a map that surrounds us has not changed and does not look like changing in the foreseeable future. This inaction is the major cause of the deteriorating mental health in our community.³²

³⁰ Hawkesbury Environment Network (HEN), *Submission 3*, p. [1].

³¹ HEN, *Submission 3*, p. [1].

³² Fullerton Cove Residents Action Group, *Submission 4*, p. [1].

- 3.40 Fullerton Cove residents proposed a practical solution to the jurisdictional issue which halts work at the perimeter of a PMAP:

Develop a Management Plan for off Base PFAS Contamination Clean Up and Remediation. This Plan (PMP) to include all Governments, Government Agencies and Local Government and cover Drains, Soil, Water Bodies, Airborne Transmission, Dust, Disposal, Communication, with the aim to removing the RED ZONE.³³

- 3.41 Asked about its obligations to protect environments off-site, Defence advised in an AQoN notice that:

Where PFAS has migrated off-site, beyond the boundaries of Commonwealth land, Defence has a responsibility to ensure environmental regulators and any persons or organisations likely to be impacted are promptly advised of any contamination. Defence is committed to responsible environmental management and has established relationships with state and territory regulators in each jurisdiction where a Defence property is subject to a PFAS investigation. Defence complies with its legislative and regulatory obligations, regardless of where it operates, and seeks to conform to state and territory environmental management legislation, where it does not conflict with Commonwealth legislation.³⁴

Coordination with the states and territories

- 3.42 In its report, the JSCFADT had identified discrepancies between bore water management in Katherine town, and the advice provided at RAAF Tindal on water safety by Defence. Action point four of *Recommendation 2* referred to the need for consistency in regulation, in particular for use of water for irrigation, on a national basis.
- 3.43 The Government's response provides a brief section on the requirements for 'collaboration and consistency across jurisdictions on environmental standards'. It refers in particular to the development of the PFAS *National Environmental Management Plan* (NEMP) and the revised NEMP2.0, which

³³ Fullerton Cove Residents Action Group, *Submission 4*, p. [2].

³⁴ Department of Defence, *Submission 1 – Answers to Questions on Notice (AQoN)*, p. [13].

has specific guidance on re-use of water and the implications for animals and plants onsite.³⁵

- 3.44 The National Health and Medical Research Council (NHMRC) advised that in 2017 it was commissioned by the Department of Health to develop specific health-based guideline values for PFAS (including PFOS, PFOA and PFHxS) for drinking water and recreational water. Current guidance comprises:
- A chemical factsheet and health-based guideline values for PFAS for the ADWG [*Australian Drinking Water Guidelines 2008*] published on 24 August 2018.
 - Guidance and health-based guideline values for PFAS in recreational water (including PFOS, PFOA and PFHxS), as an addendum to the *Guidelines for Managing Risks in Recreational Water*, published on 12 August 2019.³⁶
- 3.45 These documents, the NHMRC advises, provide 'nationally consistent standards to maintain public health that underpin state and territory regulations on drinking water and recreational water quality.'³⁷
- 3.46 As part of its review, the Sub-committee advised state and territory governments of the inquiry and called for an update on coordinated activities in PFAS-related work between their environmental protection and other agencies and those of the Commonwealth. In response, the Chief Minister of the Northern Territory (NT), Queensland's Minister for the Environment and the Great Barrier Reef, and the NSW Minister for Energy and Environment provided status reports on their policies and work with the Commonwealth.³⁸
- 3.47 The Sub-committee subsequently invited submissions from the NT PFAS Taskforce and the Queensland Government to provide more detail on this work.³⁹
- 3.48 In March 2020, the NT PFAS Taskforce advised that it would delay making a submission due to urgent diversion of staff to the NT's

³⁵ Government response, *Recommendation 2*, p. 10.

³⁶ National Health and Medical Research Council (NHMRC), *Submission 6*, p. [1].

³⁷ NHMRC, *Submission 6*, p. [1].

³⁸ Correspondence dated respectively dated 10 December 2019, 23 January 2020; and 28 January 2020 respectively.

³⁹ The NSW Government advised its policy was unchanged since its submission to 2018 PFAS inquiry. Correspondence dated 28 January 2020.

COVID-19 response.⁴⁰ The Chief Minister's letter, however, provided some detail on co-ordination of EPA activities within the Territory:

The Northern Territory Environment Protection Authority (NT EPA) continue[s] to work closely with the Department of Defence throughout the transition to remediation of Defence sites in the Northern Territory, to ensure the PFAS Management Area Plans (PMAPs) response principles are appropriate to comply with Northern Territory environmental laws. It must be noted the Department of Defence has shown a willingness to treat the NT EPA as an active member providing technical input into its remediation program for the three Northern Territory Defence sites.⁴¹

3.49 Queensland's Department of Environment and Science (Qld DES) provided a detailed submission which highlighted the state's status as the first Australian jurisdiction to introduce a policy banning the use of PFAS chemicals in firefighting (in 2016). The submission went on to describe its collaboration with Defence to ensure PMAPs in Queensland are compliant with the State's environmental laws, including its controls on PFAS use and remediation.⁴²

3.50 While Qld DES reports positive engagement with Defence in developing documents for PMAPs and Ongoing Monitoring Plans at the seven Defence investigation sites in the state,⁴³ it had criticisms about the process:

DES is of the understanding from Defence that PMAPs are high level documents that are not intended to define the specific remedial measures to be undertaken, noting that information gathered as part of the Detailed Site Investigations was not collected for this purpose and that further investigations are required at some sites in order to inform specific remedial actions. This approach presents a risk of delaying remedial actions.⁴⁴

⁴⁰ Advice to the Secretariat from the Chief Minister's Office, 27 March 2020.

⁴¹ Letter from the Chief Minister, the Hon Michael Gunner MP, 10 December 2020, p. 1.

⁴² Queensland Department of Environment and Science (DES), *Submission 7*, p. 1.

⁴³ Army Aviation Centre Oakey, RAAF Base Amberley, RAAF Base Townsville, Lavarack Barracks, Townsville, HMAS Cairns, and former WW2 Fuel Installation, Hill, Wide Bay Training Area, RAAF Base Scherger, p. 4, Qld DES, *Submission 7*, p. 4.

⁴⁴ Qld DES, *Submission 7*, p. 5.

- 3.51 The Qld DES calls for improved timeliness of remedial actions and for more direction in PMAPs to meet Queensland's environmental obligations. It also highlights Section 13 in the NEMP, which requires on-site or off-site treatment (including destruction), containment and removal of PFAS contaminants.⁴⁵
- 3.52 Further, it specifically requests Defence to cease using fluorinated firefighting foams at the Army Aviation Centre at Oakley, expressing concerns about recontamination of remediated areas or release of additional contaminants.⁴⁶
- 3.53 The implications of these concerns are considered further in discussion of national and international standard setting for PFAS in Chapter 5.

Focus on research and innovation

- 3.54 *Recommendation 2* of the JSCFADT's report includes directions for government to 'continue to invest in research and deployment of international expertise in remediation technology'. This is a companion directive to point three in *Recommendation 1*, for work to better identify gaps and priorities for investigation and remediation based on contamination levels and human health risk.
- 3.55 The Government response advised that Defence's commitment to PFAS remediation across its estates totals \$400 million in investigations, providing support to affected communities, funding research activities and implementing remediation initiatives. The response goes on to highlight Defence's commitment to support research in 'effective and efficient remediation' in partnership with industry:

Defence works with industry providers to identify and bring to maturity remedial technologies that may address PFAS migration via groundwater and surface water, and mitigation of risks from contaminated soils, wastewater treatment plants, and construction materials. At October 2019 Defence has funded 10 research activities valued at \$3.5 million.⁴⁷

⁴⁵ Qld DES, *Submission 7*, p. 5.

⁴⁶ Qld DES, *Submission 7*, p. 3.

⁴⁷ Government response, *Recommendation 2*, p. 7.

- 3.56 Defence in evidence to the Sub-committee described its efforts to inform and attract industry innovators to participate in these PFAS research and remediation activities. Defence advised:

On 30 May 2019, Defence held a PFAS Industry Information day in Sydney to provide industry with advice on the scope and scale of Defence's PFAS remediation challenge, and how Defence will approach the market to seek solutions for these challenges. One hundred and seventy nine industry members, representing 119 companies attended the event. Defence advised industry participants of its PFAS Research and Technology Demonstration Priorities during this day.⁴⁸

- 3.57 The Government's response reported in summary:

Defence works with industry providers to identify and bring to maturity remedial technologies that may address PFAS migration via groundwater and surface water, and mitigation of risks from contaminated soils, wastewater treatment plants, and construction materials.⁴⁹

Industry partnerships

- 3.58 Defence's website, as noted previously, provides information on PFAS technology experts currently involved in remediation work at Defence sites nationally. In its first report, the Sub-committee surveyed this work, asking Defence about the methods being used to extract contaminants from soil and water as well as experimentation to destroy or reduce these contaminant concentrations.

- 3.59 The Sub-committee subsequently invited Defence remediation partners to provide an overview and progress report on their work.⁵⁰ In its submission, Synergy Resource Management Pty Ltd, an Australian owned and operated company delivering water treatment solutions for Defence at Williamtown, among other sites, advised:

Our collaborative relationship with Defence, demonstrated through successful execution of multiple PFAS water treatment projects, continues to support the ongoing PFAS management program through the removal of PFAS contaminants from over 1.8

⁴⁸ Government response, *Recommendation 2*, p. 7.

⁴⁹ Government response, *Recommendation 2*, p. 7.

⁵⁰ Submissions received to date are listed in Appendix A.

billion litres of PFAS contaminated water at RAAF Williamtown alone. This volume of PFAS contaminated water is comprised of 1.2 billion litres treated by the Lake Cochran WTP and Megalitres treated by the Construction WTP to date.⁵¹

3.60 In regards to its research and innovation model, Synergy stated:

At Synergy we aim to continually improve our WTP [water treatment plant] technology and treatment processes through research, development, experience and innovation. Synergy have a dedicated team of environmental scientists, chemists and engineers that work in collaboration with the Queensland University of Technology to test and design new remediation techniques and strategies. Learning also happens during works and over the past twelve years our operational team have improved the way that we utilise our systems resulting in smarter more efficient treatment with lower resource use and waste output.⁵²

3.61 The Sub-committee last year provided written questions to Defence about procurement processes for remediation contractors and whether project outcomes were subject to peer review by Government or external experts.⁵³ Defence later advised that its procurement of technological solutions, management and monitoring processes respond to screening criteria in the NEMP, stating:

In most procurement activities undertaken by Defence's PFAS Investigation and Management Branch (PFASIM), evaluation criteria for PFAS remediation technologies will be specific to the proposal and the conditions at the particular site in question. Defence may obtain additional expert advice and oversight from an environmental consultant appointed by Defence for remediation and management of the Defence property. Where appropriate, Defence also has the ability to seek additional validation from other external experts, such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO), or counterparts in the United States Department of Defence.⁵⁴

⁵¹ Synergy Resource Management Pty Ltd *Submission 16*, p. 21.

⁵² Synergy Resource Management Pty Ltd *Submission 16*, p. 4.

⁵³ Department of Defence, *Submission 1 – AQoN*, Question 2 (a), p. [3].

⁵⁴ Department of Defence, *Submission 1 – AQoN*, Question 2 (a), p. [3].

3.62 The Government's response further elaborates on the close engagement between Australian and United States Defence and Environment agencies, as part of the OECD's effort to build 'cooperative approaches to resolving the global issue of PFAS'.⁵⁵ Discussion of the refinement of our national laws and of international agreements governing regulation of PFAS is in consideration of the Government's responses to *Recommendations 7 to 9* in Chapter 5.

Funding national research

3.63 The Sub-committee also determined in this review to expand its investigation of innovative approaches to PFAS remediation by inviting recipients of Australian government PFAS research grants to outline their projects in submissions.

3.64 The response advised of the Government's \$13 million investment in funding for national remediation research grants administered by the Australian Research Council (ARC), and a further \$12.5 million for PFAS health impact research (through the National Medical and Health Research Council – NHMRC) and the Australian National University's epidemiological project, the PFAS Health Study.⁵⁶

3.65 Invitations were extended to ARC and NHMRC recipients and to the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) at the University of Queensland, which has ongoing support from Defence.⁵⁷

3.66 At the time of writing the Sub-committee had received reports on exciting research projects, some involving university and industry partners, which work towards environmentally sustainable solutions to remediate soil and water, and even to destroy PFAS.⁵⁸

3.67 Professor Cheng Fang at the University of Newcastle will lead research into electrochemical-sonication destruction mechanisms with university experts in environmental remediation and ecotoxicology to destroy and

⁵⁵ Government response, *Recommendation 2*, p. 10.

⁵⁶ Government response, *Recommendation 2*, p. 9, and see Department of Defence, *Submission 1 – AQoN*, Question 2, p. 4.

⁵⁷ Government response, *Recommendation 2*, p. 7.

⁵⁸ Professor Cheng Fang, University of Newcastle, *Submission 10*, p. 1.

detoxify PFAS and its end products. He advises that the method is cleaner as it uses electricity rather than chemicals in the process:

Most of the present remediation technology can only remove PFAS, such as from water streams, by adsorption. However, the adsorbed PFAS is not destroyed but merely transferred from one matrix to another. Our proposal is to promote active destruction of PFAS to complete the full mitigation process and thus clean up the substances from our environment.⁵⁹

- 3.68 Professor Behdad Moghtaderi, Director, Priority Research Centre for Frontier Energy Technology and Utilisation at University of Newcastle is partnering with the University of Queensland and Evocra Pty Ltd to demonstrate a pilot-scale version of the 'PFAS Harvester' for commercialisation.⁶⁰ The submission advises of the broader benefits of this partnership:

The collaboration between some of the leading Australian researchers and engineers at UON, UQ and Evocra will significantly enhance Australia's research and innovation capacity in the emerging field of PFAS remediation, resource recovery and waste minimisation. Development and deployment of the PFAS Harvester process will also directly contribute to the Australian Government Research Priority "Soil and Water" by tackling the Practical Research Challenge of "Minimising damage to, and developing solutions for restoration and remediation of, soil, fresh and potable water, urban catchments and marine systems". The project will also train two PRA researchers capable of tackling problems of importance in PFAS remediation and waste utilisation...More importantly, the interactions among the partner organisations will provide a great opportunity to inspire the next generation of Australian innovators and technology development companies.⁶¹

- 3.69 The submission reports that the PFAS Harvester is not only cost effective, and highly efficient in destroying PFAS contaminants but its poly-generation platform also 'produces valuable by-products eg.

⁵⁹ Professor Cheng Fang, University of Newcastle, *Submission 10*, pp. 1, 2.

⁶⁰ Professor Behdad Moghtaderi, University of Newcastle, *Submission 13*, p. 1.

⁶¹ Professor Behdad Moghtaderi, University of Newcastle., *Submission 13*, p. 14.

hydrogen enriched syngas, calcium carbonate rich ash/slag, calcium fluoride'.⁶²

- 3.70 The Sub-committee was also advised about the CRC CARE's ongoing partnership with Defence to develop innovative solutions to remediate challenging environmental contaminants, such as aqueous film-forming foam (AFFF).⁶³ The CRC CARE reports an award winning solution it has developed using modified clay as an immobilisation technology for the treatment of PFAS contaminated soil, surface water and groundwater:

matCARE™ is a patented technology that has been used in containerised mobile wastewater treatment plants to remediate wastewater contaminated with PFAS as a result of firefighting training at various Royal Australian Air Force (RAAF) sites throughout Australia, including Edinburgh (SA), Pearce (WA) and Townsville (QLD). It was also used to remediate PFAS-contaminated wastewater at Adelaide Airport. matCARE is effective in treating perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorohexane sulfonate (PFHxS) and another 25 PFAS substances. matCARE also [ab]sorbs a wide range of other pollutants, including PH and chlorinated hydrocarbons (CH), which are likely to be associated with PFAS.⁶⁴

- 3.71 The CRC reports that the technology has removed more than 99 per cent of PFAS (99.7 per cent of PFOS and 98.8 per cent of PFOA) from contaminated ground water at RAAF Pearce and Edinburgh.⁶⁵ A new matCARE trial using an innovative horizontal-reactor permeable reactive barrier is also being scaled up at RAAF Richmond, which will enable use of the technology at a wider range of airfields.⁶⁶
- 3.72 Submissions received on other research projects received to date are in Appendix A. NMHRC grant projects are discussed in Chapter 4, in reference to *Recommendations 3 and 4*, for review of the health opinion and extension of blood testing.

⁶² Professor Behdad Moghtaderi, University of Newcastle., *Submission 13*, p. 8.

⁶³The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE), *Submission 19*, p. 1.

⁶⁴ CRC CARE, *Submission 19*, p. 1.

⁶⁵ CRC CARE, *Submission 19*, p. 1.

⁶⁶ CRC CARE, *Submission 19*, p. 2.

Committee comment

- 3.73 The Government's response to the JSCFADT's second recommendation indicated confidence in the current structures and policy trajectory for PFAS remediation.
- 3.74 This chapter of the report has evaluated the detail of Defence's PFAS National Investigation and Management program with a focus on the effectiveness, timeliness and responsiveness of its management of sites under PFAS Management Area Plans (PMAPs) in particular.
- 3.75 The Department of Defence has indicated that a site investigation may take two years before a PMAP is developed. This is a long lag time for people in affected areas and may support community views that little is being done and progress is slow. For people residing near Defence bases the protracted process of investigation and site assessment and the disjuncture between Commonwealth and state or territory responsibilities, leaves some residents, like those near Richmond RAAF and Williamtown, living in a PFAS half-life of restrictions but without the benefits of a co-ordinated remediation plan or support services within the PMAP.
- 3.76 The Government response states that Defence has spent around \$400 million in total on investigations, site management and research, and supports to PFAS affected communities on Commonwealth sites. This includes some \$29 million for funding for industry and national research priority activities.
- 3.77 The Committee in its first report identified a need for more detail in the Department of Defence's actual investment in PFAS remediation work, research, on contract arrangements and progress reports.⁶⁷ While the Government response and its answers to questions on notice provide this information for the last reporting period, the Sub-committee anticipates that this detail will be routinely included in future Department of Defence annual reports.

⁶⁷JSCFADT, *First report*, December 2019, Chair's Forward, p. vi, and see discussion p. 42.

Recommendation 2

The Committee recommends that the Department of Defence includes information on its investment in PFAS remediation programs, research and related activities in its annual reports along with tabular progress reports on remediation work under PMAPs for all sites.

- 3.78 The first action point in the JSCFADT's second recommendation specifically calls on government to publish its draft remediation and management plans (PMAPs) for each investigation area and to consult the public on these plans prior to their finalisation.
- 3.79 The Government response reports that Defence has to date published PMAPs for 17 sites and has plans to publish investigation results and ongoing monitoring reports for all sites. Defence also anticipates that sharing this information will assist residents better understand the remediation process.
- 3.80 In this chapter, the Sub-committee has discussed concerns about the changing boundaries and status of PFAS investigation sites, and the ongoing review of land under PMAPs. In December last year this subject was investigated with the Department of Defence who acknowledged that more needs to be done to ensure that the official status of land cleared of PFAS contamination is more easily discernible to residents and the public.⁶⁸
- 3.81 The Sub-committee notes that site investigation and management is a complex process and that the information published is equivalently complex. The Committee welcomes the Department's publication of more simplified Factsheets on PMAP sites, which have a map showing management phases,⁶⁹ and its intention to publish the results of site investigations and monitoring. However, the Sub-committee considers that changes in the contamination status of sites and their boundaries should be more clearly identified on up-to-date site maps on the website, and made available to residents.

⁶⁸ Mr Grzeskowiak, Department of Defence, *Committee Hansard*, 2 December 2020, p. 7, and see *First report*, December 2019, pp.40–41.

⁶⁹ For example, see Department of Defence, Army Aviation Centre Oakey PMAP fact sheet www.defence.gov.au/environment/pfas/oakey/ and RAAF Base Williamtown PMAP factsheet www.defence.gov.au/environment/pfas/Williamtown/

Recommendation 3

The Committee recommends that the Department of Defence should publish on its website up-to-date maps showing the changing boundaries of PFAS investigation and PFAS Management Area Plan (PMAP) sites, with the status of areas officially cleared of PFAS contamination plainly indicated.

The Committee recommends copies of these maps should be made available to residents on request.

The Committee also recommends that the Department ensures public input is sought through community engagement throughout the process.

- 3.82 Action point four of *Recommendation 2* called on the Government to ensure consistency in approach outside Commonwealth sites, in consultation with state, territory and local governments. The Queensland Department of Environment and Science's submission highlights concerns which are reflected in submissions people living near – but not included in – the framework of PFAS supports under the PMAP.
- 3.83 Information from DES provides a caution in observing that PMAPs are high level documents that 'are not intended to define the specific remedial measures to be undertaken'. Qld DES considers that, by not specifying the work needed to comply with state-based environmental laws or working towards NEMP requirements for on-site or off-site treatment (including destruction), containment and removal of PFAS contaminants, this work is unnecessarily delayed.
- 3.84 The Sub-committee noted by contrast the proactive approach being adopted by Airservices Australia which has committed \$30 million to PFAS-related work since 2006. This has included funding for research with university and industry partners and identification of 22 PFAS affected airfield sites for possible remediation and delivery of PMAPs. The response notes the Department of Infrastructure will use information from this work, with that acquired from state and territory environmental protection agencies, to develop 'a whole-of-precinct approach to site assessment and management at airports' around Australia.⁷⁰
- 3.85 As referenced in this chapter, Fullerton Cove Residents Action Group proposed a practical solution to the problem of off-base contamination. This was to 'Develop a Management Plan for off Base PFAS

⁷⁰ Government response, *Recommendation 2*, p. 8.

Contamination Clean Up and Remediation'. This off-base management plan would 'include all Governments, Government Agencies and Local Government' and cover all management of all contamination sources and communication.⁷¹

- 3.86 The Sub-committee notes the Government's advice that PMAPs aim to be responsive to the specific features of a remediate site and to priorities which change over time and must be monitored and re-assessed.
- 3.87 The Sub-committee therefore considers that, to expedite a timely and effective remediation process, PMAPs must be practical documents that direct compliance with a jurisdiction's environmental policies and standards as well national PFAS regulatory frameworks.

Recommendation 4

The Committee recommends that PMAPs should be practical documents that direct compliance with a jurisdiction's environmental policies and standards as well national PFAS regulatory frameworks for timely remediation works in and around Defence bases.

- 3.88 The Sub-committee discusses the potential and the risks for cross-jurisdictional collaboration in PFAS remediation works in consideration of National PFAS regulatory frameworks and standards in Chapter 5.
- 3.89 Finally the Sub-committee notes and commends the substantial investment the Government has made for research into innovative technologies which have potential to reduce the extent of contamination and in some cases completely destroy residue PFAS contaminants.
- 3.90 The Sub-committee intends to further investigate Defence's monitoring and reportage of remediation outcomes and to investigate the range of technological solutions currently being investigated by experts in the future. Research into PFAS-related health impacts is discussed in more detail in Chapter 4.
- 3.91 Discussion of the refinement of our national laws and of international agreements governing regulation of PFAS is discussed further in

⁷¹ Fullerton Cove Residents Action Group, *Submission 4*, p. [2].

consideration of the Government's responses to *Recommendations 7, 8 and 9* in Chapter 5.