GUIDANCE FOR MANAGING PFAS IN SA

Industry consultation 1 Feb – 1 Mar 2023

CONSULTATION REPORT

July 2023

Guidance for managing PFAS in SA – consultation report, July 2023

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7 July 2023

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Executive Summary

Per- and poly-fluoroalkyl substances, known as PFAS, are a group of synthetic chemicals that have been extensively used in a range of industrial and consumer products since the 1950s. PFAS are of concern around the world because they have high thermal, chemical and biological stability, can be bioaccumulative, and are capable of long-range environmental transport through soil and water media.

In January 2018, Australia's Environment Ministers endorsed Australia's first PFAS National Environmental Management Plan (NEMP). The PFAS NEMP provides valuable guidance around storage, reuse, and disposal of contaminated material to facilitate proactive decision-making for the management of sites impacted by PFAS. However, jurisdiction-specific guidance and regulation is required for certain aspects of the NEMP to be implemented.

In March 2020, the South Australian Environment Protection Authority (EPA) published the Landfill disposal criteria for PFAS-contaminated waste (SA) guideline to provide further SA-specific context to the regulation of PFAS, whilst maintaining consistency with the NEMP. The EPA has recently undertaken further work regarding the policy and operational management of PFAS-contaminated waste in South Australia, including the development of draft guidelines for disposal site suitability and the management of waste soils. These guidelines are consistent with both the NEMP 2.0, released in January 2020, and the draft NEMP 3.0.

Preliminary engagement with key stakeholders occurred in relation to site suitability for PFAS-contaminated waste disposal in December 2022 and January 2023, ahead of the targeted industry consultation. On 1 February 2023, the EPA commenced a targeted industry consultation to seek feedback on draft guidelines for a period of one month.

- Draft PFAS in waste soils guideline (Draft Reuse Guideline)
- Draft PFAS-contaminated waste disposal site suitability guideline (Draft Siting Guideline)

Highly technical feedback from qualified stakeholders was received during the consultation and has been considered by the EPA.

- **Draft Reuse Guideline:** the challenge was to balance the promotion of the waste hierarchy for PFAS-contaminated soils that may otherwise be suitable for reuse, whilst achieving the highest protection of the environment in accordance with state and national guidance, in an area where scientific knowledge is still emerging.
- **Draft Siting Guideline:** consultation on the Draft Siting Guideline did not generate any concern from industry and government stakeholders, and changes have been made to incorporate feedback.

On 18 July 2022, the EPA issued the Draft Reuse Guideline as the *PFAS in waste soils interim guideline*. This guideline may be used until the *Environment Protection Regulations 2009* have been updated to address PFAS.

The *Draft PFAS-contaminated waste disposal site suitability guideline* (Draft Siting Guideline) will go out for community consultation before being finalised. Any proposals will be assessed on a site-specific basis with reference to the draft guidelines until then.

1 Purpose and objectives

The purpose of consultation on the draft guidelines was to seek industry and government input so this could be considered during the EPA's development of the guidelines, with the following objectives:

- Consult with impacted stakeholders on managing PFAS-contaminated waste, including parties liable for site contamination, environmental consultants and other key stakeholders.
- Provide a comprehensive digital engagement website that provides a central source of information relevant to PFAS-contaminated waste reuse, disposal and containment. This site linked to a concurrent consultation on Cleanaway's application to dispose of PFAS-contaminated waste at its Inkerman landfill.
- Ensure that environmental consultants, state government departments and interested stakeholders are engaged. This enabled a well-informed draft guideline to be developed for community consultation.

2 Background

Determining where PFAS-contaminated waste can be disposed of in South Australia is a combination of market demand, relevant planning authority approval, and EPA authorisation in the form of a licence. The PFAS NEMP v2.0 was released in January 2020 and is the current version. It provides governments with a consistent, practical, risk-based framework for the environmental regulation of PFAS-contaminated materials and sites. The draft PFAS NEMP 3.0 was agreed to by the Heads of EPAs and was released on 23 September 2022 for public consultation until 28 February 2023, and a final version has not yet been published.

A landfill operator with an EPA licence is entitled to apply to add PFAS-contaminated waste to the list of wastes it receives, providing it can meet the criteria stipulated in the *EPA Landfill disposal criteria for PFAS-contaminated waste* and the *Environmental management of landfill facilities – solid waste disposal*. The EPA stipulates that the landfill cell must meet the country's two most stringent criteria for waste of this kind, as endorsed by each of the Heads of EPAs and Environment Ministers nationally and outlined in the current PFAS National Environmental Management Plan Version 2.0, and consistent with the Consultation Draft PFAS NEMP 3.0.

The EPA has undertaken further work regarding the policy and operational management of PFAS-contaminated waste soil in South Australia, including the development of the following draft guidelines. These guidelines provide site selection criteria for disposal sites and outline how waste soils containing PFAS can be safely reused.

- PFAS-contaminated waste disposal site suitability guideline (Draft Siting Guideline)
- PFAS in waste soils guideline (Draft Reuse Guideline)

Draft Reuse Guideline

The Draft Reuse Guideline outlines the EPA's proposed position on the reuse of waste soils containing PFAS. It focuses on Waste Fill (PFAS interim) criteria[1] for waste soils that contain very low concentrations of PFAS and the Intermediate Waste Soil (PFAS interim) criteria for potential reuse of soils that contain higher concentrations of PFAS with auditor oversight.

The Draft Reuse Guideline ensures consistency with the current PFAS National Environmental Management Plan Version 2.0 and the Consultation Draft PFAS NEMP 3.0. It also considers published and personally communicated advice from other jurisdictions.

Draft Siting Guideline

The Draft Siting Guideline provides guidance to landfill development proponents at the site selection stage. It will also assist planning authorities and the EPA to assess development applications lodged under the *Planning Development and Infrastructure Act 2016* (PDI Act).

This guidance is also relevant for existing licensed sites, and will assist the EPA in assessing licence-change applications involving controlled permanent disposal (not storage or treatment) of PFAS-contaminated waste in South Australia.

The site suitability criteria in the Draft Siting Guideline includes:

- regional-scale natural physical and hydrological characteristics as well as socioeconomic, ecological and land-use factors, taking into account the need to meet section 10 (Objects) and section 25 (General Environmental Duty) of the *Environment Protection Act 1993* (EP Act) and the *Environment Protection (Water Policy) 2015*; and

[1] 'Waste fill' is defined in the EP Regulations, and substances are listed in concentrations. This list of substances does not include waste consisting of or containing PFAS. The Draft Reuse Guideline is therefore intended to apply as interim guidance until such a time as the EP Regulations are updated.

- an emphasis on the need for a detailed site specific ecological and human health risk assessment to be undertaken, should a site not be excluded automatically because it has not met one of the Draft Siting Guideline criteria.

Maps displaying the majority of the Draft Siting Guideline criteria were made available on the EPA website during the consultation period. These can be viewed at www.engage.epa.sa.gov.au/guidance-for-managing-pfas-in-sa (see the interactive 'disposal suitability map').

The Draft Siting Guideline states that if a site does not fully comply with the criteria, it may be possible to overcome risks associated with the siting through the design of the facility.

Parliamentary Inquiry into PFAS disposal

The Draft Guidelines were developed with consideration given to the submissions made to the Environment, Resources and Development Committee of Parliament, which commenced an Inquiry into Per- and Polyfluoroalkyl substances (PFAS) contaminated waste disposal in 2021. 33 submissions were made to this Inquiry by members of the community and organisations, including the EPA. Submissions closed on 6 October 2021 and further information about the Committee and the inquiry can be found on the Committee's website.

In its submission, the EPA proposed to develop siting factors to inform the assessment of future proposals for PFAS waste disposal locations. The Committee delivered an interim report before the last State election that recommended a process by which appropriate sites might be identified.

The preliminary findings of the Committee strongly recommend that the economic and environmental consequences of South Australia continuing its reliance upon other jurisdictions accepting its waste be considered. On 29 May 2023, the EPA provided an update to the Committee to build on the EPA's submission and updated the Committee on further work undertaken to date.

Aboriginal engagement on EPA Guidelines

During concurrent engagement with Aboriginal Elders on other matters, interest was expressed in having further consultation with the EPA on activities regarding protecting the environment.

The Guidelines have both been updated to incorporate a requirement for landfill development proponents to undertake Aboriginal engagement in accordance with the Aboriginal Affairs and Reconciliation Division of the Attorney-General's Department guidance.

Sites of significance according to Aboriginal tradition and sites significant to Aboriginal archaeology, anthropology and history are protected in South Australia by the *Aboriginal Heritage Act 1988*. The EPA is proposing that proponents will undertake early engagement directly with Aboriginal people to manage Aboriginal heritage within ground disturbing projects. During that process, there may be requests for heritage surveys, assessments and reports. Generally, these services are performed by commercial heritage professionals in consultation with Traditional Owners. The Aboriginal Affairs and Reconciliation Division of the Attorney-General's Department can provide further guidance.

Cleanaway's application to receive and dispose of PFAS-contaminated waste

A concurrent application by Cleanaway to receive and dispose of PFAS-contaminated waste into its existing landfill at Inkerman was assessed during the consultation period.

On 9 May 2023, the EPA approved PFAS-contaminated solid waste to be disposed of at the Cleanaway Inkerman landfill, north of Adelaide. The decision came after a rigorous 2.5-year assessment process being undertaken alongside community engagement, including further work regarding the policy and operational management of PFAS-contaminated waste in South Australia. This application is consistent with the Draft Siting Guideline.

Cleanaway followed the appropriate protocols regarding Aboriginal Heritage that are now incorporated into the guidelines.

3 Consultation approach

Ahead of the targeted industry consultation, EPA staff engaged with key waste management companies (Cleanaway, ResourceCo and Integrated Waste Services) and State Government departments (Department for Infrastructure and Transport, Department for Energy and Mining and the Department for Environment and Water) about the Draft Siting Guideline.

The EPA targeted its consultation to over 400 stakeholders from the site contamination and waste industries, accredited site contamination auditors, contaminated land associations and consultancies, government agencies and other parties liable for site contamination.

The Engage EPA digital engagement website was set up as a central source of information with copies of both guidelines, details of the online information session, presentations and reference material. An interactive map was developed, showing the majority of areas in the Draft Siting Guideline where PFAS-disposal sites would be unsuitable. Links to the website were sent to the targeted electronic distribution list and published in a media release.

On 1 February 2023, a media release was sent to approximately 200 media outlets advising that the EPA had released two new PFAS-related guidelines for consultation. The EPA hosted two digital information sessions – one on each draft guideline – and invited people to join online. The draft guidelines, session dates and further information are still available from www.engage.epa.sa.gov.au/guidance-for-managing-pfas-in-sa.

The EPA posted on social media via its Twitter and LinkedIn accounts on 2 February and again on 14 February 2023 (see Appendix 2).

Two online sessions were held on 14 and 16 February 2023.

4 Evaluation

4.1 Number of interactions and areas of interest

The EPA has had **72** personal interactions since the formal consultation period began, with **42** people participating in online information sessions. The digital engagement website has been visited **2 260** times by **1 157** visitors (as at 5pm on 1 June 2023). Of those visitors, **738** are considered to be 'informed', having downloaded a document, visited the 'key dates' page, or visited multiple project pages. The most downloaded documents were:

- Draft Reuse Guideline (**894** views/downloads by **491** visitors)
- Draft Siting Guideline (**768** views/downloads by **428** visitors)
- PFAS in waste soils presentation (Draft Reuse Guideline), 14 Feb 2023 (**94** views/downloads by **55** visitors)
- PFAS-waste site suitability presentation (Draft Siting Guideline), 16 Feb 2023 (**77** views/downloads by **47** visitors)

4.2 Online information sessions

Online information sessions were held on each of the guidelines.

4.2.1 14 February 2023 – Draft Reuse Guideline

33 people attended the online session, representing Renewal SA, AECOM, TC Consulting, Nyrstar, WSP, Department for Infrastructure and Transport, Adelaide Airports Limited, Bluesphere, Groundwater, Waste Management and Resource Recovery Association of Australia, Viva Energy, Kleinfelder and Clydeco.

A presentation was provided by the EPA and was subsequently published on the Engage EPA website.

Questions and discussion focused on testing requirements, whether the EPA will approve a disposal pathway for this waste in South Australia, and the management of soils where there is a potentially contaminating activity. It was also noted that there an existing process for this that is outlined in the SA Standard for the production and use of Waste Derived Fill.

Based on feedback received in submissions, further consideration of the applicability of the criteria, and discussion with other jurisdictions, the EPA has incorporated minor amendments to the Waste Fill (PFAS interim) and Intermediate Waste Soil (PFAS interim) criteria. The amendments ensure adequate protection of the environment, enable the waste soils circular economy, and ensure consistency across jurisdictions.

4.2.2 16 February 2023 – Draft Siting Guideline

18 people attended the online session, representing Renewal SA, the Town of Gawler, Nyrstar, Department for Infrastructure and Transport, Adelaide Airports Limited, Bluesphere, Land and Water Consulting, Mockinya Consulting, Groundwork, WSP, and Clydeco.

A presentation was provided by the EPA and was subsequently published on the Engage EPA website.

Questions and discussion focused on seeking clarity around the definition of PFAS-contaminated waste, the need for a site-specific human health and ecological risk assessment to be undertaken on *any* site contemplating disposing of this waste, and industry looking to invest with confidence.

The EPA updated the Draft Siting Guideline to articulate that PFAS is already found in the general waste stream. Further information regarding compounds considered by the PFAS National Environmental Management Plan (PFAS NEMP),

and whether any changes are likely to the risk-based hierarchy of organic wastes, are outlined in *Table 1. Key themes raised about the Draft Reuse Guideline* below.

4.3 Formal submissions

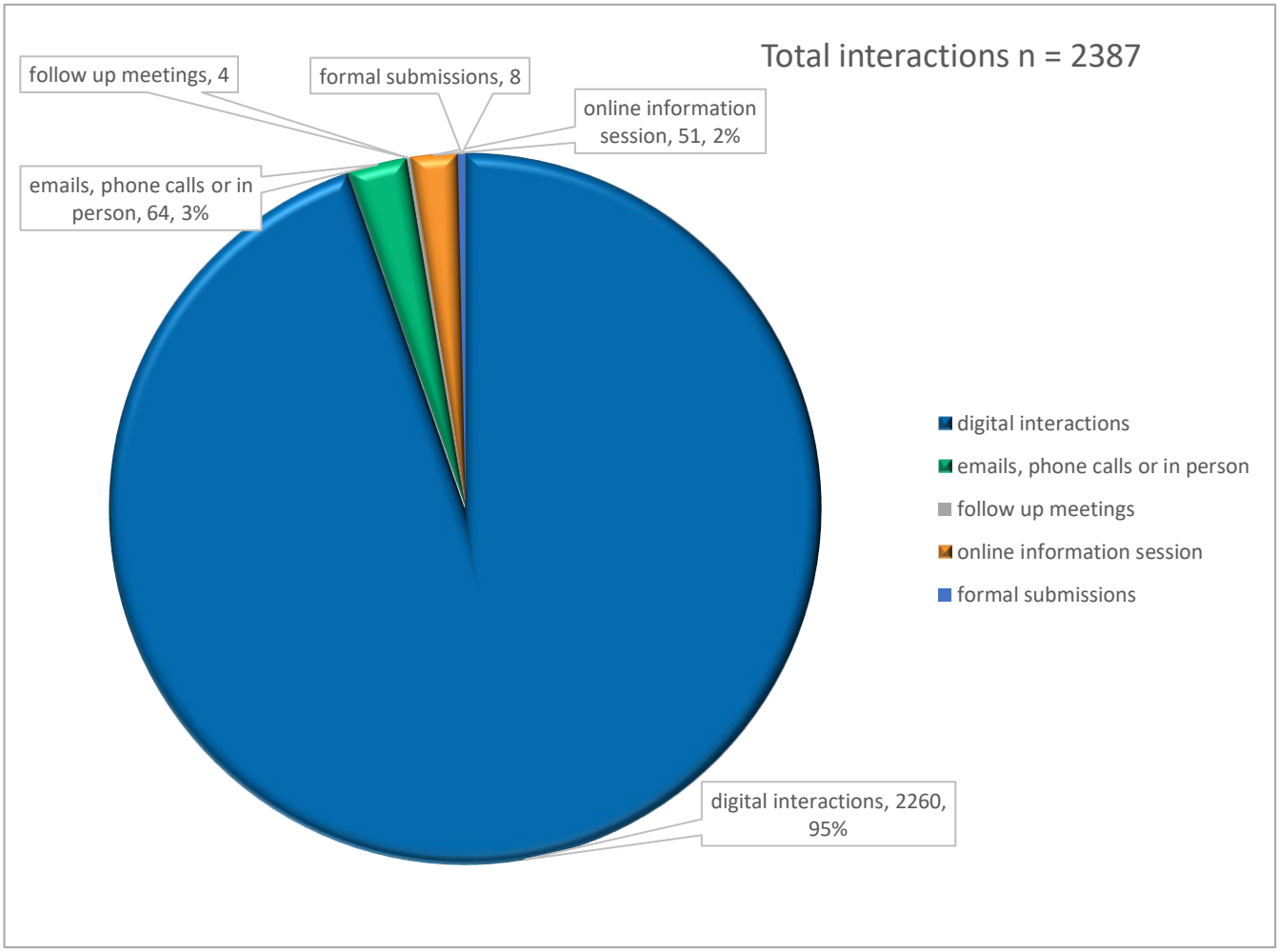
8 formal submissions were received from:

- City of Holdfast Bay
- Renewal SA
- Waste and Recycling Industry Association (SA)
- Department of Defence
- Environmental Consultant, AECOM
- Waste Management and Resource Recovery Association of Australia (WMRR)
- Adelaide Airports Limited
- Department for Infrastructure and Transport

4.4 Interaction types

Significant effort went into ensuring the Engage EPA website was a central source of information where stakeholders could easily reference all material relevant to the consultation. The number and quality of personal interactions during the online information sessions was also evident.

Figure 1 Interactions during and since the formal consultation period



4.5 Key themes raised during consultation

Table 1 Key themes raised about the Draft Reuse Guideline

Key themes	EPA further information and updates made to the Draft Reuse Guideline
Criteria are only provided for 3 types of PFAS (PFOS, PFHxS and PFOA) - what is the rationale for why 28 analytes must be analysed?	The guideline states that "A broader suite of 28 PFAS chemicals and a Total Oxidisable Precursor (TOP) Assay should also be tested and are required where a reuse proposal triggers the Auditor Protocol to inform the environmental risk of a range of PFAS chemicals and their precursors and any site-specific assessment." The broader suite of analytes should be used to compare to the PFAS concentrations at the destination site and, in accordance with Section 12 in the PFAS NEMP, ensure that the reuse of soils does not lead to increased or unacceptable risk to human health or the environment. The TOP Assay should be used to characterise the potential presence of precursors that may convert to endpoint PFAS compounds of interest. The EPA acknowledges that this broader testing regime will not always be practicable to implement, and that clear guidance is only available for PFOS, PFHxS and PFOA at this point in time. The EPA has therefore included this as a recommendation for all waste soil reuse but will only mandate its implementation for those that meet the Intermediate Waste Soils (PFAS interim) criteria, through the Auditor Protocol. This will contribute to ensuring that all reasonable and practicable measures have been taken to prevent and minimise environmental harm. **Outcome**: No proposed changes to the guideline.
At what point is it expected that PFAS analytes will be included within the Waste Derived Fill Standard (WDF Standard)?	The Interim PFAS in Waste Soils guideline will outline the requirement for testing PFAS for the foreseeable future. The guideline provides further clarity on how PFAS should be considered as "other analytes as relevant" referred to in Table 3 of the Waste Derived Fill Standard (WDF Standard). This position may change as PFAS regulation develops in South Australia. Any amendment to the WDF Standard to specifically include PFAS would also require amendments to EP Regulations and the *Current criteria for the classification of waste*, which would be most appropriate once the state of knowledge regarding management of PFAS in waste soils is developed further. **Outcome**: No proposed changes to guideline.
Why aren't the criteria being applied to all waste soils, as is the case in the WDF Standard? Won't this result in avoidance of the requirement for testing for PFAS?	The PFAS in Waste Soils guideline requires targeted testing for PFAS using an interim approach that is based on managing sites that pose a higher risk of being PFAS-impacted. It also clarifies to industry where there is currently no specific guidance and clarifies how PFAS should be considered as "other analytes as relevant" referred to in Table 3 of the WDF Standard. This position may change as PFAS regulation develops in South Australia. **Outcome**: No proposed changes to guideline. Further work is proposed to be undertaken to determine how and when the WDF Standard, the EP Regulations and the *Current criteria for the classification of waste* would be updated.

Key themes	EPA further information and updates made to the Draft Reuse Guideline
Which intermediate waste soil receipt sites in South Australia would be permitted to accept intermediate waste soil under audit protocol?	Those sites already permitted to receive this Intermediate Waste Soil would be able to do so for Intermediate Waste Soil (PFAS interim) in accordance with the WDF Standard. **Outcome**: No proposed changes to guideline.
Soil samples analysed for PFOS, PFHxS and PFOA may return concentrations less than the interim waste fill dry weight criteria (<0.005 mg/kg) but still detect a leachable component. **Clarification is sought on the need for analysis of these samples for leachable concentrations under Australian Standard Leaching Procedure (ASLP), for material to be accepted by a landfill.**	At the proposed dry weight criteria of <0.005 mg/kg (for each compound), the theoretical maximum leachate concentrations are: • PFOS+PFHxS: 0.5 ug/L • PFOA: 0.25 ug/L These values are less than those outlined in the Landfill disposal criteria for PFAS-contaminated waste guideline. Therefore soils that need to be tested for PFAS (as outlined in the guideline) that have a dry weight <0.005 mg/kg may be disposed of as PFAS-contaminated waste to a single or double composite lined cell without a leachate test. At the time of this report, the only landfill approved to take PFAS-contaminated waste In South Australia is Cleanaway's Inkerman landfill. The cell is single composite lined. **Outcome**: Clarifications about the need for (and frequency of) leachate testing have been included in the finalised guideline. This aspect is proposed to be clarified further in an update to the Landfill disposal criteria for PFAS-contaminated waste guideline. That guideline states that leachate must be tested for disposal of PFAS-contaminated waste, but it does not provide clarifications on when PFAS should be tested.
How the leachable concentration criteria for Waste Fill (0.01µg/L) were derived.	The rationale for the criteria is in the presentation provided at the EPA's online information session. It also outlines how these criteria relate to the Landfill disposal criteria for PFAS-contaminated waste guideline. Since the consultation: 1. The Cleanaway Inkerman landfill has been approved to receive and dispose of PFAS in a cell with a single composite liner (i.e. disposal criteria (leachable) are 0.7 µg/L PFOS+PFHxS and 5.6 µg/L PFOA). 2. The Waste Fill (PFAS interim) and Intermediate Waste Soils (PFAS interim) criteria have been amended informed by submissions, further consideration of the applicability of the criteria, and discussions with other jurisdictions. **Outcome**: The finalised guideline contains amendments to Waste Fill (PFAS interim) and Intermediate Waste Soil (PFAS interim) criteria.

Key themes	EPA further information and updates made to the Draft Reuse Guideline
Concerns regarding the practical application of the proposed criteria, considering likely ambient concentrations of PFAS, and mass balance discrepancy with acceptable concentrations of PFAS in soil likely to translate to exceedances in leachate.	The EPA is aware of the discrepancy between dry weight and leachable concentrations in the criteria in the Draft Reuse Guideline. This is a result of: • For the Waste Fill (PFAS interim) criteria, leachate tests having a lower Limit of Reporting (LOR) than what is routinely available for dry weight tests; • The low concentrations of PFAS needed to meet human health and ecological guidance/protection values as outlined in the PFAS NEMP; and • The leachate concentrations applicable to landfill disposal. The proposed criteria were developed to be precautionary and protective of the environment, and the leachable component of the criteria is designed to be the limiting factor to determining the suitability of waste soil reuse. The Draft Reuse Guideline also included opportunities to utilise alternative leachate test methods. Some of these methods are outlined in draft PFAS NEMP 3.0, and may be more representative of a reuse scenario as opposed to disposal. This may lead to less of a discrepancy between dry weight and leachable concentrations for some scenarios. However, feedback received in submissions indicated that alternative leachate test methods may not be widely used or available, and that a more practicable resolution would be to make minor amendments to the criteria and require ASLP as the standard leachable test method. Based on feedback received in submissions, further consideration of the applicability of the criteria, and discussion with other jurisdictions, the EPA has incorporated minor amendments to the Waste Fill (PFAS interim) and Intermediate Waste Soil (PFAS interim) criteria. **Outcome**: The finalised guideline contains amendments to Waste Fill (PFAS interim) and Intermediate Waste Soil (PFAS interim) criteria.
Organic waste and resource recovery, biosolids, and consideration for testing requirements at various stages in material flows.	This is outside of the scope of the Draft Reuse Guideline, which has been developed to provide guidance on the management of waste soils. The EPA acknowledges submissions that noted the exposure of the organics industry to pervasive chemical contaminants, and potential impacts due to bioaccumulation. The draft PFAS NEMP 3.0 also provides guidance on assessing risks from PFAS contamination for these materials. The EPA has noted the comments regarding composting and will investigate whether there is additional work that can be undertaken on these matters. This work will be separate to this guideline and will consider the guidance provided within the PFAS NEMP 3.0. **Outcome**: No proposed changes to guideline.

Key themes	EPA further information and updates made to the Draft Reuse Guideline
Potentially cost-effective options to treat PFAS in soil so that it may meet leachability criteria.	The EPA acknowledges that alternative treatment options would provide one avenue to resolve the discrepancy between the dry weight and leachable criteria in the Draft Reuse guideline. The EPA proposes to undertake further work to consider the viability of solidification and stabilisation treatment technologies. Based on feedback received in submissions, further consideration of the applicability of the criteria, and discussion with other jurisdictions, the EPA has incorporated minor amendments to the Waste Fill (PFAS interim) and Intermediate Waste Soil (PFAS interim) criteria. **Outcome**: The finalised guideline contains amendments to Waste Fill (PFAS interim) and Intermediate Waste Soil (PFAS interim) criteria. The EPA proposes to undertake further work to consider the viability of solidification and stabilisation treatment technologies.
Soils not proposed for reuse where the Draft Reuse Guideline does not apply	**Outcome:** The Draft Reuse Guideline has been updated with minor wording changes to clarify that: • The reuse of waste soils containing PFAS off-site should only occur after all options for on-site use, waste avoidance, waste treatment and volume reduction have been considered and implemented wherever reasonable and practicable. • This guideline does not apply to the management of soils within a site (i.e. for the purposes of the management/remediation of site contamination).
Concern regarding the requirement for routine use of the US EPA Method 1320 Multiple Extraction Procedure (MEP) leachability test.	The EPA has amended the wording in the Draft Reuse Guideline to clarify that either Australian Standard Leaching Procedure (ASLP) or US EPA Method 1320 Multiple Extraction Procedure (MEP) would be acceptable leachate test methodologies. The inclusion of the reference to the MEP was intended to reinforce that disposal of soils to landfill requires the use of MEP. The EPA will also consider revising the Landfill disposal criteria for PFAS-contaminated waste to accept ASLP in response to these comments and the updated information on leachate test methodologies in PFAS NEMP 3.0 (draft). **Outcome**: Guideline wording amended, proposal to review and revise the Landfill disposal criteria for PFAS-contaminated waste (epa.sa.gov.au).

Table 2 Key themes raised about the Draft Siting Guideline

Key themes	EPA further information and updates made to the Draft Siting Guideline
PFAS-contaminated waste in South Australia	All landfills are likely to already contain low concentrations of PFAS as a result of the disposal of everyday household products that contain small amounts of PFAS. It is not logistically feasible for landfill operators to remove this from the general waste-stream. However, where PFAS is a known or suspected contaminant in waste, soils, or at a site, PFAS will need to be tested and managed. PFAS detections in groundwater above relevant human health and ecological criteria must be reported to the EPA under Section 83A of the *EP Act*. Material with PFAS content exceeding 50 milligrams per kilogram will need to be destroyed or undergo a treatment process that irreversibly transforms PFAS into less hazardous compounds.[2] Such treatment processes include incineration or other thermal destruction, which are not currently available in South Australia. **Outcome**: Proposed changes have been made to the guideline.
Disposal pathway for PFAS-contaminated waste in South Australia	On 9 May 2023 the EPA approved PFAS-contaminated solid waste to be disposed of at the Cleanaway Inkerman landfill, north of Adelaide. It means that South Australia now joins the rest of Australia in providing a landfill site where PFAS-contaminated waste can be safely contained and disposed of. The decision came after a rigorous 2.5-year assessment process being undertaken alongside community engagement, including further work regarding the policy and operational management of PFAS-contaminated waste in South Australia. **Outcome**: No changes made to the guideline.

4.6 Consultation conclusions

Highly technical feedback from qualified stakeholders was received during the consultation. This has been considered by the EPA and changes to the draft guidelines have been made to incorporate this feedback.

On 18 July 2022, the EPA issued the Draft Reuse Guideline as the *PFAS in waste soils interim guideline*. This guideline may be used until the *Environment Protection Regulations 2009* have been updated to address PFAS.

The *Draft PFAS-contaminated waste disposal site suitability guideline* (Draft Siting Guideline) will go out for community consultation before being finalised. Any proposals will be assessed on a site-specific basis with reference to the draft guidelines until then.

[2] In conformance with the Stockholm Convention on persisting organic pollutants.

Appendix 1 Social media posts

Appendix 2.1 SA EPA Twitter and LinkedIn posts on 2 February 2023

SOCIAL MEDIA POSTS AND REACTIONS

Environment Protection Authority South Australia (SA EPA)
5,548 followers
4mo •

#SAEPA has released 2 guidelines focusing on the broader policy and operational management of #PFAScontaminated waste in South Australia, including the development of draft site selection criteria on how waste soils containing PFAS can be safely disposed.

Per- and poly-fluoroalkyl substances, known as #PFAS, are manufactured chemicals that have been used in a range of industrial and consumer products since the 1950s. PFAS are of concern around the world because they do not naturally degrade, can bioaccumulate in our food, and can travel long distances through groundwater.

You are invited to provide your feedback on the following draft guidelines:
PFAS-contaminated waste disposal site suitability guideline
PFAS in waste soils guideline

Consultation is open from 1 February until 1 March 2023.
Details: http://ow.ly/uzk150MBCiH

#SAEPA has released 2 guidelines focusing on the broader policy and operational...
Posted by Trixie Tan
2/1/2023
Boost

Image | All followers

2,252	-	64	2.84%	52	0

South Australian EPA @SA_EPA · Feb 2
#SAEPA has released 2 guidelines focusing on broader policy & operational management of #PFAScontaminated waste, including draft site selection criteria on waste soils containing PFAS for safe disposal. We invite your feedback from 1 Feb-1 March 2023.
ow.ly/fTfR50MBCiG

2 112

Appendix 2.2 SA EPA Twitter and LinkedIn posts on 14 February 2023

SOCIAL MEDIA POSTS AND REACTIONS

Environment Protection Authority South Australia (SA EPA)
5,548 followers
3mo •

#SAEPA has released 2 guidelines focusing on broader policy & operational management of #PFAScontaminated waste, including draft site selection criteria on waste soils containing PFAS for safe disposal.
There will be 2 #online info sessions with opportunity to speak with #SAEPA experts about the guidelines.
Draft waste soils guideline at 10 am on 14 February 2023
Draft siting guideline at 10 am on 16 February 2023

To register and book a place: ow.ly/fTfR50MBCiG

Guidance for managing PFAS in SA
engage.epa.sa.gov.au • 2 min read

Guidance for managing PFAS in SA
Posted by Trixie Tan
2/14/2023
Boost

Article | All followers

676	-	18	2.66%	15	0

South Australian EPA @SA_EPA · Feb 27
Last chance to give feedback on #SAEPA guidelines managing #PFAS contaminated waste in #SouthAustralia.

Share your thoughts on:
PFAS-contaminated waste disposal site suitability
PFAS in waste soils

Submit by 1 March 2023 ow.ly/uzk150MBCIH

engage.epa.sa.gov.au
Guidance for managing PFAS in SA
Per- and poly-fluoroalkyl substances, known as PFAS, are manufactured chemicals that have bee...

Appendix 2 Submissions

There were **8** formal submissions received during the submission period.

Table 3 Submissions

FORMAL SUBMISSIONS RECEIVED DURING THE CONSULTATION PROCESS	
Adelaide Airport	I am writing this letter on behalf of Adelaide Airport Limited regarding the draft guideline on PFAS in Waste Soils Guideline by the Environmental Protection Authority (EPA). Following on from the EPA online information session held on 14 February 2023, and review of the draft PFAS in waste soils guideline, we have the following feedback and would appreciate your response. 1. If criteria are only provided for PFOS, PFHxS and PFOA, can you confirm the rationale behind requesting that 28 analytes are analysed for (rather than a shorter suite)? 2. If soil samples analysed for PFOS, PFHxS and PFOA return concentrations less than the interim waste fill dry weight criteria (<0.005 mg/kg), which is also the laboratory detection limit of some major labs used in South Australia, do we still need to analyse these samples for leachable concentrations (e.g. ASLP) for the material to be accepted by a landfill? 3. If we do need undertake ASLP for PFAS when dry weight is <LOR, how do consultants go about selecting a sample(s) for leachable concentrations (as a sample containing the "greatest" concentration will not be identifiable)? Is this just selected at random or based on field indicators/presence of fill? 4. At what point is it expected that PFAS analytes will be included within the Waste Derived Fill Standard, noting currently under the Waste Derived Fill standard, all non-domestic soils in excess of 100 tonnes are required to undertake analysis for chemical substances included in Appendix 1 and 2 of the Waste Derived Fill Standard. In addition, any soils where a potentially contaminating activity has occurred (as defined in the Environment Protection Regulations 2009) will require analysis for Appendix 1 and 2 compounds. An exhaustive list of PCA sites is included in the EP Regs, including fill or soil importation, which would encompass most commercial sites across metropolitan Adelaide. 5. Clarification of point 1 on page 3 of the consultation document, the reference to 'history of PFAS use at the site, or where potentially contaminating activities have been undertaken that may reasonably have been expected to have involved PFAS-containing materials'. This requirement is quite specific and is in contradiction with the intent and approach of the current Waste Derived Fill Standard to provide broad-scale risk control in the re-use of fill materials between sites (point 4 above), Typically, not enough is known about a site's history to be able to make such an assessment for the purposes of Waste Fill classification. It is expected that the use of such a trigger will result in the continued practice of avoiding PFAS testing for the purposes of reducing waste disposal costs, and a lack of impetus to effectively managing PFAS wastes in SA (which are widespread). PFAS by its nature is highly mobile and able to travel long distances from a source in groundwater, surface water and air, and is often found at trace concentrations a considerable distance from any reasonably considered source site. 6. Clarification on which intermediate waste soil receival sites will be permitted to accept intermediate waste soil under audit protocol and the timeframes for becoming available, noting most 'trace level' PFAS contaminated soils currently in storage or in-situ across

	South Australia, if able to be diverted from landfill, would fall into the intermediate category (due to leachability requirements). 7. Clarification on how the leachable concentration criteria for Waste Fill (0.01µg/L) was derived, noting that they are more conservative than any other State waste criteria. In addition, why is the leachable concentrations criteria for intermediate waste soil criteria 0.07µg/L, which corresponds to an unlined landfill type under Table 6 of the PFAS NEMP (HEPA, 2022)? This implies that these thresholds were primarily derived to allow intermediate waste soil to be reused under an audit protocol (in line with the Waste Derived Fill Standard) and not landfill disposal. No site is going to accept PFAS impacted soils classed as intermediate waste soil when there is no certainty around off-site disposal facilities and costs. Will higher waste criteria be applied for current landfills that have submitted a licence application for landfill disposal of PFAS impacted materials (Inkerman Landfill)? And will it be 0.7 µg/L or 7 µg/L? 8. Following on from the points above, we have significant concerns about the practical application of the proposed criteria. Concentrations of PFAS in soil partition into water very easily and studies have shown that approximately 50% of dry weight concentrations typically partition into leachable concentrations, using the Australian Standard Leaching Procedure (ASLP) method. Therefore, using the water to soil ratio of 20 to 1 in the ASLP method (i.e. 20 L of water per 1 kg soil), the theoretical maximum leachable concentration for 0.005 mg/kg of PFOS in soil is 0.25 µg/L, which equates to 0.125 µg/L based on 50% partitioning to leachable concentrations. This would mean that most soils with detectable PFOS concentrations (0.005 mg/kg) is likely to produce leachable concentrations of PFOS above the intermediate waste soil (interim) criteria of 0.07 µg/L. i.e. when ASLP testing is completed for PFOS using the current criteria, very little soils will be classed as Waste Fill or Intermediate Waste Soil. We understand this is why the Victorian EPA adopted a lower total concentration criterion of 0.004 mg/kg for PFAS (comprising PFOS - 0.002 µg/l; PFHxS - 0.002 µg/l; PFOA - 0.001 µg/L), as outlined in Victoria Government Gazette Designation GG2022S026, *Classification of PFAS-impacted soil* (released 20 January 2022). We understand this was a practical screening level where the Victorian EPA felt comfortable that total concentrations were unlikely to translate to leachable concentrations of PFOS greater than 0.07 µg/L. Exceedances of these threshold levels (total concentrations or 95%UCL) triggers the need to submit an EPA Designation Application (F0127) to classify PFAS impacted soils, which also triggers the need for leachability (ASLP) testing. We also note that the draft NEMP (v3) also states many times that ASLP testing methods "may not be suitable when the total concentration in the sample is near or below the laboratory limit of reporting". Numerous studies (including those undertaken by Victorian EPA) have also shown that ambient PFAS levels in soils would correspond to leachable concentrations above 0.01 ug/L (the proposed Waste Fill criteria). Under the proposed framework, large volumes of soils with ambient PFAS concentrations would require disposal to a licenced landfill or facility which doesn't currently exist in South Australia.
Adelaide Airport (2)	Assuming a site has a known PCA which may have resulted in PFAS contamination, can you please clarify the following: 1. If soil samples analysed for PFOS, PFHxS and PFOA return concentrations less than the interim waste fill dry weight criteria (<0.005 mg/kg), which is also the laboratory detection limit of some major labs used in SA, do we still need to analyse these samples for leachable concentrations (assume ASLP) for the material to be accepted by a landfill?

	2. If we do need undertake ASLP for PFAS when dry weight is <LOR, how do consultants go about selecting a sample(s) for leachable concentrations (as a sample containing the “greatest” will not be identifiable)? Is this just a blind guess?
Waste Management and Resource Recovery Association of Australia (WMRR)	Thank you for the opportunity to provide feedback on the EPA’s Draft PFAS-contaminated waste disposal site suitability guideline and Draft PFAS in soils guideline. The Waste Management and Resource Recovery Association of Australia (WMRR) is the national peak body for all stakeholders in the essential waste and resource recovery (WARR) industry. We have more than 2,000 members across the nation, representing the breadth and depth of the sector within business organisations, the three (3) tiers of government, universities, and NGOs. WMRR notes that these documents are being consulted on whilst the draft PFAS National Environmental Management Plan (PFAS NEMP) 3.0 is also open for public consultation, and we would query whether distribution for comment should have been deferred until such time as the PFAS NEMP has been finalised given the clear dependencies with this guideline. Having said this, WMRR wishes to stress that we support timely and cost-effective regulatory approval of waste disposal sites, and EPA License Process Change applications at existing sites. WMRR advocates that waste treatment and disposal facilities are essential infrastructure for materials like PFAS-contaminated waste that are hazardous and do not currently have safe pathways for resource recovery. PFAS contaminated materials are a hazard that requires appropriate risk management. As such WMRR supports the safe disposal of materials that cannot be re-used or recycled, and disposal at acceptable facilities that are appropriately sited, designed, licensed and operated to effectively manage potential impacts to the environment. WMRR has significant concerns about the prevalence of PFAS across materials within the community and the lack of action at the start of the supply chain to eliminate its use, or at the very least make the public aware of its presence. Whilst WMRR’s full submission can be found at Annexure A, we would note that the SA draft PFAS-contaminated waste disposal site suitability guideline specifically refers to the PFAS NEMP V2.0 2020 without referencing the review or draft. However, the guideline, in its current form, is consistent with the draft PFAS NEMP 3.0. The draft PFAS in waste soils guideline references the draft PFAS NEMP 3.0 however the addition of section 12.4 ‘Organic waste and resource recovery materials’ in section 12 of the draft PFAS NEMP 3.0 is not mentioned in the SA guideline. Section 12.4 also references the new 15.4 ‘PFAS Criteria in biosolids’ which although it is not waste soil, may be useful for users of the guideline. The guideline also references Appendix B of the PFAS NEMP which is now Appendix C in the draft. WMRR notes that the criteria used in the waste derived fill (WDF) standard (for recovery, reuse and disposal) is amended by the proposed change to the soil guideline to include PFAS. WMRR notes that there are also EPA guidelines for Compost (updated 2019) and standards for the production and use of Waste Derived Soil Enhancer (WDSE) (2010). WMRR would submit that the Compost and WDSE Guidelines are also in need of urgent review given the changes proposed to the PFAS in soils guideline and the actions of other state regulators on allowable compost inputs. WMRR would request that the review of the Compost Guideline proceed as a priority given PFAS NEMP 3.0 and the need for industry certainty. Please do not hesitate to contact the undersigned if you would like to discuss WMRR’s feedback further.

Environmental Consultant, AECOM	On the 1st of February 2023 the SA EPA (EPA) released a Draft for Comment version of two PFAS-focussed waste guidelines. 1. PFAS in waste soils guideline 2. PFAS-contaminated waste disposal site suitability guideline. The EPA has invited feedback on these guidelines. The consultation period closes on 1 March 2023. This memorandum highlights some key concerns with the draft *PFAS in waste soils* (EPA 1130/23) guideline. **Scope & Applicability** • The document provides PFAS concentration limits for waste soil reuse in SA. • It is understood, in essence, to be an addendum to the EPA Standard for the production and use of waste derived fill (WDF Standard; October 2013) to explicitly address PFAS, as PFAS contaminants are absent in the 2013 Standard. • The WDF Standard relates principally to the excavation and reuse of waste soils on non-source-site properties, consistent with the **definition of Waste Soil** from the **WDF Standard** **Waste Soil** — All soil including dredge soil excavated and removed from any site, other than virgin material. Waste Soil is classified according to the chemical substances it contains and physical criteria. Waste soil includes dredge spoil and consists of clay, rock, sand, soil, or other inert natural mineralogical matter and may have minor inclusions such as natural organic matter, but does not contain other wastes such as asbestos or bitumen. For soils not proposed for reuse, the PFAS in waste soils guideline refers out to the GAR: *For guidance on PFAS-impacted soils that are not proposed for excavation and reuse or disposal, please refer to the EPA publication Guidelines for the assessment and remediation of site contamination (GAR).* As such, for sites where management/remediation of PFAS is proposed, without removal of the soil from the site, it is inferred that the PFAS in waste soils document would not be expected to apply. However, the document would benefit from more explicitly clarifying this issue, else, in the absence of equivalent guidance (particularly for ASLP leachable concentrations), this PFAS in waste soils framework might inadvertently be more broadly applied to assessment and management of site contamination. **Guideline Values and Mass Balance** • The document provides criteria for two classes of soil: 1. Waste Fill (effectively negligible PFAS concentrations if they meet these criteria, allowing reuse with minimal restrictions) 2. Intermediate Waste Soil (require Auditor sign off for use on other properties) The Draft PFAS waste soils guideline provides total (dry weight) and ASLP (AS4439.3) leachable criteria for these two categories of soil:

6 The EPA sets out the following waste fill (interim) criteria:

Parameter	Dry weight concentration (mg/kg)	Leachate concentration (µg/L)
PFOS	<0.005	<0.01
PFHxS	<0.005	<0.01
PFOA	<0.005	<0.01

7 The EPA sets out the following intermediate waste soil (interim) criteria:

Parameter	Dry weight concentration (mg/kg)	Leachate concentration (µg/L)
PFOS	<1 (sum of PFOS and PFHxS)	<0.07 (sum of PFOS and PFHxS)
PFHxS	<1 (sum of PFOS and PFHxS)	<0.07 (sum of PFOS and PFHxS)
PFOA	<10	<0.56

key concern with the above criteria is the apparent substantial disconnect between the total and likely leachate criteria.

The ASLP test uses a 20:1 water (or solvent):soil solution. Therefore, if all (100%) of the PFAS is leached out of a soil (theoretical maximum) by the leaching process, the concentration in the ASLP leachate concentration (mg/L) will be 20 times lower than the soil concentration (mg/kg), due to this volume dilution. In this way, a simple mass balance calculation from the Dry Weight PFAS concentration can be undertaken to estimate the % leached via ASLP. Kabiri et al (2022)[1] evaluated the leaching behaviour of PFAS from 12 contaminated soils using ASLP (and MEP) and it included this type of mass balance assessment. They found: - PFAS leaching was related to C-chain length, with shorter PFAS more readily leached than longer chain compounds. Generally though, PFAS are *highly leachable* under the fully saturated conditions present in the ASLP or similar laboratory leaching procedures.

- Leaching of longer chain compounds was lower under acidic conditions than in neutral conditions, with alkaline pH leaching the highest proportion of PFAS.

- The PFAS chemical structure (chain length, functional group) was more important than soil properties in controlling PFAS leaching.

- Alkaline ASLP leaches reasonably approximated cumulative MEP (water as solvent) leach data and are likely a substantially more cost effective and practical alternative to MEP.

- For PFOS, the proportion of the total PFOS present that was leached in the alkaline (pH 9.2) ASLP test ranged from 34% to 108%, with an average of approximately 60%. Lower soil concentrations appeared to leach higher proportions of the PFOS mass present, with the lowest four dry weight concentration samples averaging approx. 95% of the PFOS mass leached (83%-108%) via alkaline (pH 9.2) ASLP.

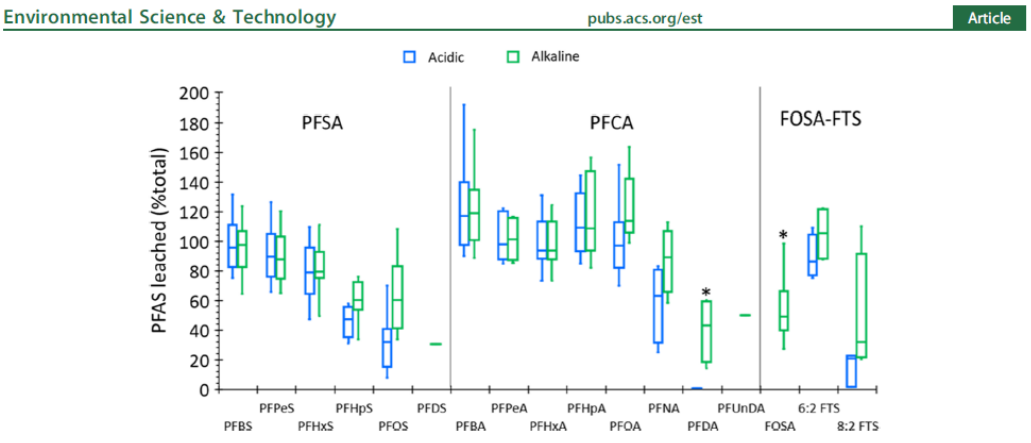


Figure 1. Boxplot of the percentage of total PFAS leached with varying CF_2-chain lengths in acidic and alkaline solutions from 12 soils using ASLP.

Extensive testing on the potential for PFAS in soil to leach has been undertaken on Defence projects in South Australia and interstate. The findings of this Defence PFAS in soil leachability testing were consistent with results published by Kabiri et al, with, on average, approximately 90% of the theoretical maximum leachable PFAS found to have leached via the ASLP tests, across many hundreds of samples.

• As such, a soil **at the proposed Waste Fill criteria of 0.005 mg/kg** would be expected to generate an ASLP leachate concentration of approximately 0.005 mg/kg x 1000/20 = **0.25 µg/L or 25 times the proposed ASLP leachate criteria** (0.01 µg/L) above. Even assuming less than 100% of the PFAS is leached, the ASLP leachable PFAS is likely to be approx. 20 times the guideline, while meeting the upper dry weight concentration limit. **Soil at the Intermediate Waste 1 mg/kg** Dry Weight criteria would be expected to produce an **ASLP leach concentration of up to approx. 50 µg/L**, or **more than 700 times higher** than the equivalent ASLP leachate concentration criteria (0.07 µg/L) for the Intermediate Waste soil. Even assuming only 60% of the PFOS leached, which is likely an underestimate at this dry weight concentration, **the ASLP criteria would still be approximately 400 times more stringent than the dry weight criteria**.

The Dry Weight concentration limits above are effectively irrelevant, reuse under this guideline will be constrained by the leachate targets.

• Extending this mass balance assessment to dry weight targets. For a soil to meet the proposed *Intermediate Waste Soil* ASLP leachate criteria of 0.07 µg/L and thereby be potentially available for reuse under the WDF Audit protocol, it would likely **need to be below a Dry Weight concentration of approx. 0.0014 mg/kg**, well below even the dry weight Waste fill criteria (0.005 mg/kg).

• Consequently, in order to meet these leachate criteria at anything approaching the dry weight criteria, some immobilisation or treatment of PFAS would need to be implemented. However proposed Section 8C of the Draft guideline explicitly prohibits this, advising only destruction or removal is considered appropriate.

PFAS in waste soils

8 In relation to the waste fill (interim) criteria and the intermediate waste soil (interim) criteria:

a Both dry weight and leachate concentrations of the criteria must be met for the soil to comply with the criteria.

b Where the guideline values refer to the sum of PFOS and PFHxS, this includes PFOS only, PFHxS only, and the sum of the two.

c The physical and/or chemical treatment of waste soils to meet the waste fill (interim) criteria or the intermediate waste soil (interim) criteria and subsequently be reused would only be considered under the audit protocol with a treatment plan. The EPA will only accept destruction or removal treatment methodologies for waste soil reuse where PFAS is present; solidification and stabilisation methodologies will not be accepted.

The draft guideline constrains potentially cost-effective options available within SA to treat PFAS in soil so that it may meet leachability criteria.

• It is noted that this apparent disconnect between total dry weight and ASLP leachable PFAS criteria is also inherent in the PFAS NEMP; within the decision tree for Reuse of Soil (Figure 7 in the PFAS NEMP) and the proposed landfill disposal criteria. In this case of the PFAS NEMP Table 11 Landfill acceptance criteria, the relative discrepancy is even more stark. For an *unlined* landfill category, the acceptable Total Concentration (mg/kg) in soil is 20 mg/kg PFOS+PFHxS, while the ASLP leachable acceptance criteria is the 0.07 µg/L drinking water guideline. At the 20 mg/kg dry weight concentration, the theoretical maximum ASLP leachable concentration (1000 µg/L) would be approximately 14,000 times higher than the 0.07 µg/L criteria. Even for a double lined landfill (50 mg/kg and 7 µg/L), the ASLP leachate criteria is more than two orders of magnitude more conservative than the dry weight criteria.

	• Based on this simple mass balance, the total dry weight soil concentration that would give rise to an ASLP leachate concentration equal to the PFAS NEMP double-lined landfill ASLP criteria of 7 µg/L, based on 100% of the PFAS leaching, would be 0.14 mg/kg. If only 60% of the PFAS leached, this would still only be 0.23 mg/kg. • Kabiri et al (2012) also note this concern, summarising that *none* of the 12 samples tested in their study (dry weight concentration range 0.01 to 699 mg/kg PFOS) would be suitable for disposal to an unlined landfill under the NEMP proposed leachate criteria, despite 9 of the 12 samples meeting the 20 mg/kg dry weight criteria for unlined landfill disposal. Only four samples in the study met the "double-lined landfill" ASLP criteria of 7 µg/L, with the highest dry weight concentration that met this 7 µg/L ASLP leachate criteria being only 0.09 mg/kg, more than 500 times less than the proposed dry weight criteria of 50 mg/kg, and an order of magnitude below the dry weight target for Intermediate Waste. **leachability criteria will be expected to limit: - *waste soil reuse* to maximum soil PFOS+PFHxS concentrations of approx. *0.002 mg/kg or less.*** **- *landfill disposal* without leachability pre-treatment (such as immobilisation or other treatment) to maximum soil PFOS+PFHxS concentrations of approx. *0.2 mg/kg or less*.** • Given the currently available widely applied PFAS destructive technology is limited to high temperature incineration, and this is not currently available in SA, this effectively means **all Waste Soil at concentrations of PFOS +PFHxS greater than approx. 0.2 mg/kg dry weight would likely need to be transported interstate for incineration**, as they could not be reused, nor disposed of to landfill. • The high cost in energy for transport and incineration mean this is not considered a particularly environmentally sustainable solution, particularly for soils at this relatively low concentration. • While the use of the ADWG as a leachate target (or 10-fold multiples of this) is understandable from a simple precautionary principal perspective, it is not clear that it is a practicable, risk-based target in considering ASLP leachable PFAS. Particularly where the proposed guidance explicitly prohibits treatment focussed on reducing leachability. **Reconsideration should be given to the magnitude of the ASLP targets, or the use of leachability mitigation management (perhaps under the WDF Auditor protocol) (immobilisation or similar), or both.** **MEP Test Methodology** Item 9 on Page 4 of the draft guideline states that "*The US EPA Method 1320 (Multiple Extraction Procedure; MEP) is appropriate in addition to ASLP for leachate testing as it is a requirement for landfill disposal of PFAS-contaminated wastes in South Australia"*. • The Multiple Extraction Procedure (MEP) (US EPA Method 1320) is a sequential (10-fold) extraction test methodology that is designed to simulate repetitive leaching via an acidic solution, in an improperly designed landfill. It generally takes several weeks for the laboratory to undertake the multiple extraction and analysis steps and is an expensive analysis. The first leach step in the MEP methodology is similar to the ASLP leach procedure, however while the ASLP standard methodology incorporates a range of potential leach fluids, based on proposed use of the soil and the pH of soil solutions, the standard MEP methodology specifies an acidic leach solution. • While the acidic nature of the MEP leach solution is conservative (worst case) for the leaching of cationic metals, studies have shown that key PFAS are less leachable at low pH than they are in alkaline conditions. Kabiri et al (2012) found that more than twice as

	much PFOS was leached into solution using an alkaline leach, than for an acidic leach, with a neutral (water leach) providing an intermediate leach concentration. • As such, the specification of the MEP methodology, unless modified to address the option for use of alternative neutral or conservatively, an alkaline pH, appears likely provide an underestimate of leachable PFAS. • Kabiri at al (2022) concluded that "*Comparing different leaching tests showed that the results using the alkaline ASLP were similar to the cumulative MEP data and the former might be more practical for routine use than the MEP*." That is, there is likely little to gain from the significantly more expensive and time intensive MEP analysis, where the initial leach step extracts the majority of the PFAS, unless perhaps the MEP analysis is incorporated into assessment of the longevity of some form of stabilised/immobilised soils where materially lower leachability is expected. • **It is recommended that the stipulation inferring routine use of the MEP procedure (Item 9) be reconsidered or the recommendation softened to circumstances where immobilisation or similar treatment forms part of the management strategy.**
Department of Defence	General It is understood the proposed concentration limits apply only to waste derived fill material, and not to the remediation process. For sites where management/remediation of PFAS is proposed and soil is not removed from the site, this document is not expected to apply. *It is suggested this is clarified in the guideline document.* Section 6 Defence has found through extensive testing on a range of sites that PFAS are highly leachable (approximately 90% of the theoretical maximum leachable PFAS) under the fully saturated conditions created in ASLP or similar leaching procedures. On this basis, it seems the proposed dry weight concentrations for both the waste fill and intermediate waste soils become irrelevant, as the leachate limits will always be the limiting factor. To meet the leachate criteria some form of treatment of PFAS would be required, however the draft guideline explicitly prohibits solidification and stabilisation methodologies (8(c)). *It is suggested consideration is given to the leachability mitigation options (i.e. include solidification and stabilisation of soils as an option) and/or the proposed leachability targets.*
Waste and Recycling Industry Association (SA)	The WRISA considered the two guidelines for managing PFAS in SA at its March committee meeting and is pleased to provide the following feedback. • WRISA is supportive of the EPA clarifying the management of PFAS and the • intent of accepting 'background' levels of PFAS, as a pervasive suite of chemicals in our environment and consumer products while focusing on contaminated soils. • WRISA requests that the EPA consider identifying testing requirements for various points in material flows • WRISA has significant concerns with the exposure of the organics industry from pervasive chemical contaminants, in not just inputs (such as kerbside and other sources of contamination) and immediate outputs but also exposure to longer term market sensitivity and potential impacts from bioaccumulation in plant/animal products. The organics industry in SA underpins a significant proportion of our shared circular economy / sustainability objectives and measures of protection are required to minimise the industries exposure to commercial / litigation impacts.

Renewal SA	• The guideline is unclear on whether PFAS leachability testing is required before acceptance at recycling facilities where the soil is not going into a landfill cell, but rather being stored for later reuse under the WDF standard. We don't believe leachability testing is necessary in this situation as it storage is not in a landfill environment and leachability would be assessed later on under auditor protocol for any intermediate waste soils. • Waste soils containing PFAS can be reused in accordance with the PFAS NEMP which states that reuse of materials containing PFAS has to be approved by the regulator, and the regulator has to assess reuse options. It's stated that the intermediate criteria is the maximum that would be accepted but the upper end of the limit may not be. o Clarity is needed on whether soils with PFAS levels that meet the waste fill criteria can simply be reused in accordance with the usual processes outlined in the standard for the production and reuse of waste derived fill, or if specific EPA approval will be required. o For soils containing PFAS that meet the intermediate criteria, reuse of intermediate would be occurring under auditor protocol - is the regulator approval necessary when the responsibility will already be with the appointed auditor ? if regulator approval is necessary, will it be an additional step on top of the auditor protocol and what will need to be submitted/how long will this step take, or will it in practice be rolled into the administrative review of audit reports ? **PFAS-contaminated waste disposal site suitability guideline** • The guideline is unclear on whether the criteria for PFAS in WF and IWS automatically flow through to EPA licenced facilities that only store material (not controlled permanent disposal) or whether a process change application will be required. If so suggest clarificiation on whether any additional management measures will be required to allow acceptance of PFAS containing soils at recycling facilities.

City of Holdfast Bay	The City of Holdfast Bay (CoHB) fully supports the proposed legislative criteria stated within the Environmental Protection Authority draft Per- and poly-fluoroalkyl substances (PFAS)-contaminated waste disposal site suitability guidelines. The CoHB considers the draft guidelines to be comprehensive and risk adverse enough to protect South Australian communities and ecosystems from potential serious health and environmental hazards whilst still providing safe opportunities for site suitable disposal. The CoHB also supports the draft sampling and analysis criteria set in the PFAS in waste soils guideline. It is the CoHB view that the criteria are both risk adverse and robust enough to protect both the community and the environment whilst still supporting the industrial composting sector. The CoHB does not support or agree with the recent NSW EPA legislation prohibiting compostable packaging, cardboard, animal faeces and teabags disposal in green FOGO bins as a result of PFAS content. This measure drastically reduces food and organic waste recycling efficiency and if introduced locally has the potential to both reduce landfill diversion rates and damage the state's flourishing circular economy. The CoHB advocates for an increased phase out and ban on products containing PFAS and similar chemical make-up of products that can be composted. The CoHB has the utmost confidence and assurance from our organics composter, Peat's Soils, that their use of world leading technology and methods to process organic matter removes any risk of levels of unsafe contaminants like PFAS being present in end use compost products. Yours sincerely Roberto Bria Chief Executive Officer
Department for Infrastructure and Transport	*DRAFT PFAS IN WASTE SOILS GUIDELINE – EPA1130/23* Thank you for the opportunity to provide comment on the Environment Protection Authority's (EPA) draft '*PFAS in waste soils guideline*'. The Department for Infrastructure and Transport (the Department) acknowledges the effort undertaken by the EPA and is appreciative of the guidance and certainty this draft guideline will provide the South Australian industry regarding sustainable, cost-effective management solutions for soils containing this chemical of concern. The Department has provided commentary on the draft guideline in relation to how it would interact with the Department's business, as well as a broader industry perspective (Attachment 1). The Department welcomes further opportunity to participate in the review and formalisation of this guideline. Please contact [redacted] to discuss this further.

Attachment 1: Comments of Draft PFAS guideline

Section Reference	Comment
'Legislation' – 5th paragraph	"…the EP Regulations, the *Current criteria for the classification of waste* and the WDF Standard is undertaken to incorporate PFAS in the suite of substances to be tested to…" Wording tends to suggest that PFAS will be included in the *Current criteria for the classification of waste* (or SA Waste Screen) and therefore ALL waste soils will require PFAS dry weight and leachate testing. We believe this is not the intent given the position within Point 1. Consider rewording. Should PFAS be included in the waste criteria suite, there would be significant risk, cost and effort for Department projects in addition to the wider development and construction industry.
The EPA's position and regulatory approach - Point 1.	The Department is supportive of a targeted approach for classification related to sites which could be reasonably expected to have PFAS impacted soils.
The EPA's position and regulatory approach - Point 3.	For ease of interpretation, it is recommended that the requirements for 'disposed' soils be separated from 're-used' soils (i.e. separate points).
The EPA's position and regulatory approach - Points 5 - 7	Extrapolation of the dataset generated by the Department, completed as part of the T2D project, indicates that in general leachability will drive higher waste soil classifications and would result in larger amount of soil requiring disposal to landfill. This outcome will reduce the opportunity to meet waste to resources and sustainability outcomes across all sectors and exhaust the monopolised waste receival location. Furthermore, it is expected that a significant amount of soil with dry weight <1 mg/kg will fail leachate criteria, including the criteria we understood to be applied to the Inkerman Facility. This will result in a significant volume of soil needing to be transported interstate for destruction. The Department requests the EPA review dry weight concentrations, to better reflect the dry weight – leachability relationship, particularly when using ASLP method.
The EPA's position and regulatory approach - Point 8c.	The Department understands that solidification and stabilisation methodologies are consistent with ASC NEPM and has been accepted interstate. Therefore, we query why this approach is not considered acceptable to the EPA.
The EPA's position and regulatory approach - Point 9.	The work undertaken by the Department as part of the T2D project indicates that the ASLP method will deliver a more conservative leachate concentration. Where ASLP leachate fails but dry weight concentration do not exceed relevant PFAS NEMP criteria for a less sensitive land use (e.g. open space and commercial/industrial), an alternative leaching method may be warranted that better mimics in-situ retention.

Department for Infrastructure and Transport	The EPA's position and regulatory approach - Point 10.	The Department seeks clarity as to what would be the requirements of "rigorous justification" for an alternate leachate assessment.

	General Comment	The Department acknowledges the value of implementation of *PFAS in waste soils guideline* and the *PFAS-waste site suitability guideline* and looks forward to the greater certainty these guidelines and other tools in the regulatory system will provide government and industry.
		
		Some of the tools the Department would consider invaluable to support the way the State tackles PFAS, include:
		• insight into PFAS distribution ('background' monitoring program) across metropolitan Adelaide;
		• public messaging from the 'trusted voice' that is the EPA.
		  • Given the current public concern regarding storage of PFAS material in landfills and creation of landfills for this purpose, has consideration been given to how the EPA will control the messaging regarding WDF (in accordance with the guidelines)? We see this as a risk from a stakeholder engagement/community acceptance perspective.
		  • We anticipate that Government and other Industry/Developers will face significant challenges meeting stakeholder engagement expectations and outcomes without the EPA's 'trusted' voice.
		  • Furthermore, the current messaging is that 'any concentration is not ok'. What consideration has been given to broader community/public education about the prevalence/risk/acceptance of PFAS?

Appendix 3 Changes to guidelines as a result of consultation

Changes were made to both guidelines as a result of the consultation. Please see below for the tracked changes.

Appendix 3.1 Draft Reuse Guideline

https://engage.epa.sa.gov.au/82966/widgets/393686/documents/264854

Appendix 3.2 Draft Siting Guideline

https://engage.epa.sa.gov.au/82966/widgets/393686/documents/264857