



Ancillary Document

to the PFAS National Environmental Management Plan Version
2.0
July 2020

National Chemicals Working Group of the Heads of EPAs
Australia and New Zealand



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Ancillary Document to the PFAS National Environmental Management Plan Version 2.0

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Preface

The purpose of this document is to explain how the National Chemicals Working Group (NCWG) of the Heads of EPAs Australia and New Zealand (HEPA) has considered and responded to feedback provided in public consultation on the second version of the per- and poly-fluoroalkyl substances (PFAS) National Environmental Management Plan (the PFAS NEMP 2.0).

The PFAS NEMP 2.0 consultation process

The draft PFAS NEMP 2.0 was published on 28 February 2019 for public consultation. It provided new and updated guidance on the environmental management of PFAS contamination in Australia, along with clarification of some of the guidance retained from the first version of the PFAS NEMP (the PFAS NEMP 1.0) published in February 2018.

The NCWG held public consultation sessions on the draft PFAS NEMP 2.0 in all state and territory capital cities in March and April 2019. Around 550 people, representing a wide range of industry, government and community stakeholders, attended the sessions. There was a high level of engagement in the post-presentation questions and answers. Attendance and engagement were much higher than for the PFAS NEMP 1.0 consultation process in August and September 2017.

Feedback was invited on four topics with new or significantly revised content that were considered in-scope for the consultation process:

- A. Environmental guideline values
- B. Soil reuse
- C. Wastewater management
- D. On-site containment

Fifty written submissions were received from the forty-nine organisations and one individual listed at Attachment A. These submissions raised more than 900 items of feedback, including more than 800 items of in-scope feedback. Additional feedback was received verbally in the public consultation sessions.

The NCWG considered all in-scope and out-of-scope feedback received.

The out-of-scope feedback included:

- feedback relating to external frameworks that are authorised through existing processes (e.g. the Australian and New Zealand Water Quality Guidelines and human health advice)
- feedback relating to implementation of the PFAS NEMP in each jurisdiction
- feedback relating to regulatory policy, including the application of principles such as the polluter pays principle, the precautionary principle, and conservation of biodiversity and ecological integrity
- feedback relevant to future PFAS NEMP work

All out-of-scope feedback was referred for appropriate consideration including, where relevant, in the PFAS NEMP future work program described below and/or in the formal review of the PFAS NEMP scheduled for 2023.

The PFAS NEMP future work program

The PFAS NEMP future work program is grouped into six themes to focus resources and expertise and help drive progress on the main priorities, as noted by HEPA in March 2019. The six themes are:

Theme 1: Understanding and managing the PFAS chemical family. This includes, for example, validation of analytical methods including the TOP Assay, additional guidance on sampling and analysis of PFAS other than perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonic acid (PFHxS), and consideration of the need for additional advice on perfluoroalkyl acid (PFAA) precursors.

Theme 2: Environmental data and monitoring. This includes, for example, ambient monitoring and data sharing.

Theme 3: Water. This includes, for example, development of ecological guideline values and underpinning research, additional guidance on managing PFAS in wastewater including biosolids, wastewater treatment effluent and groundwater, and further guidance on the importance of considering bioaccumulation in risk assessment.

Theme 4: Soil. This includes, for example, further development of indirect and direct ecological guideline values for soil, PFAS behaviour and the influence of soil chemistry, and guidance on managing PFAS in soil, such as potential criteria for reuse of soil.

Theme 5: Resource recovery and waste management. This includes, for example, development of additional guidance on managing PFAS in resource recovery for non-organic and organic waste, and sampling of unusual matrices including those found in construction waste.

Theme 6: Detailed advice on application of the PFAS NEMP guidance. This includes, for example, site assessment, remediation and treatment trials, site prioritisation, sampling, and on-site containment.

Responses to consultation feedback

To assist the reader, the Responses to Consultation Feedback section of this document sets out the consultation feedback and NCWG responses in five tables corresponding to the four in-scope consultation topics along with the out-of-scope feedback:

Table A.	Environmental guideline values
Table B.	Soil reuse
Table C.	Wastewater management
Table D.	On-site containment
Table E.	Out of scope

Each table includes four columns:

- Theme – the key theme of the feedback being responded to.
- Summary of feedback – the key messages in the feedback included in the theme.

- Submissions commenting – the non-confidential written submissions that provided feedback included in the theme.
- Response – the NCWG response to the summarised feedback for the theme.

Where submitters raised the same or similar questions within a theme, one response is provided. The tables include only substantive feedback, and do not include some less significant matters such as minor edits.

Clarifications and editorial changes

The consultation draft of the PRAS NEMP 2.0 included a range of editorial clarifications where stakeholder feedback indicated that this might be useful to clarify the intent of the text in the PFAS NEMP 1.0. Additional opportunities for clarification were suggested by some of the consultation submissions. The NCWG identified further clarifications where the consultation feedback suggested that some stakeholders may have found certain matters unclear or confusing. Consideration of these opportunities for clarification led to numerous routine editorial changes to improve clarity that are not discussed in this document.

Overarching questions and answers

The feedback also raised several overarching questions addressed in a Q&A format below.

Question 1: What is the PFAS NEMP 2.0?

Relevant NEMP 2.0 reference: Section 1.1 and Section 3

The PFAS NEMP provides nationally consistent guidance on the environmental management of PFAS contamination to protect flora and fauna, ecological communities and ecosystems, and human health, including guidance on prevention of the spread of contamination. It supports collaborative action on PFAS by Commonwealth, state and territory and local governments around Australia and in New Zealand.

The PFAS NEMP is appended to the Intergovernmental Agreement on a National Framework for Responding to PFAS Contamination, available on the Council of Australian Governments (COAG) website.

The PFAS NEMP 2.0 updates four specific priority areas of the PFAS NEMP 1.0 which was published in January 2018. An overarching review of the PFAS NEMP is scheduled for 2023.

Regulation and implementation remain the responsibility of each jurisdiction as part of its broader environmental regulation responsibilities, drawing on established principles of sound environmental regulation as outlined in Section 3 of the PFAS NEMP 2.0. Consequently, implementation matters such as prioritisation of specific sites or types of site, potential restrictions on resource recovery, and potential financial impacts are out of scope for the PFAS NEMP.

Question 2: What does the PFAS NEMP 2.0 not do?

Relevant NEMP 2.0 reference: Section 1.1 and Section 3.

The PFAS NEMP 2.0 is not regulation. Its focus is contamination management, and it does not cover PFAS import and use. It relies on implementation by the relevant regulator. As implementing regulations or policies may vary from jurisdiction to jurisdiction, local impact assessment requirements apply where appropriate. Regulation impact statements are not required for national guidance, such as the PFAS NEMP, as the details of implementation mechanisms, timeframes and expectations are likely to vary from jurisdiction to jurisdiction.

Implementation matters such as jurisdictional prioritisation of specific sites or types of site, decisions on water quality objectives for the area, potential restrictions on resource recovery, and potential financial impacts are out of scope for the PFAS NEMP.

Question 3: Is the PFAS NEMP 2.0 applicable in New Zealand?

Relevant NEMP 2.0 reference: nil

The New Zealand Ministry for the Environment (MfE) and the New Zealand Environment Protection Authority (EPA) have participated in the development of the PFAS NEMP 2.0. They have advised that the PFAS NEMP 2.0 is a joint Australian/New Zealand document, similar to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. The PFAS NEMP 2.0 is therefore applicable to the management of PFAS in New Zealand. Whilst MfE and the EPA have identified that some aspects could be clarified to assist in the interpretation and application of the PFAS NEMP 2.0 in New Zealand, this could be addressed through the next versions of the PFAS NEMP (i.e. the PFAS NEMP 3.0).

Question 4: Will the PFAS NEMP be amended when there are changes in referenced national frameworks?

Relevant PFAS NEMP 2.0 reference: nil

The PFAS NEMP will be updated to reflect changes to relevant aspects of the national frameworks referenced in the PFAS NEMP 2.0, such as the National Health and Medical Research Council (NHMRC) guidelines for managing risks in recreational water.

Question 5: What are the Water Quality Guidelines?

Relevant PFAS NEMP 2.0 reference: Section 8.6.3.

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Water Quality Guidelines) provide nationally agreed guidance that water managers can use for water quality planning, setting objectives, approvals, licensing and compliance, monitoring and assessment. For example, water quality managers, local government environment officers, farmers and irrigators, and authorities can use the Water Quality Guidelines to develop water quality management plans.

The guidance and guidelines values in the Water Quality Guidelines are not mandatory and governments can use them as they see fit, taking into account local conditions and requirements.

The Guidelines are a joint initiative of Australian Commonwealth, state and territory governments, and the Government of New Zealand. They have been actively used by governments since 1992 and most recently revised and updated in 2018.

The Guidelines are part of the National Water Quality Management Strategy (NWQMS), a joint national approach to improving water quality in Australian natural and semi-natural waterways. They are referred to as the Water Quality Guidelines in this document.

Question 6: How do I use the PFAS NEMP in management?

Relevant PFAS NEMP 2.0 reference: Section 20

The PFAS NEMP is designed to supplement existing management frameworks, including the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (the ASC NEPM). This is reflected in its structure, content, and development process, which has focused on developing guidance on PFAS-specific matters that is not available elsewhere. For example, Section 10 of the PFAS NEMP 2.0

provides PFAS-specific guidance on stockpiling, storage and containment that is cross-referenced to existing management frameworks where relevant.

While site-specific application of the PFAS NEMP 2.0 guidance is overseen by the local regulatory authority, future work is planned to develop guidance on priority matters as part of Theme 6 – site-specific application of PFAS NEMP guidance.

Question 7: Will the PFAS NEMP improve the availability of technologies to remediate PFAS-contaminated soil and water and disposal facilities for solid wastes, including wastes containing more than 50 mg/kg?

Relevant NEMP 2.0 reference: [Appendix C](#)

As the focus of the PFAS NEMP is guidance on matters to consider to adequately address risk, it is not intended to provide advice on commercial considerations such as the availability of remediation and disposal services. However, environmental regulators are conscious of the challenges associated with PFAS remediation and disposal, particularly in locations where environmentally sound and cost-effective solutions are yet to be provided by the market.

The Commonwealth and state and territory governments are supporting research into PFAS remediation and destruction, in collaboration with industry and the tertiary sector.

Extensive new guidance has also been provided in Section 10 of the PFAS NEMP 2.0 to support the environmentally sound stockpiling, storage and containment of PFAS-contaminated waste awaiting permanent remediation or disposal.

Responses to consultation feedback

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
<p>Bioaccumulation & mixing zones and the Water Quality Guidelines</p>	<p>Feedback provided on the implementation of the draft Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Water Quality Guidelines) default guideline values, including views on the species protection values themselves, the relevance of background levels and limit of reporting, and whether mixing zones should be allowed for bioaccumulative substances such as PFAS.</p> <p>Extensive feedback that is also relevant to this theme is summarised elsewhere in this document, particularly in Section C on wastewater and Section D on the water quality guideline values.</p>	<p>Australasian Land and Groundwater Association – submission 1</p> <p>City of Busselton</p> <p>Hunter Water</p> <p>Queensland Urban Utilities</p> <p>Sydney Water</p> <p>WA Government</p>	<p>Setting the species protection values is out of scope of the NEMP as it falls under the auspices of a separate national framework – the National Water Quality Management Strategy and the associated Water Quality Guidelines.</p> <p>To assist users of the NEMP 2.0, clarification has been provided on the application of Water Quality Guideline values in aquatic systems to account for both direct toxicity and bioaccumulation, including consideration of mixing zones, acknowledging that application of these may differ across jurisdictions.</p> <p>The Water Quality Guidelines and the <i>National Environment Protection (Assessment of Site Contamination) Measure 1999</i> (the ASC NEPM) provide definitions of background, and background ambient, noting that, as an anthropogenic contaminant with no natural sources, PFAS does not have a natural safe background. For example, for toxicants generated by human activities such as PFAS, the Water Quality Guidelines provides the following guidance:</p> <p><i>For toxicants generated by human activities, detection at any concentration could be grounds for investigating their source and for management intervention. For globally distributed chemicals, such as residues of DDT (dichlorodiphenyltrichloroethane), it may be necessary to apply representative background concentrations — as for naturally occurring toxicants.</i></p> <p>Additional guidance is included around undertaking biota measurements.</p>

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
			Comments on jurisdiction-specific matters have been noted by the relevant jurisdiction for consideration as appropriate.
Application of the guideline values to wastewater treatment outputs including biosolids, recycled water and effluent	<p>Is it intended that the soil guideline values apply to biosolids or compost?</p> <p>Extensive feedback that is also relevant to this theme is summarised elsewhere in this document, particularly in Section C on wastewater and Section D on the water quality guideline values and on future work under Theme 3 - water.</p>	Sydney Water	<p>The guidance on environmental guideline values in section 8, and the guidance on soil reuse in section 12, apply to soils amended with materials such as biosolids or compost, but not to biosolids or compost <i>per se</i>, noting that the environmental guideline values are not remediation or clean-up values nor pollute up to values.</p> <p>The development of guidance on wastewater treatment outputs is a priority for future work under Theme 3 – Water as described on p. 6.</p>
Risk-based management	Feedback provided on aspects of risk-based management. Changing guideline values can change the interpretation of site investigations. Suggestion was made to consider the impacts of PFOS and PFHxS independently as well as when added together.	BP Australia WA Government	<p>Noted.</p> <p>These matters will be further considered in the future work program including under Theme 1 – the PFAS family and Theme 6 - site-specific application of the NEMP guidance.</p>
Status and derivation of ecological guidelines	Requests for additional information about the derivation process and authorisation for the ecological guideline values (i.e. whether they were derived as part of the NEMP process or another national framework); what data are used in developing guideline values and in what circumstances this needs to be only on Australian species. Questions about the applicability of the ECCC guidelines.	South East Water Water Services Association of Australia	<p>Noted.</p> <p>Explanations of the derivation of the Canadian (ecological guideline values, including for indirect ecological soil protection have been included in the NEMP 2.0, including further clarity on how it is to be applied and what the criteria are intended to protect (e.g. secondary consumers). The preparation of a technical report is underway and this will be addressed further in future works. Some additional background on rationale and selection of the ecological criteria has been added.</p>

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
	<p>Questions on when the technical work underpinning the guideline values will be published.</p>		
<p>Clarification of the bird egg ecological guideline value</p>	<p>Editorial suggestions regarding Table 4, including identification of a typo in one of the units.</p> <p>Requests for background information for the proposed changes in the bird egg value.</p> <p>Seeking clarification on the use and appropriateness of a bird egg value including endangered species.</p>	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Brisbane Airport Corporation</p> <p>ExxonMobil Australia</p> <p>NZ Ministry for the Environment</p> <p>Queensland Airports Ltd</p>	<p>Additional text has been included in the NEMP 2.0 explaining why an additional safety factor was applied (due to limited data and uncertainty). The unit typo was fixed.</p> <p>More information has been provided in the NEMP 2.0 on the use of the bird egg value, along with the other wildlife values.</p> <p>The Canadian guidelines refer to whole egg - this has been clarified in the table.</p>
<p>Clarification of the soil ecological guideline value</p>	<p>Comments on the ecological soil guideline values:</p> <ul style="list-style-type: none"> - indicated a preference for higher guideline values (i.e. less protective) for land classified as industrial/commercial land; - reflected confusion about the removal of land use categories that were not considered relevant for their intended purpose; 	<p>Australasian Land and Groundwater Association – submissions 1 and 2</p> <p>Australian Government - DITCRD</p> <p>BP Australia</p> <p>Canberra Airport</p> <p>CRC CARE</p> <p>Golder Associates</p>	<p>Clarification has been provided in Section 2 - Scope regarding the use of terms such as PFAS contamination and PFAS-contaminated when referring to environmental media in which detectable levels of PFAS are present.</p> <p>Further clarification is provided on ecological criteria, what the guidance is intended to protect, and how this relates to land uses. Consideration must be given to the wildlife and exposure pathways present rather than a land use planning classification.</p> <p>A consistent land use category is provided, titled 'All land uses', for all ecological soil guideline values – the single land use category for direct exposure was previously titled 'Public open space'. This was done to improve consistency and reduce confusion.</p>

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
	<p>- sought clarification on the changed status of the 0.14 mg/kg guideline value;</p> <p>-pointed out risk assessments take time and are a cost for industry; and</p> <p>- raised concern the screening value would be used as a default remediation criteria</p> <p>- Comment sought regulatory impact analysis to be undertaken</p> <p>Extensive feedback also relevant to this theme is summarised elsewhere in this document in Section D on implementation of NEMP 1.0 and on regulatory policy.</p>	<p>Queensland Airports Ltd</p> <p>Senversa</p> <p>Viva Energy Australia</p> <p>WA Government</p>	<p>The NEMP 2.0 allows for considering site-specific characteristics that may justify the use of a higher value (up to 0.14 mg/kg) as the trigger for a detailed site-specific investigation of risk. These characteristics could justify the use of a higher value.</p> <p>Regulatory impact analysis is undertaken when proposing new regulatory policy approaches. The NEMP is guidance that relates to, and is implemented under, existing regulatory regimes that already cover water quality, already cover site assessment for all other contaminants, and already cover transport and waste. Final decisions on what is specifically required need site by site consideration, as for other contaminants. Accordingly, regulatory impact analysis would not apply.</p> <p>It is noted that there is often conflation between screening guideline values, how they are implemented and what they mean in terms of clean up. The methodology for deriving guideline values is, necessarily, a scientific process based on effects data. The screening values then sit within an implementation framework which appropriately considers costs to business. Decisions are made on a site by site basis. Changing science-based screening values because of perceived cost implications brings cost considerations into the incorrect part of the process, the science-based effects, rather than implementation and could undermine risk-based decision making.</p>
Clarification of ecological guideline values - wildlife	The NEMP values are not remediation values and further guidance is requested about using them appropriately.	Australia Pacific Airports Corporation	Additional clarification has been provided on:

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
	<p>The examples of relevant considerations for assessing risks to secondary consumers need be more pragmatic for the ecological indirect guidance.</p> <p>What does ww mean? Can more information be provided about the Uncertainty factor used in table 4?</p> <p>The Canadian guidelines are for PFOS only - why is the heading in table 4 PFOS+PFHxS? Is this a typo?</p>	<p>Burdekin Shire Council and Bligh Tanner</p> <p>EnRiskS</p> <p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p> <p>Queensland Airports Ltd</p>	<ul style="list-style-type: none"> • how the guideline values are to be used, including updates in the table; • wet weight (ww); and • Canadian guidelines which are for PFOS only, <p>For the NEMP 2.0, criteria are given as the sum of PFOS and PFHxS to account for the toxicity of both. Additional text has been added to the NEMP 2.0 to explain this and indicate it is not a typo.</p> <p>Clarification is provided that the guideline values are for site investigations and not intended as clean-up criteria.</p>
<p>Human health and ecological guidelines – publishing supporting analysis</p>	<p>Publish the data, assumptions and calculations used to determine the human health and ecological guidelines.</p> <p>Clarify the land use scenarios.</p>	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australian Airports Association</p> <p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p> <p>Sydney Airport</p>	<p>The NSW OEH Report which summarised the considerations undertaken by a multi-jurisdictional team established under the NEMP 2.0 work program, was provided and the consultation period was extended to allow for stakeholder consideration. This report includes information on derivation of the soil criteria based on the ASC NEPM.</p> <p>on derivation of the soil criteria based on the ASC NEPM.</p> <p>Additional text on assumptions and land use have been added in the NEMP 2.0.</p> <p>Consultation comments which remain relevant will also be considered in further developing associated supporting reports and in future reviews of the NEMP.</p>

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
Human health guidelines - soil	<p>Changes to two human health investigation levels (HILs) (PFOS + PFHxS, and PFOA) had been proposed in the draft NEMP 2.0 for the residential with garden/accessible soil scenario (HIL A).</p> <p>Comments requested:</p> <ul style="list-style-type: none"> • non-standard calculations for specific circumstances; • clarification on the underlying assumptions; • consistency in terminology with the ASC NEPM; 	<p>Australasian Land and Groundwater Association – submission 2</p> <p>Burdekin Shire Council and Blight Tanner</p> <p>EnRiskS</p> <p>ExxonMobil Australia</p> <p>Friends of the Earth Australia</p> <p>GHD</p> <p>Golder Associates</p>	<p>The NSW OEH Report which summarised the considerations undertaken by a multi-jurisdictional team established under the NEMP 2.0 work program, was provided and the consultation period was extended to allow for stakeholder consideration. This report includes information on derivation of the soil criteria based on the ASC NEPM.</p> <p>Changes made to the NEMP 2.0 include:</p> <ul style="list-style-type: none"> • additional text and background information is provided on how the values were derived; • additional example scenarios (such as for a higher level of produce consumption from home gardens) and example calculations (for soils with higher PFHxS than PFOS content); and

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
	<ul style="list-style-type: none"> • access to the technical reports by NSW and QLD outlining the detailed calculations (this was subsequently released); and • a scientific review of new literature on transfer factors and incorporation of findings from this review into the calculations. <p>Clarification was also requested on:</p> <ul style="list-style-type: none"> • background intake and exposure pathways including how the values in table 2 should be used • the sampling methods required • whether the updated investigation values for gardens with accessible soil apply to mulch and compost • why values are considered more reliable • home grown produce assumptions • the explanatory text around application of the guideline values • when site specific values might be used 	<p>qldwater</p> <p>Queensland Airports Ltd</p> <p>Queensland Urban Utilities</p> <p>Sydney Water</p> <p>WA Government</p> <p>Water Services Association of Australia</p>	<ul style="list-style-type: none"> • reversal of the proposed new PFOA HIL A back to the value already in operation in NEMP 1.0 due to the volume of new literature on transfer factors that drive the guideline value in opposite directions. This value could potentially be revisited in future versions. <p>Further clarification is also provided on the following:</p> <ul style="list-style-type: none"> • additional text on exposure pathways to consider for PFASs which relates to assuming 80% of exposure comes from other pathways; • Acceptable exposure levels used in generating in Table 2 include intake from background and other exposure pathways. • Text on guideline values has been clarified, noting that the values are conservative and cover different access scenarios to soil. Further clarity on land uses has been provided. • The use of TOPA and handling of precursors are dealt with in a different section of the NEMP 2.0, and requirements are likely to vary between jurisdictions. Guideline values given in the NEMP 2.0 for human health are for PFOS + PFHxS and PFOA. • The NEMP 2.0 guidance and guideline values are not intended for compost/ biosolids. Therefore the NEMP 2.0 provides further clarity on the intent of the guideline values, along with more consistent terminology. The Australian Government Department of Health has advised that the PFOS tolerable daily intake (TDI) determined by Food Standards Australia and New Zealand (FSANZ) should also apply to PFHxS therefore combined PFOS+PFHxS guidance values have been retained. More clarity is provided on how the value was derived, as well

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
	<ul style="list-style-type: none"> • why PFOS + PFHxS is used and not PFOS and PFHxS separately • whether the guidelines are for PFAS (total) or PFAS (TOPA) 		<p>as additional text on background and multiple exposure pathways.</p> <ul style="list-style-type: none"> • Note, there have been changes in the adopted values in the revised NEMP 2.0 - this is as further review of the literature for the PFOA transfer factor to plants is being undertaken. • Language has been clarified to be more consistent with the ASC NEPM. • Added clarity is provided in the text on consumption of home-grown eggs which requires additional assessment of risk. This is exposure specific. • In vivo precursor transformation cannot be quantitatively included in a guideline at this stage and is out of scope for this section. Noting that precursors should be considered where appropriate. • The 50 mg/kg refers to the Low Content Limit for waste for PFOS set under the Basel Convention, which is then applied by the Stockholm Convention. Note, this is the limit that establishes levels in waste that are considered hazardous enough to warrant extremely high-level destruction or disposal requirements. • Additional information is added as a footnote.
Human health guidelines - soil – NSW Office of	A range of technical comments on various aspects of the NSW OEH report including:	Australasian Land and Groundwater Association – submission 1	The NSW OEH Report was provided, and the consultation period was extended to allow for stakeholder consideration. That report

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
<p>Environment and Heritage report</p>	<ul style="list-style-type: none"> • transfer factors • edible portions • sampling methods • assumptions • calculations • why PFOS + PFHxS is used as a sum rather than PFOS and PFHxS separately 	<p>Australasian Land and Groundwater Association - submission 2</p> <p>Australian Government - Airservices Australia</p> <p>GHD</p> <p>Golder Associates</p> <p>NZ Ministry for the Environment</p> <p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p> <p>Queensland Airports Ltd</p> <p>Queensland Urban Utilities</p> <p>Senversa</p> <p>South East Water</p> <p>WA Government</p>	<p>includes information on derivation of the soil criteria based on the ASC NEPM.</p> <p>This feedback will also need to be followed up as part of theme 4 (Soil) in the NEMP future work program. This theme includes, for example, activities to progress the further development of indirect and direct ecological guideline values for soil, PFAA behaviour and the influence of soil chemistry, and guidance on managing PFAS in soil, such as potential criteria for reuse of soil.</p> <p>Some aspects of NEMP 2.0 have been clarified in response to the feedback including:</p> <ul style="list-style-type: none"> • Based on FSANZ information, combined PFOS+PFHxS criteria have been retained. More clarity is provided on how the value was derived, as well as text on background and multiple exposure pathways. • Also there was not sufficient data to derive one TF for PFHxS. Additional information is also available in the OEH Report.
<p>Recreational waters</p>	<p>In 2019, the NHMRC published updated recreational water guideline values. Were these included in the NEMP 2.0?</p>	<p>Canberra Airport</p> <p>Queensland Urban Utilities</p>	<p>The updated recreational guideline values are included in the NEMP 2.0 with clarification around the underlying assumptions.</p>

Table A. Environmental guideline values

Theme	Summary of feedback	Submissions commenting	Response
	Do the recreational values take into account other exposures e.g. drinking water?	WA Government	<p>Editorial changes were made to provide further clarity on human health exposure pathways, and on how guideline values account for other exposure pathways.</p> <p>Further work is planned on wastewater outputs, including recycled water, as part of Theme 3 – water.</p>

Table B. Soil reuse

Theme	Summary of feedback	Submissions commenting	Response
<p>Application of the decision tree</p>	<p>Responses expressed the view that the decision tree was too conservative because of the requirement around soil leachate concentrations. Submissions asserted that soil leachate concentrations would always exceed the ecological water guideline value referenced in the decision tree, meaning that, in practice, an assessment of risk would be required for any soil with PFAS. Comments also indicated the cost of risk assessments is expected to be an issue.</p> <p>Clarifications were sought or suggestions made in relation to these and other related matters including:</p> <ul style="list-style-type: none"> the ability to re-use soils in areas where the material has PFAS concentrations (in soil or leachate) that are equal to, or lower than, the destination site; use of compost material or topsoil bought in smaller quantities by residential or commercial operators; the suggested use of a 'detect' threshold for PFAS in freshwater and marine water, due to practicality (of 	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australia Pacific Airports Corporation</p> <p>Australian Airports Association</p> <p>Australian Government - DITCRD</p> <p>Brisbane Airport Corporation</p> <p>ExxonMobil Australia</p> <p>Hunter Water</p> <p>Qantas</p> <p>Queensland Airports Ltd</p> <p>Senversa</p> <p>South East Water</p> <p>Sydney Airport</p> <p>Viva Energy Australia</p> <p>WA Government</p>	<p>The decision tree for soil reuse has been modified:</p> <ul style="list-style-type: none"> The key change is removal of the previous reference to the 99% species protection level for aquatic ecosystems from Box C [noting that a rigorous and nationally-agreed approach was used to generate the freshwater PFOS and PFOA DGVs]. Regulators believe this addresses the suggestion in the comments for adoption of a detect threshold rather than using the current freshwater WQG 99% species protection level for PFOS. Note 7 has been modified to stress the importance of the assessment being supported by appropriate data on background/ ambient concentrations at the destination site. Additional notes have been added to clarify that, while it may often be acceptable to place soil with low levels of PFAS in areas with higher ambient concentrations of PFAS there is still a need to consider existing impacts at the destination site (from ambient levels), and potential additional adverse impacts to aquatic receptors from the proposed reuse. <p>Importantly, the decision tree does not prevent the reuse of soil for which a risk assessment has been undertaken.</p> <p>Note it is intended that relevant regulators be consulted in regard to any proposals for reuse, and that the decision tree will guide assessment, by both proponents and regulators, of all reuse proposals. However, text has been included to the fourth paragraph of Section 12 allowing for the use of holistic PFAS management plans for large sites or large organisations.</p>

Theme	Summary of feedback	Submissions commenting	Response
	<p>using the current 99% species protection level) to assess leachate</p> <ul style="list-style-type: none"> • suggestions regarding application of the decision tree to different land uses • the lack of a pathway in the decision tree for comparison of total soil concentrations to background levels in soil 		<p>Note that development of agreed 'uncontaminated soil' criteria or minimum intervention criteria remains an aim for future PFAS NEMP work (theme 4). Ongoing investigations of ambient concentrations around Australia are expected to assist with this.</p>
<p>Clarification of the scope for application of decision tree</p>	<p>Stakeholders assumed that the reuse decision tree could also apply to biosolids or other organic waste and resource recovery products.</p> <p>Clarifications were sought in regard to other related matters including:</p> <ul style="list-style-type: none"> • the soil properties and impact on transport of PFAS from the initial receiving soils; • transfer of PFAS from soil into agricultural produce; • the definition of on-site reuse vs permanent on-site containment; and 	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>Hunter Water</p> <p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p> <p>qldwater</p> <p>Queensland Airports Ltd</p> <p>Queensland Farmers' Federation</p>	<p>Section 12.1 has been re-drafted to improve clarity, noting that further work is to be undertaken for a future NEMP on soil (Theme 4) and water (Theme 3).</p> <p>While the title of Section 12 reflects the content of the section: Reuse of PFAS-contaminated materials including soils and water, the title of section 12.1 (which contains the decision tree) now reads 'Reuse of soil'.</p> <p>Also, additional text has been added to the second paragraph of Section 12.1 noting that the decision tree is to be applied only to soil reuse and not to materials such as biosolids or other organic waste recovery products.</p> <p>Clarifying text has been also added in several areas including to the second paragraph of Section 12.1 noting:</p> <ul style="list-style-type: none"> • that the decision tree does not apply to soils intended for agricultural purposes

Theme	Summary of feedback	Submissions commenting	Response
	<ul style="list-style-type: none"> management expectations for material with PFAS levels below the criteria. 	<p>Queensland Urban Utilities</p> <p>Senversa</p> <p>WA Government</p> <p>Waste Management and Resource Recovery Association</p>	<ul style="list-style-type: none"> while the decision tree does not apply to biosolids it would apply to soils previously been amended with biosolids; and the meaning of reuse. <p>The National Chemicals Working Group will further engage and consult with stakeholders to develop further guidance on the recovery of other materials for inclusion on future versions of the NEMP (Themes 3 and 5).</p>
<p>Communication with environmental regulators / national consistency / Commonwealth regulators</p>	<p>Submissions commented on confusion about consultation with environmental regulators on Commonwealth land, national consistency, and that the decision tree may not be consistent with the regulatory framework in place in New Zealand.</p>	<p>Australian Airports Association</p> <p>Canberra Airport</p> <p>NZ Ministry for the Environment</p> <p>Queensland Airports Ltd</p>	<p>The PFAS NEMP provides nationally agreed guidance on the management of PFAS contamination in the environment, including prevention of the spread of contamination. It supports collaborative action on PFAS by the Commonwealth, state and territory and local governments around Australia. The NEMP is an Appendix to the Intergovernmental Agreement on a National Framework Responding to PFAS Contamination.</p> <p>The NEMP recognises the need for sound regulation of PFAS by each jurisdiction in a way that can adapt to local circumstances and emerging priorities. As such it is important to consult with the relevant regulator when considering reuse of PFAS containing material. Feedback on the confusion about identifying regulators has been passed on to regulators.</p> <p>One of the principles of the NEMP is consistency across jurisdictions including the Commonwealth and this applies to future work, including on reuse of PFAS-impacted materials.</p> <p>Note that a footnote has been added to Section 12.1 explaining that the decision tree for reuse of soil may not be applicable in New Zealand.</p>

Table B. Soil reuse

Theme	Summary of feedback	Submissions commenting	Response
Acknowledgement of usefulness of decision tree	Support for the soil reuse decision tree as a useful tool.	City of Rockingham - Millar Road Landfill	<p>Acknowledged.</p> <p>The NEMP as a whole will be reviewed in 2023. These comments will be provided to the review.</p>
Use of PFAS management plans to authorise soil reuse	Stakeholders with potentially ongoing soil reuse requirements (e.g. airports) expressed the view that being expected to refer every excavation and reuse scenario to their regulator would be unreasonable.	Brisbane Airport Corporation	<p>Note that relevant regulators expect to be consulted regarding any proposals for reuse, and that the decision tree will guide assessment, by both proponents and regulators, of all reuse proposals.</p> <p>However, options providing for the development and use of holistic PFAS management plans for large sites/precincts or large organisations have been included in a text box in the decision tree and a paragraph in Section 12.1.1.</p> <p>The development of agreed 'uncontaminated soil' criteria or minimum intervention criteria remains an aim for future PFAS NEMP work (theme 4). Note also that ongoing investigations of ambient concentrations around Australia are expected to assist with this.</p>
Risk acceptability	Comments on risk acceptability from different perspectives.	<p>Australasian Land and Groundwater Association – submission 1</p> <p>NSW EPA - Hazardous Materials Unit</p> <p>Queensland Airports Ltd</p>	<p>Assessment of soil reuse in the PFAS NEMP 2.0 is based on the principles that reuse must not lead to an unacceptable risk to human health and/or the environment, or an increase in the level of risk at or near the location in which it is used, noting however that decisions on acceptability may be made on a case by case basis with the regulator. In relation to risk, the terms 'acceptable' or 'unacceptable' have been selected in preference to 'insignificant' or 'significant'.</p>

Theme	Summary of feedback	Submissions commenting	Response
Reuse with a detailed risk assessment	Comments on Chapter 12.2 reuse with a detailed risk assessment including clarity around when reuse can occur and the rationale behind the requirements to consult a regulator where re-use situations may include exposure pathways to potentially sensitive receptors.	Australasian Land and Groundwater Association – submission 1 Queensland Airports Ltd	The dot-point items listed under 'Reuse requiring consultation with the environmental regulator' are intended to identify scenarios that may pose a risk, and that may require more detailed consideration. Reuse in these situations is not ruled out, but it is noted that such proposal may require additional management measures to be implemented at the destination site. The separation distances listed in the dot points are intended to be approximate, but are considered appropriate as triggers for specific consultation with the regulator to ensure assessment and/or management strategies are considered.
Uncontaminated or minimum intervention criteria	Several submissions raised the need for further guidance and a criterion to identify soils which contain low or background levels of PFAS and could be considered as 'unrestricted' or suitable for fill. This relates in part to Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM) that are commonly adopted in construction and development projects.	Australian Government - Airservices Australia Queensland Airports Ltd Sydney Airport WA Government	Development of agreed 'uncontaminated soil' criteria or minimum intervention criteria remains an aim for future PFAS NEMP work (theme 4). Ongoing investigations of ambient concentrations around Australia are expected to assist with this.
Waste management including waste hierarchy, landfilling and resource recovery	Submissions highlighted confusion about application of the waste hierarchy and whether the NEMP was implying that soil re-use is less desirable than landfill disposal.	Australian Landfill Owners' Association ExxonMobil Australia NSW EPA - Hazardous Materials Unit South East Water	The role of reuse in the waste hierarchy has been clarified in the text (Section 12.1) Note that resource recovery and waste management is identified as a key theme of future PFAS NEMP work (Theme 5).

Table B. Soil reuse

Theme	Summary of feedback	Submissions commenting	Response
		Sydney Water Viva Energy Australia	

Table C. Wastewater management

Theme	Summary of feedback	Submissions commenting	Response
Wastewater management overall	<p>A range of feedback was received that is best addressed or considered in planned future work in discussion with water utilities. This includes:</p> <ul style="list-style-type: none"> Wastewater inputs including source/market controls; Wastewater operations including treatment and cost recovery; and Wastewater outputs including biosolids, recycled water, effluent, and residuals, and environmental monitoring and risk assessment. 	Various submissions	<p>Most matters raised in feedback on wastewater management will be considered in developing the future NEMP work program on wastewater management, where appropriate. The NEMP 2.0 states:</p> <p><i>Further work, in collaboration with the water industry, will be undertaken to establish PFAS management criteria and guidance for water authorities and environmental regulators based on current science, and will inform future versions of the NEMP.</i></p> <p>Noting this, the opportunity has been taken in this document to provide clarifications where this is considered helpful.</p>
Wastewater inputs including source/market controls	<p>Requests for clarification included the following:</p> <ul style="list-style-type: none"> The management of PFAS inputs to the wastewater system, including domestic and other diffuse sources and trade waste and other point sources. This concern was frequently cited as the main reason for expressing strong support for market controls on PFAS-containing products and articles, and ratification of the Stockholm Convention listings of 	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australian Government - Airservices Australia</p> <p>Australian Landfill Owners' Association</p> <p>Brisbane Airport Corporation</p> <p>Burdekin Shire Council and Bligh Tanner</p>	<p>The current NEMP 2.0 text has been revised to more clearly acknowledge that the majority of current PFAS contamination is thought to come from ongoing uses in domestic and commercial products and articles, with the remainder attributed to industrial trade waste and legacy contamination. This is supported by information provided in consultation feedback, particularly from utilities and waste management and resource recovery industry. Moreover, there is often no way for domestic, commercial, and industrial customers to readily identify PFAS when purchasing products and articles.</p> <p>Consideration of potential market controls remains outside the scope of the NEMP. Consultation feedback received on this matter is being referred for consideration through relevant national processes.</p>

Table C. Wastewater management

Theme	Summary of feedback	Submissions commenting	Response
	<p>PFOS and PFOA (and PFHxS, if listed in the future).</p> <ul style="list-style-type: none"> The identification and quantification of PFAS, noting that analytical standards and methodologies are available for only a small minority of the over 4,700 PFAS compounds identified to date, and there are technical challenges with measuring PFAS in complex mixtures such as wastewater. This is a threshold issue for utilities seeking to control PFAS in wastewater inputs. Opportunities and constraints associated with intervention at point sources of PFAS, particularly trade waste discharges, were a key focus for consultation feedback. For some utilities, reducing PFAS in trade waste (through measures such as education, enforcement, and differential pricing to encourage pre-treatment) could contribute to reductions in the PFAS mass load reaching wastewater treatment plants. For other utilities, particularly in regional and remote areas, trade waste may be a negligible contributor to PFAS mass load. Monitoring and control of input from the liquid waste industry, including 	<p>City of Rockingham - Millar Road Landfill</p> <p>City West Water</p> <p>Clarence Valley Council</p> <p>Australian Government - DITCRD</p> <p>Hunter Water</p> <p>Melbourne Water</p> <p>NSW Department of Industry</p> <p>Qantas</p> <p>qldwater</p> <p>Queensland Airports Ltd</p> <p>Queensland Urban Utilities</p> <p>South East Water</p> <p>Sydney Water</p> <p>Victorian Water Industry Association</p> <p>Viva Energy Australia</p> <p>WA Government</p>	<p>separate to the NEMP (see question 9 of the overarching questions and answers at the start of this document).</p> <p>In regard to trade waste, environmental regulators recognise:</p> <ul style="list-style-type: none"> The costs, benefits and unintended effects of trade waste interventions (such as suboptimal or non-compliant waste disposal) require careful consideration. However, environmental regulators note that There may be difficulties in identifying, substantiating, and seeking remediation of, contamination from a specific entity. This can be a particular challenge in areas with multiple businesses and complex infrastructure, such as industrial estates, airports, and mixed-use areas. <p>Note that water utilities usually negotiate terms of their trade waste licences as part of commercial profit arrangements and this needs to be reflected in PFAS management criteria and guidance to be developed for the NEMP. Such negotiations are not something governments generally do.</p>

Table C. Wastewater management

Theme	Summary of feedback	Submissions commenting	Response
	septic tankers, was also raised as another significant challenge.	Waste Management and Resource Recovery Association Water Services Association of Australia	
Wastewater operations including treatment and cost recovery	<p>Feedback received:</p> <ul style="list-style-type: none"> Sought clarification regarding the management of PFAS within the wastewater system, including operational and infrastructure considerations, availability, suitability and cost of pre-treatment, treatment and disposal options, and cost recovery including the polluter pays principle; Emphasised there are limited options available for treating and disposing of PFAS-contaminated materials, particularly in regional areas. Disposal of solid waste materials, although usually technically possible, is not necessarily affordable or feasible as a long-term option. For sewage, the consistent message from utilities is that there is no scientifically demonstrated, commercialised, scalable technology currently available in Australia that can meet the 	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australian Landfill Owners' Association</p> <p>Brisbane Airport Corporation</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>Clarence Valley Council</p> <p>Friends of the Earth Australia</p> <p>Hunter Water</p> <p>Melbourne Water</p> <p>NZ Ministry for the Environment</p> <p>qldwater</p> <p>South East Water</p>	<p>Regarding options to treat and dispose of PFAS-contaminated materials, environmental regulators note that while there are commercially available and effective water treatment technologies in use, a key matter is finding a technology that can handle the volumes of material generated.</p> <p>Cost recovery, if feasible, would enable utilities to set appropriate price signals for acceptance of contaminated wastewater from trade waste customers. Regarding opportunities for wider cost recovery, the text in the NEMP 2.0 has been clarified to acknowledge that utilities are secondary sources of PFAS with very limited ability to identify or control PFAS in wastewater from primary or diffuse (i.e. domestic) sources. There are also uncertainties associated with stormwater and groundwater intrusion and potential legacy contamination of sewerage assets.</p> <p>Environmental regulators recognise that that establishing an integrated approach to containment, treatment and disposal of PFAS (and potentially other contaminants of emerging concern) in wastewater would not be a short-term project. It would involve a significant collaborative effort between the water industry, researchers and regulators to identify pragmatic options, evaluate net environmental benefits, and make the case for additional investments where appropriate. A key consideration would be</p>

Table C. Wastewater management

Theme	Summary of feedback	Submissions commenting	Response
	<p>requirements of urban wastewater treatment plants.</p> <ul style="list-style-type: none"> Was provided on the threshold question of opportunities for cost recovery, consistent with the polluter pays principle. 	<p>Sydney Water</p> <p>Victorian Water Industry Association</p> <p>WA Government</p> <p>Warren Godson</p> <p>Waste Management and Resource Recovery Association</p> <p>Water Services Association of Australia</p>	<p>mechanisms to appropriately allocate costs, with reference to value for money, public benefit, and the polluter pays principle.</p>
<p>Wastewater outputs including biosolids, recycled water, effluent, and residuals, and environmental monitoring and risk assessment</p>	<p>Comments seeking clarification regarding the management of PFAS outputs from the wastewater system, including biosolids, recycled water, effluent, and residuals, and environmental monitoring and risk assessment.</p>	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australian Government - Airservices Australia</p> <p>Australian Government - DITCRD</p> <p>Brisbane Airport Corporation</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>Clarence Valley Council</p> <p>ExxonMobil Australia</p>	<p>The important benefits from use of wastewater outputs for utilities, local governments, and industries including agriculture, mining and energy are recognised by environmental regulators and that it will be important to carefully consider and manage the introduction of any proposed changes to established practice. Considerations include risk-based criteria, appropriate control points, and implications for the water industry and the broader waste management sector, including waste recycling and landfills. Site-specific and catchment-based or ambient monitoring programs are also suited to a considered, risk-based approach.</p> <p>Accordingly, the text in the NEMP 2.0 clarifies whether guidance in other sections of the NEMP 2.0 applies to wastewater outputs. For example, Section 12 now specifies that the reuse decision tree only applies to soils, which will not be used on agricultural land, and does not apply to other materials such as biosolids.</p>

Table C. Wastewater management

Theme	Summary of feedback	Submissions commenting	Response
		Friends of the Earth Australia Hunter Water Melbourne Water NSW EPA - Hazardous Materials Unit NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group qldwater Queensland Farmers' Federation Queensland Urban Utilities South East Water Sydney Water Victorian Water Industry Association Viva Energy Australia WA Government Warren Godson	

Table C. Wastewater management

Theme	Summary of feedback	Submissions commenting	Response
		<p>Waste Management and Resource Recovery Association</p> <p>Waster Ser4vices Association of Australia</p> <p>Yarra Valley Water</p>	
Wastewater regulation including regulatory status of the NEMP	Comments seeking clarification regarding regulation of the management of PFAS in wastewater, including regulatory status and implementation of the NEMP excluding matters covered elsewhere.	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australian Landfill Owners' Association</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>City West Water</p> <p>ExxonMobil Australia</p> <p>Hunter Water</p> <p>Melbourne Water</p> <p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p> <p>NSW Department of Industry</p>	<p>The NEMP 2.0 states that it:</p> <p>‘provides nationally agreed guidance on the management of PFAS contamination in the environment, including prevention of the spread of contamination. It supports collaborative action on PFAS by the Commonwealth, state and territory and local governments around Australia. The NEMP is an Appendix to the Intergovernmental Agreement on a National Framework Responding to PFAS Contamination.’</p> <p>The NEMP aims to protect flora and fauna, ecological communities and ecosystems, and human health.</p> <p>Regulation and implementation of the NEMP remains the responsibility of each jurisdiction as part of its broader environmental regulation responsibilities, drawing on established principles of sound environmental regulation as outlined in Section 3 of the NEMP 2.0. Consequently, implementation matters such as prioritisation of specific sites or types of site, potential restrictions on resource recovery, and potential financial impacts are out of scope for the NEMP.</p>

Table C. Wastewater management

Theme	Summary of feedback	Submissions commenting	Response
		NSW EPA - Hazardous Materials Unit qldwater Queensland Urban Utilities South East Water Sydney Water Victorian Water Industry Association Viva Energy Australia WA Government Waste Management and Resource Recovery Association Water Services Association of Australia Yarra Valley Water	<p>As detailed elsewhere in this document, additional text has been provided in Section 8 and elsewhere to clarify the purpose and application of the environmental guideline values in the NEMP 2.0. This was in response to the concerns expressed in some consultation feedback that the environmental guideline values were being perceived as discharge standards or remediation criteria.</p> <p>As noted at the start of Section C of the Ancillary Document, further work is planned, in consultation with other regulators and the water industry, as outlined in Section 20 of the NEMP 2.0. Depending on industry and regulator views this may include guidance on contaminants of emerging concern more broadly. A key focus will be risk-based approaches to develop guidance tailored to utilities with different risk profiles. This could, for example, consider contaminant load thresholds, as suggested by some consultation feedback. Another, more traditional option, also supported by consultation feedback, is using operational categories such as large urban utilities, small local or regional water utilities (which includes local governments in some jurisdictions), and local governments regulating on-site sewage and wastewater systems.</p> <p>Relevant considerations, supported by consultation feedback, could include catchment characteristics, legacy contamination, management capacity, operational capacity, and ability for the customer base to fund implementation.</p>

Table D On-site containment

Theme	Summary of feedback	Submissions commenting	Response
<p>Clarify terms and meanings used in the stockpiling, storage and containment section</p>	<p>Suggestions this section might benefit from restructuring and/or clarification of terminology. For example, there was some confusion over matters such as the definition of short-term or temporary stockpiles, long-term storage versus disposal, and the relationship between the guidance in this chapter and the landfill disposal guidance in Section 14 carried over from the PFAS NEMP 1.0.</p> <p>Requests to broaden the parameters for pragmatic handling of small, transient stockpiles. Some stakeholders felt these requirements should apply to larger volumes of soil; while one submission asked to limit small, transient stockpiles to single instances (to close off on those who might seek to divide larger stockpiles into individual 10 m³ lots).</p> <p>Requests for more consistent language suggesting the use of PFAS-contaminated, PFAS-containing, or PFAS-impacted.</p>	<p>Australia Pacific Airports Corporation</p> <p>Brisbane Airport Corporation</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>Canberra Airport</p> <p>CRC CARE</p> <p>ExxonMobil Australia</p> <p>Lloyd Consulting</p> <p>NZ Ministry for the Environment</p> <p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p> <p>Senversa</p> <p>WA Government</p>	<p>Additional guidance, editorial clarifications, and glossary entries have been made to address matters raised. The terms transient, temporary, remediated and rehabilitated were also considered and clarified.</p> <p>The use of a single term throughout Section 10 is both appropriate in terms of guidance and would be consistent with the suggestion being made by stakeholders.</p> <p>PFAS-contaminated is now used throughout Section 10 because:</p> <ul style="list-style-type: none"> • Stockpiling, storage, or containment of site material implied a decision by site owners or managers to consolidate material that was either presumed to be contaminated, or known to be contaminated, by PFAS. • PFAS-contaminated was considered to be more consistent with the definition of contamination provided in NEMP 1.0 and with the ASC NEPM definition. <p>Following examination of PFAS mass-balance and exposure issues, the definition of transient has been clarified in the proposed text. Draft NEMP 2.0 limits (less than 10 m³, less than 48 hours, no rain expected, and covered with a tarp) have been retained.</p> <p>Proposed volumes and durations are consistent with other guidelines.</p> <p>Development of agreed national criteria for 'uncontaminated soil' remains a goal in the future PFAS NEMP work program.</p>

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
			Text clarifying the meaning of reuse has been added to Section 12. Clarifying text has been added explaining when storage and containment would apply.
Include additional case studies / examples / check lists.	Two checklists for the requirements in section 10 were submitted for potential inclusion in the NEMP.	NZ Ministry for the Environment	These examples are indicative (rather than definitive or exhaustive) and are considered useful. They are included in a new Appendix E
Include Basel and Stockholm Conventions low content limit advice.	Comments requesting guidance around storage and containment of materials contaminated above 50 mg/kg.	Australasian Land and Groundwater Association – submission 1 Australian Government - DITCRD CRC CARE Senversa Viva Energy Australia	Text in Section 14.6 is considered to provide adequate information about the management of PFAS-contaminated material with a PFOS, PFOA, or PFHxS content greater than 50 mg/kg. Consistent with agreed international approaches, PFAS-contaminated material with a PFOS, PFOA, or PFHxS content greater than 50 mg/kg must be disposed of in such a way that the persistent organic pollutant content is destroyed or irreversibly transformed so that they do not exhibit the characteristics of persistent organic pollutants or otherwise disposed of in an environmentally sound manner when destruction or irreversible transformation does not represent the environmentally preferable option or the persistent organic pollutant content is low, taking into account international rules, standards, and guidelines, including those that may be developed pursuant to the Stockholm Convention, and relevant global and regional regimes governing the management of hazardous wastes. Waste with a persistent organic pollutant content greater than 50 mg/kg is not permitted to be subjected to disposal operations that may lead to recovery, recycling, reclamation, direct reuse or alternative uses of persistent organic pollutants. For example,

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
			<p>techniques such as plasma arc or high temperature incineration (above 1100°C) are already agreed technologies for destruction.</p> <p>The Basel Convention has requirements for disposal of waste below the 50 mg/kg limit. Disposal is different than onsite containment. The text in section 10 has been clarified to make it clear that this section pertains to onsite containment only and that section 13 pertains to remediation including destruction and section 14 pertains to disposal to landfill.</p>
<p>Include additional containment / storage advice.</p>	<p>Several submissions raised issues about leachate management, collection systems, and sumps.</p> <p>Some submissions discussed chemical immobilisation. One industry submission noted that the efficacy of chemical immobilisation has not yet been demonstrated in the scientific literature on field trials.</p> <p>Several submissions raised the need to contain airborne emissions for volatile PFASs.</p> <p>Several submissions raised issues about leachate management, collection systems, and sumps.</p>	<p>Lloyd Consulting</p> <p>NSW EPA - Hazardous Materials Unit</p> <p>NZ Ministry for the Environment</p> <p>qldwater</p> <p>Senversa</p> <p>Viva Energy Australia</p> <p>WA Government</p>	<p>Reporting requirements around a loss of containment are a matter for environmental regulators and the site owner, and might not be restricted to the reporting of liquids only.</p> <p>Additional text has been inserted about chemical immobilisation. This is also an area of possible future work.</p> <p>Changes have been made to the text to assist with clarity.</p> <p>Additional text referring to airborne emissions has been added.</p> <p>Detailed guidance for wastewater treatment outputs is planned for future work.</p>

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
Include Conceptual Site Models	Further development of Conceptual Site Model (CSM) guidance in the NEMP, including thematic discussion around the CSM, siting and design considerations, would be beneficial.	Senversa	The ASC NEPM Schedule B2 provides detailed guidance on CSM development. Further CSM guidance, including a generic CSM for a stockpile, will be considered as part of the future NEMP work program.
Include in-text citations / references / cross references.	<p>Suggestions for clarifications for Section 10 including intersections with Sections 12 (re-use) and 14 (landfills), a proposal for a RIS and various edits to the Section.</p> <p>Views also included on the reuse decision tree and associated conditions and the need for design of on-site storage and containments in a site-specific, risk-based way.</p> <p>Proposal to prepare a Regulatory Impact Statement (to determine the costs to Australia that flow from the requirements of the proposed Plan) to understand and justify the requirements that are being proposed.</p>	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australia Pacific Airports Corporation</p> <p>Senversa</p> <p>Viva Energy Australia</p> <p>WA Government</p>	<p>Text has been added to clarify the scope of this section compared to section 14 which deals with disposal to landfill and section 12 which deals with reuse.</p> <p>Matters of off-site disposal, and re-use, are addressed in other parts of the PFAS NEMP 2.0, for example through changes to the re-use decision tree.</p> <p>While additional references of national standards and frameworks may be of benefit to end users, it was not considered appropriate to include references to all relevant texts.</p> <p>Matters associated with the assessment of site contamination are addressed in other national frameworks, such as the ASC NEPM 1999.</p> <p>Regarding the call for a RIS see the overarching Q&A section of this document.</p>
Include pragmatic 'no content' limit / soil classes.	<p>Several submissions questioned whether there should be a level of PFAS contamination below which no management actions would be required.</p> <p>Submissions questioned why 'landfill-like containment requirements' are needed for</p>	<p>Brisbane Airport Corporation</p> <p>Canberra Airport</p> <p>Queensland Airports Ltd</p>	<p>Various responses are provided to these matters:</p> <ul style="list-style-type: none"> Text has been clarified including what is meant by storage and containment compared to reuse or disposal.

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
	low-level PFAS impacted soil stored onsite?	Senversa WA Government	<ul style="list-style-type: none"> • A limit PFAS contamination, below which no management actions would be required, was considered to be outside the scope of changes raised in the draft PFAS NEMP 2.0. • For transient stockpiles, following examination of PFAS mass-balance and exposure issues, limits (less than 10 m³, less than 48 hours, no rain expected, and covered with a tarp) have been retained. Note that the proposed volumes and durations are consistent with other guidelines. • PFAS contamination in products and articles is considered to be a significant matter, as is the potential leaching of PFAS from municipal and other landfills. Regulators are conscious that the presence of very low concentrations of PFASs in soil or water does not automatically preclude the accumulation and concentration of these substance in higher trophic level consumers. Also, PFAS contamination at concentrations exceeding a guideline level should be seen as a trigger for additional, escalating management action and not pollute up to values. Further guidance on these important issues is available in Section 8 of the NEMP. • Cited examples are considered to provide sufficient guidance on what constitutes a pragmatic approach to small volumes of soil. Also, the characterisation of stockpile contamination is adequately addressed in the schedules to the ASC NEMP. • Soil classification guidance is being considered by NCWG for inclusion in the future work program.

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
			<ul style="list-style-type: none"> Note that the decision to stockpile PFAS contaminated material is a matter for the site owner / manager and the relevant regulators.
Include references to regulators	Reinforcement of the importance of consultation with the various regulators and other stakeholders.	Hunter Water NZ Ministry for the Environment	<p>Additional text has been added on consulting with regulators, e.g. on floodplain risks for location decisions.</p> <p>Note that issues associated with sewage / wastewater treatment plants are addressed in other parts of the PFAS NEMP 2.0 (section 15 and Appendix D).</p>
Include site auditor / validation advice	Further clarity needed on definitions of consultants able to undertake, supervise and sign off PFAS related work, and need for approval of key documents prior to construction commencement.	NZ Ministry for the Environment qldwater	<p>The National Chemicals Working Group (NCWG) considers that referring to a suitably qualified and experienced person is sufficient for the purposes of the NEMP. The draft text has been amended accordingly.</p> <p>The NCWG considers that the sharing of best practice exemplars would be beneficial for all NEMP users. This will be considered in the future NEMP work program.</p>
Include technical / prescriptive advice.	Several submissions requested more quantitative design criteria, including for bunding, membrane permeability values, composite liner definitions and design criteria, spill retention design standards, flood risk criteria, and soil classification criteria.	CRC CARE NSW Department of Industry NZ Ministry for the Environment NZ Regional and Unitary Councils - Contaminated	<p>Some changes were made to the NEMP 2.0 text including on bunding capacity.</p> <p>Various responses are provided to matters raised:</p> <ul style="list-style-type: none"> A site specific risk assessment should not be required in every case. Consideration of the risks may be sufficient in some cases, while others will indeed require a more detailed site specific risk assessment.

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
		<p>Land and Waste Special Interest Group</p> <p>qldwater</p> <p>Queensland Airports Ltd</p> <p>WA Government</p>	<ul style="list-style-type: none"> • Some matters raised are adequately addressed by other national or jurisdictional frameworks including construction of intermediate bulk containers (IBCs), also known as intermediate bulk units (IBUs). <p>Matters that are addressed in other parts of the PFAS NEMP 2.0 including soil re-use and off-site disposal.</p> <p>Two matters are being considered by NCWG in the context of the NEMP future work program:</p> <ul style="list-style-type: none"> • Guidance on passive and active barrier controls • Technical specifications and definitions.
<p>Include treatment / disposal / destruction advice</p>	<p>Comments on matters such as disposal, re-use, destruction, engineered containment facilities including on-site encapsulation.</p>	<p>Australian Government - Airservices Australia</p> <p>NZ Ministry for the Environment</p> <p>OPEC Systems</p> <p>Queensland Airports Ltd</p> <p>WA Government</p>	<p>Some changes were made to the NEMP including:</p> <ul style="list-style-type: none"> • the addition of disposal to treatment options • the inclusion of chemical binding and immobilisation as part of on-site encapsulation <p>Three matters are being considered by NCWG in the context of the NEMP future work program:</p> <ul style="list-style-type: none"> • Further consideration of destruction, irreversible transformation, and environmentally sound disposal • Guidance on the use of in-situ chemical treatments for binding and immobilisation • The science around chemical containment

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
			Certain matters are addressed in other parts of the PFAS NEMP 2.0 including off-site disposal.
Include WHS advice	Expansion of the term health to include safety.	Queensland Airports Ltd	Amended accordingly.
Various observations	<p>Various observations were made including:</p> <ul style="list-style-type: none"> regulator failing to regulate support expressed for 'pragmatic' draft NEMP 2.0 support for appropriate text which reflects good practice <p>Clarification sought for whether immobilisation is acceptable for soil with greater than 50 mg/kg PFAS.</p> <p>All municipal solid waste will likely contain PFAS due to its ubiquity in domestic products and packaging.</p>	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australia Pacific Airports Corporation</p> <p>City of Rockingham - Millar Road Landfill</p> <p>Hunter Water</p> <p>Queensland Airports Ltd</p> <p>WA Government</p>	<p>The NCWG has noted these observations.</p> <p>Consistent with agreed international approaches, Section 14.6 provides information about the management of PFAS-contaminated material with a PFOS, PFOA, or PFHxS content greater than 50 mg/kg:</p> <p>[such material] must be disposed of in such a way that the persistent organic pollutant content is destroyed or irreversibly transformed so that they do not exhibit the characteristics of persistent organic pollutants or otherwise disposed of in an environmentally sound manner when destruction or irreversible transformation does not represent the environmentally preferable option or the persistent organic pollutant content is low, taking into account international rules, standards, and guidelines, including those that may be developed pursuant to the Stockholm Convention, and relevant global and regional regimes governing the management of hazardous wastes.</p> <p>In circumstances where destruction or irreversible transformation may not be environmentally preferable options due to environmental or human health impacts, the relevant environmental regulator should be consulted.</p>

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
			<p>Guidance on destruction, irreversible transformation, and environmentally sound disposal is being considered by the NCWG in the context of the NEMP future work program Theme 5 on resource recovery and waste management.</p> <p>The storage and containment requirements in Section 10 do not apply to municipal waste. Clarifying text has been added explaining what the section applies to, in particular footnote 44 which reads: <i>The description in this Section of materials as contaminated is premised on a range of on-site processes such as site investigation, construction, demolition, remediation, care and maintenance, and site management, and assumes that a decision has previously been made to manage these materials due in whole or in part to their PFAS content. This description is not intended to cover soils, sediments, surface water, or groundwater that contain PFAS and remain in situ and undisturbed.</i></p>
Provide end user training	End user awareness and training are needed to ensure guidance is correctly used.	Brisbane Airport Corporation	<p>Environmental regulators acknowledge that reports submitted to regulators to the standard required in the NEMP would result in less time delays and costs for projects and result in a better outcome for industry.</p> <p>Jurisdictions continue to provide a range of resources and education on PFAS management, and there is considerable value in the provision of further training tailored to the needs of NEMP users.</p>
Reconsider / strengthen community advice	Clarifications were suggested in relation to community consultation.	Queensland Airports Ltd	Amended accordingly.

Table D. On-site containment

Theme	Summary of feedback	Submissions commenting	Response
Reconsider or strengthen floodplain / stormwater / runoff management advice	<p>A range of feedback was provided in relation to floodplains and stormwater management including:</p> <ul style="list-style-type: none"> the prescriptive nature of floodplain management guidance the practicality of guidance on stormwater management and the need for emergency maintenance the need for more emphasis on preventing rainwater and runoff from becoming contaminated by PFAS from stockpiles or storage areas suitability of guidance to New Zealand stakeholders various suggested clarifications. 	<p>Brisbane Airport Corporation Burdekin Shire Council and Bligh Tanner CRC CARE NZ Ministry for the Environment NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group Queensland Airports Ltd Sydney Water</p>	<p>A full site-specific risk assessment would not be required in every instance. Flood risk should however be considered, and the siting of stockpiles in the 1:100 AEP is not generally supported. Where this can't be avoided due to site or operational constraints, the relevant regulators should be consulted and a site-specific risk may be required. The NEMP text has been amended to reflect this clarification.</p> <p>Maintenance of drains and drainage systems is not addressed in Section 10. However, neither NEMP 1.0 nor NEMP 2.0 precludes the maintenance of drains. Section 10.3.1 provides sufficient guidance on consideration of stormwater management systems at a site.</p> <p>Note that the development of sediment quality guidance continues to be considered a priority for the future NEMP work program.</p> <p>Regarding the transport of PFAS-contaminated waste, this is addressed in Section 11 of the NEMP 2.0.</p>
Review existing facilities	Guidance sought on existing stockpiling, storage and containment facilities.	ExxonMobil Australia	Amended to address existing facilities.

Theme	Summary of feedback	Submissions commenting	Response
<p>Reword / rephrase / restructure existing advice</p>	<p>Several suggestions were made with the aim of re-wording, rephrasing or restructuring the Section 10 NEMP 2.0 text, covering a range of topics including:</p> <ul style="list-style-type: none"> • interim storage being a management step ahead of treatment or disposal • suggested changes to assist in the interpretation or understanding of the text, removal of ambiguities • selection of suitable on-site storage and containment and the need for site specific assessment 	<p>Australasian Land and Groundwater Association - submission 1</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>CRC CARE</p> <p>ExxonMobil Australia</p> <p>Hunter Water</p> <p>Lloyd Consulting</p> <p>NZ Ministry for the Environment</p> <p>Qldwater</p> <p>Queensland Urban Utilities</p> <p>South East Water</p> <p>Viva Energy Australia</p> <p>WA Government</p>	<p>Amendments to the NEMP 2.0 to address in-scope matters included:</p> <ul style="list-style-type: none"> • articulating that the goal is to provide a robust interim storage solution until a more effective treatment or disposal solution becomes available • recommending a site-specific assessment that considers the potential for PFAS to be released into the surrounding environment and the control measures required to prevent such a release. • removal of all reference to wastewater treatment plant effluent. <p>Some suggestions were considered but not pursued because:</p> <ul style="list-style-type: none"> • they would not significantly improve the readability or the flow of information • they would introduce regulatory perspectives into national guidance • the draft NEMP 2.0 text provides adequate guidance • matters associated with sewage / wastewater treatment plants are addressed by text in other parts of the PFAS NEMP 2.0 • matters relating to off-site disposal are addressed in other parts of the NEMP 2.0.

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
Water quality guidelines	<p>Submissions provided feedback on a range of topics related to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Water Quality Guidelines). While the WQG default guideline values (DGVs) are developed under a separate national framework (the <i>National Water Quality Management Strategy</i>), responses are provided to clarify the historic development and current status of the DGVs referenced in the NEMP.</p> <p>The main matters raised in feedback relate to:</p> <ul style="list-style-type: none"> • The process to develop and the standing of the draft PFOS freshwater DGVs (2015) and the data used in generating them, specifically the inclusion of the Keiter, 2012 zebrafish data. Comment was offered on the use of the term 'draft'. • The status of the marine DGVs for PFOS and PFOA. • Requests for the DGVs to be revised in the NEMP, in accordance with the Revised National Method (2018) and 	<p>Australasian Land and Groundwater Association - submission 1</p> <p>Australia Pacific Airports Corporation</p> <p>Australian Government - Airservices Australia</p> <p>BMT Western Australia</p> <p>Brisbane Airport Corporation</p> <p>CRC CARE</p> <p>ExxonMobil Australia</p> <p>Hunter Water</p> <p>Queensland Airports Ltd</p> <p>WA Government</p>	<p>The DGVs for PFOS and PFOA are set under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Water Quality Guidelines), in accordance with the nationally-agreed process and the associated method for deriving DGVs [National Method for Deriving Australian and New Zealand Water Quality Guideline Values for Toxicants (the National Method)].</p> <p>The Water Quality Guidelines provide guidance and DGVs for a range of toxicants to assist water catchment managers to set water quality objectives and then work with communities to achieve those objectives. DGVs are therefore not remediation values nor are they discharge values although they can be used to inform water quality management practices.</p> <p>In the NEMP, the DGVs are referenced as investigation levels only. They are not remediation or discharge levels. However, with other lines of evidence, they may contribute to the setting of risk based remediation or discharge advice.</p> <p>As DGVs are amended under the WQG process, the NEMP will be updated.</p> <p>Section 13 of the NEMP 2.0 discusses remediation. Remediation values should be determined with the relevant regulator taking into account community and ecological values at the specific site.</p> <p><u>Derivation of the 2015 freshwater PFOS and PFOA technical draft DGVs</u></p> <p>In 2015, and prior to the publication of NEMP 1.0 in January 2018, draft freshwater DGVs for PFOS and PFOA were</p>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
	<p>for information on the process to further develop the DGVs (e.g. timeframe).</p> <ul style="list-style-type: none"> • A call for regulatory impact analysis of the Water Quality Guidelines. • The need for further clarity on application of the Water Quality Guidelines for bioaccumulative toxicants such as PFOS and PFOA and specifically application of the 95% DGV. 		<p>developed under the agreed Water Quality Guidelines process, according to the agreed National Method. (The term 'draft' was used consistent with WQG terminology. Following technical clearance, the draft DGVs for PFOS and PFOA were circulated by the then Department of Agriculture and Water Resources (DAWR) to the states and territories in December 2015 for information. These values were then referenced in several jurisdictional policy documents during 2017.</p> <p>Subsequently, extensive discussions occurred among Australia's national water quality experts, with the aim of finalising the DGVs. These discussions concluded the National Method had been rigorously applied, including through the use of the multigenerational (Keiter <i>et al</i>) zebrafish data. Furthermore, multigenerational data are considered highly relevant for inclusion in the PFOS species sensitivity distribution dataset, given the persistent, bioaccumulative and toxic nature of PFOS. However, it became apparent that the National Method, although robust for contaminants such as metals, was not well able to resolve some of the characteristics of the dataset around this chemical.</p> <p><u>Levels of PFOS detected in the environment and closeness to the 99% DGV</u></p> <p>PFOS levels higher than the 99% species protection level may be observed in the environment. The National Method allows for such situations in the real world. For example, catchment managers can accept any detectable concentration as an exceedance of the DGV or, alternatively, adopt the 80th</p>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
			<p>percentile of the background concentration as the water quality guideline.</p> <p><u>Use of DGVs that are around the limit of reporting (LOR)</u></p> <p>The 2015 PFOS 99% species protection level (0.23 ng/L) is around the available commercial laboratory limits of reporting, although it is noted that over time, laboratory limits of reporting may be lowered further.</p> <p>Under the National Method, modifying the endpoints selected in the PFOS dataset cannot be justified on the basis of laboratory quantitation. Note there are also DGVs for other toxicants for which the 99% species protection value is below the Limit of Reporting, including chlorpyrifos¹ which has a 99% species protection value of 0.04 ng/L and quantitation limit is 100 ng/L.</p> <p><u>Status of Marine DGVs for PFOS and PFOA</u></p> <p>The proposed marine DGVs for PFOS and PFOA were submitted through the Water Quality Guidelines third party process in November 2017 after the text of the proposed PFAS NEMP 1.0 had been finalised. They have not yet progressed through the formal WQG peer review process. The NEMP 2.0 references draft DGVs that had progressed through formal WQG peer review process and had been accepted by the relevant government committees.</p>

¹Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Toxicant default guideline values for water quality in aquatic systems – chlorpyrifos, web p. accessed 8 January 2020: <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/toxicants/chlorpyrifos-2000>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
			<p><u>Revised National Method (2018) and re derivation of draft DGVs for PFOS and PFOA</u></p> <p>In July 2018, the revised National Method was agreed by all Australian governments. All draft DGVs were screened by an ad-hoc expert screening group established by the DAWR to determine if the changes to the National Method required re-derivation of the technical draft DGVs. Re-derivation of the PFOS and PFOA freshwater DGVs, along with other draft DGVs including the PFOS and PFOA marine DVGs, was recommended.</p> <p>Work to re-derive the draft PFOS and PFOA freshwater DGVs and review a much larger number of endpoints based on a large volume of new literature continues but the task remains complex as not all taxonomic groups respond similarly, and that longer study durations appear to identify effects at lower levels. In addition, the method excludes some of the more sensitive endpoints.</p> <p>It is important to note that it is not appropriate to use the old dataset and exclude, for example, all plant endpoints, to generate a new number and use it for assessments. It is noted that while examples of such calculations have been used to illustrate a point about the scale of potential changes as a result of applying a new method in conferences, such calculations do not represent the government process, do not represent the dataset, and are not draft or actual numbers being considered.</p> <p><u>Regulatory impact analysis of the Water Quality Guidelines</u></p> <p>Regarding the calls for regulatory impact analysis:</p>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
			<ul style="list-style-type: none"> • Re the NEMP – see the overarching Q&A section of this document; and • Re the Water Quality Guidelines – similar to the response for the NEMP, Water Quality Guidelines provide national guidance that is implemented under each jurisdiction and as such do not require a RIS. <p>Matters relating to the regulatory impact analysis of the Water Quality Guidelines should be addressed to the relevant area of the Department of Agriculture, Water and the Environment which has policy responsibility for them.</p> <p><u>Application of the Water Quality Guidelines for bioaccumulative toxicants</u></p> <p>In November 2019, the then Department of Agriculture and Water Resources published updated WQG guidance on bioaccumulating compounds. Key aspects include:</p> <ul style="list-style-type: none"> • clarifying the reasoning behind the recommended application of a higher level of species protection default guideline value (DGV) for a bioaccumulating compound. The purpose of applying the higher level of protection is to protect both higher level organisms from secondary poisoning (from consuming aquatic biota) <i>as well as</i> to protect aquatic biota themselves from additional toxicity due to bioaccumulation; • more details on the circumstances under which the above recommendation can be relaxed; • updated descriptions of the processes of bioaccumulation, bioconcentration, biomagnification and trophic magnification,

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
			<p>and what constitutes a bioaccumulative compound, to reflect the current state of the science; and</p> <ul style="list-style-type: none"> highlighting the key WQG principle of continual improvement, whereby the primary water quality objective should be to continue to improve, or at least maintain, water quality conditions (i.e. as opposed to 'allowing' increases in toxicant concentration up to a guideline value).
Human health matters not considered elsewhere	<p>Some feedback and suggestions were received on human health matters, including but not limited to the human health guideline values referenced in the NEMP.</p> <p>A key focus was the precautionary approach to protection of human health, including development of guideline values, guidance on managing PFAS in drinking water including in catchments, provision of advice on avoiding PFAS exposure, and associated community concerns.</p> <p>The extensive feedback summarised elsewhere in this document on matters such as environmental guideline values and wastewater is also relevant.</p>	<p>City of Busselton</p> <p>ExxonMobil Australia</p> <p>Friends of the Earth Australia</p> <p>WA Government</p>	<p>To assist with integrated risk assessment, the NEMP references human health guideline values developed and published by health regulators – the Tolerable Daily Intake, the Drinking Water Guideline and the recreational water guideline. It also includes human health investigation levels for soil developed using a methodology consistent with assumptions set out in the ASC NEPM which already sets Human Investigation Levels in soil for a range of contaminants.</p> <p>However, health advice and related policy considerations more broadly are not within scope for the NEMP.</p> <p>Feedback received on these matters is therefore being referred to the relevant policy areas within each jurisdiction to inform their future work.</p>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
New Zealand-specific matters	<p>Feedback received from New Zealand stakeholders provided a range of feedback and suggestions, including advice on how the NEMP 2.0 guidance could be adapted to address potential areas of difference between Australia and New Zealand.</p> <p>This feedback is repeated elsewhere in this document where relevant, particularly where it relates to future work.</p>	<p>NZ Ministry for the Environment</p> <p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p>	<p>The feedback provided on potential adaptation of the NEMP to include New Zealand-specific considerations is appreciated. The Ministry for the Environment and the New Zealand EPA have participated in the development of the NEMP 2.0. The HEPA NEMP 2.0 is a joint Australia/New Zealand document, similar to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, and therefore is applicable to the management of PFAS in New Zealand. While MFE and the EPA have identified that there may be some issues with the interpretation and application of the NEMP 2.0 in New Zealand, it is proposed to, where possible, address these issues in NEMP 3.0.</p>
Implementation of the NEMP 1.0 within jurisdictions	<p>The consultation submissions provided extensive insights into practical issues associated with implementation of the NEMP, and PFAS management more broadly, within jurisdictions.</p> <p>A key focus was the importance of clarity regarding the expectations held by environmental regulators, particularly in relation to on- and off-site monitoring, risk assessment and risk management, and treatment or disposal of PFAS-contaminated material. Related to this, some submissions expressed concerns about regulator expectations regarding the management of legacy contamination and/or contamination of uncertain origin.</p>	<p>Australasian Land and Groundwater Association – submission 1</p> <p>Australian Airports Association</p> <p>Australian Government - Airservices Australia</p> <p>Australian Government - DITCRD</p> <p>Australian Landfill Owners' Association</p> <p>BP Australia</p> <p>Brisbane Airport Corporation</p>	<p>The feedback provided on NEMP 1.0 implementation matters is being referred for consideration as part of reviewing the implementation of NEMP 1.0. Where relevant, including where feedback relates to PFAS management more broadly, it is also being referred to the relevant policy areas within each jurisdiction to inform their future work.</p>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
		Burdekin Shire Council and Bligh Tanner Canberra Airport City of Busselton City of Rockingham - Millar Road Landfill Queensland Airports Ltd Sydney Airport Victorian Water Industry Association Viva Energy Australia WA Government	
Regulatory policy including polluter pays principle, precautionary principle, conservation of biological diversity	The consultation process elicited a wide range of suggestions and feedback on regulatory policy matters outside the scope of the NEMP.	Australasian Land and Groundwater Association - submission 1	As was the case for NEMP 1.0, the NEMP 2.0 provides nationally agreed guidance on the environmental management of PFAS contamination, to be implemented within each jurisdiction's environmental regulatory framework. This limits the extent to which the NEMP 2.0 consultation process can respond to the

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
and ecological integrity, and market controls	<p>A key focus was the importance of market controls on PFAS, including potential ratification of the Stockholm Convention listings of PFOS and PFOA, to minimise the ongoing risk of environmental contamination. Related to this, guidance was sought on appropriate substitutions for PFAS-containing products and articles.</p> <p>Another key focus was the extent to which the NEMP guidance, and decision-making informed by it, should refer to the guiding principles set out in section 3 of the NEMP 2.0 including principles drawn from the Intergovernmental Agreement on the Environment such as the polluter pays principle, the precautionary principle, conservation of biodiversity and ecological integrity.</p> <p>In particular, the rationale for, and extent of, protection for ecological values was questioned by some submission feedback. The point was made that in some circumstances or management settings, human health should be the primary, or possibly sole, focus.</p> <p>Some feedback questioned or sought additional information about the scientific</p>	<p>Australasian Land and Groundwater Association - submission 2</p> <p>Australian Government - Airservices Australia</p> <p>Australian Government - DITCRD</p> <p>Australian Landfill Owners' Association</p> <p>Brisbane Airport Corporation</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>Canberra Airport</p> <p>City of Busselton</p> <p>ExxonMobil Australia</p> <p>Friends of the Earth Australia</p> <p>Qantas</p> <p>qldwater</p> <p>Queensland Airports Ltd</p>	<p>very wide range of regulatory policy matters raised in submission feedback.</p> <p>For example, the NEMP is not a suitable mechanism for consideration of possible market controls on PFAS, including the potential ratification of the Stockholm Convention listings of PFOS and PFOA, which are being considered through separate national processes. The NEMP also does not provide guidance on current uses of, or substitutes for, PFAS-containing products and articles.</p> <p>It is also not within scope of the NEMP 2.0 consultation process to influence the level or type of regulatory protections accorded to environmental values in decision-making by jurisdictions. Feedback received on these matters is therefore being referred to the relevant policy areas within each jurisdiction to inform their future work.</p> <p>The NEMP 2.0 consultation process is also not able to consider adopting submission feedback suggesting fundamental changes to the guiding principles set out in Section 3 of the NEMP 2.0. The precautionary principle, the polluter pays principle and the conservation of biological diversity and ecological integrity are established by the <i>National Environment Protection Council Act 1994</i> (Cth) and its complementary legislation in each state and territory. It may be more appropriate to consider such questions as part of the 5-year review of the PFAS NEMP.</p> <p>Similarly, other environmental management frameworks such as the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM) and the National Water Quality Management Strategy, including the Australian</p>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
	evidence base for PFAS management, including evidence of ecological impacts.	<p>Queensland Farmers' Federation</p> <p>South East Water</p> <p>Viva Energy Australia</p> <p>WA Government</p> <p>Waste Management and Resource Recovery Association</p> <p>Water Services Association of Australia</p>	<p>and New Zealand Guidelines for Fresh and Marine Water Quality, are independent from the NEMP.</p> <p>The high level of interest expressed by some submissions about the evidence base regarding the environmental risks of PFAS is appreciated. In response, relevant sections of the NEMP 2.0 have been expanded and clarified and selected references have been added, including links to OECD and UNEP resources. However, it is important to note that the NEMP is not intended to duplicate the extensive information already publicly available.</p> <p>A useful resource on environmental risks, potential market controls, and associated costs and benefits, is the October 2017 Regulation Impact Statement on options for a national phase out of PFOS and related chemicals. Although it focuses only on PFOS, many of the issues discussed are relevant to PFAS more broadly. The aforementioned OECD and UNEP resources are also useful in this regard.</p>
Future work - Theme 1 - the PFAS family	<p>Extensive insights and suggestions were provided to inform future work on the PFAS family, including analysis, risk assessment and risk management.</p> <p>The key matters raised included: further guidance on the selection of analytes and limits of reporting that are appropriate for risk assessment and management, further guidance on the selection and use of non-standard analytical methods, particularly TOP Assay, and</p>	<p>Australasian Land and Groundwater Association - submission 1</p> <p>Australian Government - Airservices Australia</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>BP Australia</p>	The feedback relating to the PFAS family, including analysis, risk assessment and risk management, will inform future work under Theme 1 – the PFAS family, and will also be considered as part of reviewing the implementation of NEMP 1.0.

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
	<p>consideration of the environmental behaviour of different types of PFAS, including in biota.</p> <p>The extensive feedback summarised elsewhere in this document on matters such as environmental guideline values, wastewater, environmental data and monitoring, and site-specific guidance, is also relevant to future work in this area.</p>	<p>ExxonMobil Australia</p> <p>Golder Associates</p> <p>OPEC Systems</p> <p>Queensland Airports Ltd</p> <p>Queensland Farmers' Federation</p> <p>qldwater</p> <p>Sydney Water</p> <p>WA Government</p>	
<p>Future work - Theme 2 - environmental data and monitoring</p>	<p>Several insights and suggestions were provided to inform future work on environmental data and monitoring</p> <p>The key matters raised included: strong support for the sharing/publication of background concentration data, consideration of point sources and mass loading within catchments, and the balance between identifying sources and monitoring receptors.</p> <p>The extensive feedback summarised elsewhere in this document on matters such as wastewater and environmental</p>	<p>Australasian Land and Groundwater Association - submission 1</p> <p>Australian Government - Airservices Australia</p> <p>ExxonMobil Australia</p> <p>Friends of the Earth Australia</p> <p>Qantas</p> <p>qldwater</p>	<p>The feedback provided in relation to environmental data and monitoring, including consideration of ambient background contamination, will inform future work under Theme 2 – environmental data and monitoring, and will also be considered as part of reviewing the implementation of NEMP 1.0</p>

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Theme	Summary of feedback	Submissions commenting	Response
	<p>guideline values is also relevant to future work in this area.</p>	<p>Victorian Water Industry Association</p> <p>WA Government</p>	
<p>Future work - Theme 3 - water</p>	<p>Several insights and suggestions were provided to inform future work on water.</p> <p>The key matters raised included: provision of environmental guidelines for sediment, consideration of both mass flux and concentration, and further detailed guidance on consideration of environmental guideline values for water.</p> <p>The extensive feedback summarised elsewhere in this document on matters such as wastewater and environmental guideline values for water and biota is also relevant to future work in this area.</p>	<p>Australasian Land and Groundwater Association - submission 1</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>Golder Associates</p> <p>NSW EPA - Hazardous Materials Unit</p> <p>qldwater</p> <p>Queensland Airports Ltd</p> <p>South East Water</p>	<p>The feedback provided in relation to water will inform future work under Theme 3 - water, and will also be considered as part of reviewing the implementation of NEMP 1.0</p>
<p>Future work - Theme 4 - soil</p>	<p>Several insights and suggestions were provided to inform future work on soil.</p> <p>The key matters raised included: provision of a criterion for indirect exposure for PFOA and further</p>	<p>Australian Government - Airservices Australia</p> <p>Brisbane Airport Corporation</p> <p>Golder Associates</p>	<p>The feedback provided in relation to soil will inform future work under Theme 4 - soil, and will also be considered as part of reviewing the implementation of NEMP 1.0.</p>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
	<p>consideration of the migration of PFAS from soil.</p> <p>The extensive feedback summarised elsewhere in this document on matters such as environmental guideline values for soil is also relevant to future work in this area.</p>	<p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p> <p>Queensland Airports Ltd</p> <p>South East Water</p>	
<p>Future work - Theme 5 - resource recovery and waste management</p>	<p>Extensive insights and suggestions were provided to inform future work on resource recovery and waste management.</p> <p>The key matters raised included: waste classification and transport including labelling requirements, consideration of leachability including testing methods, thresholds and requirements for management of waste with low PFAS levels, consideration of the waste hierarchy, further detailed guidance on treatment and disposal technologies, and further detailed guidance on considerations for disposal of PFAS to landfill.</p> <p>The extensive feedback summarised elsewhere in this document on matters such as soil reuse, storage and</p>	<p>Australian Airports Association</p> <p>Australian Government - Airservices Australia</p> <p>Australian Government - DITCRD</p> <p>Australian Landfill Owners' Association</p> <p>Brisbane Airport Corporation</p> <p>Burdekin Shire Council and Bligh Tanner</p> <p>Canberra Airport</p> <p>ExxonMobil Australia</p> <p>NSW EPA - Hazardous Materials Unit</p>	<p>The feedback provided in relation to resource recovery and waste management will inform future work under Theme 5 - resource recovery and waste management, and will also be considered as part of reviewing the implementation of NEMP 1.0.</p>

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
	containment, and wastewater is also relevant to future work in this area.	<p>Qantas</p> <p>qldwater</p> <p>Queensland Airports Ltd</p> <p>Senversa</p> <p>WA Government</p> <p>Waste Management and Resource Recovery Association</p>	
Future work - Theme 6 - site-specific application of the NEMP guidance	<p>Extensive insights and suggestions were provided to inform future work on the application of the NEMP guidance to develop site-specific approaches to PFAS risk assessment, management and remediation.</p> <p>The key matters raised included: clearly explaining all key concepts, definitions and alignment with other frameworks; explicitly considering and accounting for the time, cost, logistical and capacity demands of adopting changes on the ground; publishing detailed supporting analysis, such as assumptions, calculations and reference material, to assist in developing site-specific criteria; and providing further advice on site-</p>	<p>Australasian Land and Groundwater Association - submission 1</p> <p>Australian Airports Association</p> <p>Australian Government - Airservices Australia</p> <p>Australian Government - DITCRD</p> <p>Brisbane Airport Corporation</p> <p>Burdekin Shire Council and Bligh Tanner</p>	The feedback provided in relation to the site-specific application of the NEMP guidance will inform future work under Theme 6 – site-specific application of NEMP guidance, and will also be considered as part of reviewing the implementation of NEMP 1.0.

Table E. Out of scope matters

Theme	Summary of feedback	Submissions commenting	Response
	<p>specific prioritisation of assessment and management measures, including consideration of background or off-site contamination.</p> <p>The extensive feedback summarised elsewhere in this document on matters such as implementation of the NEMP, environmental guideline values, soil reuse, storage and containment, and wastewater is also relevant to future work in this area.</p>	<p>Canberra Airport</p> <p>City of Busselton</p> <p>CRC CARE</p> <p>NSW EPA - Hazardous Materials Unit</p> <p>NZ Ministry for the Environment</p> <p>NZ Regional and Unitary Councils - Contaminated Land and Waste Special Interest Group</p> <p>OPEC Systems</p> <p>Queensland Airports Ltd</p> <p>Sydney Airport</p> <p>Victorian Water Industry Association</p> <p>WA Government</p>	

Attachment A. Submissions received

The following list includes all written submissions received from organisations and individuals.

Australian Government - Airservices Australia	Melbourne Water
Australian Government – Department of Infrastructure, Transport, Cities and Regional Development (DITCRD)	NSW Environment Protection Authority (EPA) – Hazardous Materials Unit
Australasian Land and Groundwater Association – two submissions	NSW Department of Industry
Australia Pacific Airports Corporation	NSW Office of Environment and Heritage – Science – Contaminants and Risk
Australian Airports Association	New Zealand Ministry for the Environment
Australian Landfill Owners Association	New Zealand Regional and Unitary Councils – Contaminated Land and Waste Special Interest Group
Bligh Tanner – joint submission with Burdekin Shire Council	OPEC Systems
BMT Western Australia	Qantas
BP Australia	qldwater
Brisbane Airport Corporation	Queensland Airports Ltd
Burdekin Shire Council – joint submission with Bligh Tanner	Queensland Farmers' Federation
Canberra Airport	Queensland Urban Utilities
City of Busselton	Senversa
City of Rockingham – Millar Road Landfill	South East Water
City West Water	Sydney Airport
Clarence Valley Council	Sydney Water
CRC CARE	Victorian Water Industry Association
EnRiskS	Viva Energy Australia
ExxonMobil Australia	WA Government
Friends of the Earth Australia	Warren Godson – individual submission
GHD	Waste Management and Resource Recovery Association
Golder Associates	Water Services Association of Australia
Hunter Water	Yarra Valley Water
Lloyd Consulting	Plus three submissions provided in-confidence