

Environment Protection Authority



## Summary of submissions

# Environmental management of landfill facilities: solid waste disposal



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# Summary

The guideline *Environmental management of landfill facilities (municipal solid waste and commercial and industrial general waste)*, was released in 2007. This guideline applies to all solid waste landfill facilities in South Australia and is used as the basis for preparing comment or direction on development applications under the *Development Act 1993*, and when making decisions under the *Environment Protection Act 1993* (EP Act) including the development and variation of licence conditions.

A review of the guideline was identified as a priority in 2017 because:

- the current version is 10 years old
- the nature and activities within landfill facilities have diversified and include resource recovery activities
- the quality and manufacture of geosynthetics have significantly changed over the past decade
- the composition of waste has changed and will continue to change into the future
- there are upcoming legislative amendments under the waste reform agenda, including mass balance reporting.

The guideline is used by industry as a primary reference guide for how to comply with environmental legislation in South Australia when planning, designing, constructing, operating and closing a landfill. It is a critical document in setting the minimum expectations for the operation of landfills and assists industry in meeting their general environmental duty as defined under section 25 of the EP Act.

Since the release of the initial guideline, South Australia has seen the consolidation of landfill facilities with 144 currently licensed sites (of which 74 are closed), together with significant improvements to the way landfills are designed and operated in SA. This has been a significant achievement.

Changes in the waste industry, engineering standards, the regulatory setting and technology since 2007 prompted a review of the guideline to ensure the South Australian Environment Protection Authority (EPA) continues to be consistent, transparent and relevant.

A comprehensive comparison with other jurisdictions, including NSW EPA, Victorian EPA and UK EPA was undertaken prior to updating the guideline.

## Consultation and engagement

The EPA hosted an early engagement workshop on 25 October 2017 to obtain feedback from industry prior to commencing review of the guideline. A total of 33 external stakeholders attended the workshop representing all aspects of industry. The workshop informed the scope of the review of the guideline and a summary of the outcomes was published in November 2017.

The EPA released the draft Landfill Guideline for solid waste disposal on 13 June 2018 for public consultation over an eight-week period. During the consultation period, the EPA held three industry consultation sessions across metropolitan Adelaide and met one on one with key metropolitan and regional landfill operators.

A total of 26 submissions were received from a broad range of stakeholders including industry, licensees, consultants, individuals and government. The views, comments and feedback submitted have been considered in finalising the guideline for release.

Thank you to every organisation and individual who took the time to attend a consultation session and/or submitted their views to the EPA. The feedback overwhelmingly supported the proposed changes.

The key themes arising from the consultation process included:

- 1 **Implementation:** how will the changes in the guideline affect our site?
- 2 **Revised classification system:** what happens if our site does not meet the revised containment system specified in the updated classification table?
- 3 **Closure and post closure:** is there a role for site contamination auditors and what is the process for surrendering our licence as it is no longer disposing of waste?
- 4 **Waste classification:** Does waste classification really belong in this guideline?

These themes will be explored in more detail in the following chapter-by-chapter overview.

# 1 Introduction

Chapter 1 – Introduction	No of supporting comments	No of opposing comments	No of comments seeking clarification
Objectives	–	–	–
Purpose	–	–	–
Scope	–	–	5
How the EPA will use this guideline	–	–	1
Regulatory and technical basis for this guideline	–	–	6
Implementation	–	–	7

The Introduction was reviewed to consolidate the objectives of the guideline together with editorial updates for clarification and consistency with guideline styles across the EPA.

## Scope

A number of comments sought clarification about the scope of the guideline, including application to closed landfills, liquid waste and post closure. The scope was revised in consideration of these comments. The EPA has also made minor amendments to relevant guidelines and legislation referenced in the Introduction. The guideline [Wastewater lagoon construction](#) (EPA 2018) will be updated to remove reference to landfill facilities. The EPA will also update its guideline [Waste definitions](#) (2009) where necessary.

### Specific comments included:

- Application to containment of liquids (ie leachate, wastewater from mines, organic treatment areas, winery/piggery effluent). Does the guideline apply?  
**Response:** The landfill guideline does not apply to liquid waste, including winery/piggery effluent.
- Does the guideline apply to the design, development as well as operation and post closure of landfill?  
**Response:** Yes, it does.
- Does the guideline apply to closed landfills?  
**Response:** Yes, it does.
- Does the guideline take precedence over legislation requirements?  
**Response:** The guideline does not take precedence over legislative requirements including Acts and Policies, and has been amended accordingly.

## Implementation

The EPA has provided further clarification in relation to the implementation of the guideline in response to comments received. It will continue to assess the applicability of the guideline on a site-specific basis taking into consideration existing approvals and site-specific risks.

**Specific comments included:**

- Do all leachate ponds need to be upgraded after 12 months following publication of the guidelines?

**Response:** No. Only newly constructed ponds must be constructed in accordance with the guideline unless existing ponds have failed or are causing measurable impact.

- What is the process for sites that already have approvals for landfill infrastructure, control measures and operations that are non-complying with this proposed guideline? Existing approvals are based on risk assessment and supporting information.

**Response:** The guideline will be applied based on consideration of site-specific risks and consideration of existing approvals. Where changes or upgrades are required they will be applied through conditions of licence.

- Support for the approach to raise and improve current standards around planning, design, construction, operation, closure and post closure care and a positive step to better align with national and international best practice. Seek to ensure no new landfills.

**Response:** [South Australia's State Waste Strategy 2015–2020](#) specifies that there will be no new landfills in South Australia.

## 2 Regulatory environment

Chapter 2 – Regulatory environment	No of supporting comments	No of opposing comments	No of comments seeking clarification
Waste classification	–	4	26
Siting	–	–	3
Landfill classification*	Refer Appendix 1		
Requirements for baseline environmental assessment	–	–	2

### Waste definitions

A number of submissions sought clarification as to whether the guideline *Waste definitions* (EPA 2009) will be updated to reflect changes in the guideline. The EPA will update the guideline accordingly. The [Current criteria for the classification of waste – including industrial and commercial waste \(listed\) and waste soils](#) (EPA 2010) defines waste fill, intermediate and low-level contaminated waste criteria.

#### Specific comments included:

- Reference is made to the waste definitions document – will this be updated to reflect the new landfill classifications and intermediate, low level waste, etc. and controlled waste codes?

**Response:** The *Waste definitions* guideline will be updated to reflect the revised landfill classification system. Low-level waste etc. is already captured in the guideline *Current criteria for the classification of waste – including industrial and commercial waste (listed) and wastes soils*.

- Is a definition for solid waste required?

**Response:** This definition is already included in the guideline *Waste definitions*.

### Waste classification

The feedback contained in the submissions was supportive of guidelines detailing waste classification requirements, however the appropriateness of this information within the landfill guideline was questioned, as responsibilities for classification of waste extend beyond landfill facilities. The EPA acknowledges that the classification of waste incorporates requirements for waste generators, transporters and consultants and as such the information detailing waste classification will be incorporated into a new guideline titled *Waste Classification for treatment and disposal*.

#### Specific comments included:

- Suggest that waste is appropriately classified at the point of generation and prior to removal from the point of generation. As this is not the responsibility of the landfill owner, this should be spelled out in the guidelines.

**Response:** A separate guideline will be published on waste classification for treatment and disposal.

### Chemical assessment and classification

Clarification was sought in relation to the types of waste that are required to be chemically assessed and classified, including waste soils with naturally elevated chemicals, such as manganese, barium and street sweepings. Waste Fill is prescribed in the *Environmental Regulations 2009* and sets limits for a range of contaminants. Soils that exceed the maximum permitted chemical criteria for Waste Fill cannot be classified as such, even if such contamination reflects natural elevations.

The difference between the ASC NEPM and Waste Fill classification was also raised, with the desire to review the Waste Fill criteria based on the revised NEPM. A review of the contamination thresholds for Waste Fill falls outside the scope of the current review.

**Specific comments included:**

- Notwithstanding the difference in purpose of the NEPM vs waste classification and reuse, would EPA consider revising the Waste Fill regulation for some substances given it is based on old NEPM type of documents and that the 2013 revision to the NEPM updated some of those ecological values for instance? This is raised in consideration of common occurring metals that are naturally elevated and when excavated are unable to be reused beneficially or at least very costly to do so if the auditor protocol is triggered under [Waste derived fill standard](#) (2010).

**Response:** The scope of review of the Landfill Guideline did not include review of chemical classification of soils.

- Street sweepings are included as requiring classification for landfill disposal – is this implemented/feasible?

**Response:** Street sweepings are known to be highly variable in chemical and physical composition, and must be dewatered prior to disposal to landfill. Where the source of collection is from an area that is reasonably expected to have elevated contaminants (for example industrial precincts, major roads), they should be tested prior to disposal.

**Sampling and assessment methodology**

Clarification was sought on the use of the US Environmental Agency (USEPA) Multiple Extraction Procedure (MEP), including the need to provide further detail to specify that a range of pH leach fluids are used, and how it applies to treated waste, eg by stabilisation. The guideline is a summary document that directs proponents to the appropriate test methods, to avoid duplication of details contained within standards that are subject to change from time to time. The appropriate applications of MEP have been addressed in the guideline and includes where MEP is used in lieu of treatment and following stabilisation.

The EPA has updated the guideline to allow for consideration of alternative sampling rates in consideration of feedback received, to build in flexibility based on risk and size of sample and will incorporate the NEPM requirements as relevant for new and emerging contaminants, including PFAS.

**Specific comments included:**

- 2.1.3 Fourth paragraph – states samples are to be collected on a case by case basis but a minimum of one sample per 250 m<sup>3</sup>. For large volumes of soils this would require a significantly large number of samples that would add little value for uncontaminated homogenous natural soil. Perhaps amend to state ‘unless otherwise approved by the EPA the minimum number of samples is one sample per 250 m<sup>3</sup>’.

**Response:** The EPA has considered this and amended the guideline accordingly.

- MEP – In order to prevent gross over-classification of waste and be in keeping with the Objects of the EP Act it is imperative that clarification is provided regarding exceedances of 250% of the criteria.

**Response:** The EPA has considered the issue and has amended the guideline accordingly

**Landfill siting and classification**

Siting, landfill classification and requirements for baseline environmental assessment have been reviewed to further clarify the relationship between these processes and the importance of the environmental setting in determining risks and associated requirements of the updated classification systems. The guideline has been reviewed to remove repetition and clarify high level principles within the body of the guideline and detailed design requirements within the appendices.

Minor clarification to evaluation distances, landfill gas and monitoring have been made in consideration of comments.

The chapter detailing baseline environmental assessment has been changed to state 'environmental assessment for development approval' to provide further clarification that the assessment is undertaken as part of obtaining development approval.

### 3 Containment and control of emissions

Chapter 3 – Containment and control of emissions	No of supporting comments	No of opposing comments	No of comments seeking clarification
Base and side liners	–	–	4
Leachate collection system	–	–	3
Capping	–	–	7
Alternatives	–	–	2
Design and construction quality assurance (CQA)	–	–	3

As noted earlier, the guideline has been updated to further clarify design considerations during the planning and siting (development) and operational phases.

#### Specific comments included:

- The two-year design life of a cell was questioned noting issues of practicality in regional areas.

**Response:** This requirement is included in the 2007 guideline as a suggested measure (refer section 4.3) and has been carried through in the revised guideline as a suggested measure.
- A small number of comments were received in relation to the leachate collection system, including further clarification on the application of HELP and how the 300-mm maximum leachate level is to be measured.

**Response:** The 300-mm leachate head is considered accepted best practice and based on modelling of overall liner performance. Further clarification has been included in the published guideline, and licence conditions will be reviewed to ensure consistency across the State in relation to leachate head.
- A few comments were received in relation to the suggested measure to cap landfill cells within 12 months of cessation of disposal.

**Response:** The EPA has introduced flexibility in this requirement in the updated guideline and will continue to work with licensees on a site-specific basis in consideration of existing approvals and site-specific risks.
- A comment requested a defined process to allow alternative approaches to landfill design and construction incorporating specific performance parameters.

**Response:** The EPA has included a design seepage rate performance parameter for large and restricted landfill cells in the updated landfill classification system and considers it appropriate for consultants to detail specific performance parameters where alternatives are proposed. The EPA emphasises the importance of early engagement with all parties, where alternatives are being considered.

## 4 Management, monitoring and treatment of emissions

Chapter 4 – Management, monitoring and treatment of emissions	No of supporting comments	No of opposing comments	No of comments seeking clarification
Landfill gas	–	–	8
Leachate storage and disposal	–	–	7
Surface water	–	–	2
Monitoring	–	–	3

There was general support for improved measures for monitoring received with a number of comments seeking clarification to requirements.

### Specific comments included:

- A small number of submissions identified that mandatory landfill gas collection and combustion in section 4.1.1 is inconsistent with a risk-based approach.

**Response:** The revised guideline has been updated to further clarify landfill gas considerations.

- One comment requested further consideration of methane and carbon dioxide threshold levels as they could be interpreted as spot monitoring events in the absence of other guidance.

**Response:** The EPA requires a landfill gas risk assessment to be conducted at all landfill facilities, which should detail the risks associated with the site and the proposed measures to mitigate the risks and avoid the potential to conduct spot monitoring where the risks necessitate continuous landfill gas monitoring.

- Clarification was sought on the appropriate regulatory pathway to require updates with the revised guideline in relation to monitoring.

**Response:** The EPA will use conditions of licence as the appropriate regulatory tool to update existing approvals, where necessary. This has been further clarified in the Implementation section of the revised guideline.

- One submission sought clarification on how monitoring surface water leachate quality will provide data as to the presence or extent of leakage through the liner and impacts to groundwater (noting that all liners leak), and in the absence of groundwater monitoring, how would the risks to the potential environmental values and groundwater users be identified.

**Response:** The EPA will use leachate quality and surface water as indicators to support that licensees are doing everything reasonable and practicable to minimise impacts, not to confirm the extent of impact.

- One submission asked whether leachate from landfill facilities could be used in composting.

**Response:** The EPA is not supportive of the use of leachate in composting due to the chemical composition of leachate at landfill facilities and the risks that this could present to compost products.

- Clarification was also sought in relation to the mandatory requirement to obtain site-specific approval for leachate injection and the requirement for leak detection on existing ponds.

**Response:** The EPA has considered these comments and has maintained the requirement to obtain site-specific approval for leachate injection and provided further clarification in the Implementation section of the guideline to confirm that leak detection is a requirement for future leachate lagoons.

The EPA has made further amendments on the requirements for leachate collection and disposal in consideration of the suggestions provided. Furthermore it has made minor amendments to the 'Monitoring' section to provide greater clarity and consistency in response to comments received on monitoring.

## 5 Landfill operations

Chapter 5 – Landfill operation	No of supporting comments	No of opposing comments	No of comments seeking clarification
Amenity	–	–	1
Waste disposal and placement	–	–	–
Onsite resource recovery	–	–	1
Covering of waste	–	–	4
Landfill environment management plan (LEMP)	–	–	2

The chapter on landfill operation outlines a number of suggested measures to support the objective and required outcomes. A number of comments sought clarification on the appropriateness of suggested measures which are provided as guidance and where they are not appropriate for a specific site. The EPA has considered all the comments however in many instances changes have not been considered necessary as suggested measures will be enforced through conditions of licence which reflect the site-specific risks.

The revised guideline intentionally reduced the emphasis on LEMPs as site-specific requirements will be specified in conditions of licence. However, one comment sought to further simplify the LEMP to detail operational requirements only and remove design requirements. The EPA will use the revised guideline as a tool to revise LEMP and licence condition requirements.

### Specific comments included:

- Consider onsite resource recovery should also reference the need to recover materials to an EPA approved/endorsed/supported standard with an approved recovered products plan.

**Response:** The guideline has captured this requirement and specifies 'details of resource recovery activities including waste volumes, type and stockpiling/handling within the landfill facility in accordance with existing published Standards where applicable'.

- Can daily cover, like interim cover, be Intermediate soil in suitable circumstances?

**Response:** Yes, this is already provided for in section 5.4.1

- The document refers to a minimum of 150 mm of daily cover and lists a series of dot points of what it is intended to achieve. Can the 150-mm requirement be replaced by a performance based system with objectives? Further, the removal of daily cover material is difficult and most landfill operators will not even attempt it.

**Response:** Where alternatives to the specified daily cover are requested the performance requirements specified in section 5.4.3 'Alternative daily cover' must be addressed. The requirement to remove daily cover is a suggested measure and where it is not practicable there is no expectation that this will be undertaken.

- Consider including a waste stockpile height limit in LEMPs to prevent stockpiling waste for long periods of time.

**Response:** This requirement has been strengthened.

## 6 Closure and post closure

Chapter 6 – Closure and post closure	No of supporting comments	No of opposing comments	No of comments seeking clarification
Closure plans	–	–	6
Certified statement of completion	–	–	2

The EPA has expanded the requirements detailed in the 'Closure and post closure' section of the guideline to provide further clarification on the EPA's expectations as sites prepare for closure and post closure management. The objectives and required outcomes should be read in conjunction with section 52A of the EP Act – Conditions requiring closure and post closure plans as this provides the legislative framework upon which the EPA will amend conditions of licence on a case by case basis, to prescribe certain activities and outcomes.

Several comments were received seeking clarification on the relationship between the surrender of a licence and transition to management under site contamination provisions. The EPA confirms that the purpose of a licence for the conduct of a prescribed environmental activity is to undertake all reasonable and practicable measures to minimise pollution to the environment. As such, an application to surrender a licence will be reviewed on a case by case basis in consideration of the requirements of section 6.2 of the guideline (certified statement of completion).

Where the information gathered from monitoring conducted as part of landfill activities confirms site contaminate exists, either during operation, closure or post closure of the facility, the EPA will use appropriate provisions of Part 10A of the EP Act to regulate site contamination. This would be done in conjunction with regulatory requirements of the licence concurrently, to avoid duplication of monitoring requirements.

## Appendices

Appendix 1 – Landfill classification	16 comments seeking clarification
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The comments received on the revised classification system were overwhelmingly related to site-specific circumstances and a request for clarification about how it impacts specific sites.

The landfill classification system has been reviewed in consideration of the comments received. The EPA will take this into consideration when applying the updated landfill classification system to an existing landfill facility that has existing design approvals based on site-specific risks.

The EPA confirms the following with regard to landfill classification:

- The prescribed 1.5-m capping in the landfill classification is a minimum physical separation, including interim cover. Actual capping specifications may require additional capping (eg phytocaps).
- The design seepage rates for large and restricted landfill cells are intended to be applied to new cells, not existing cells.
- The EPA has further clarified how the separation distance to groundwater is measured in response to comments received.

### Specific comments included:

- One submission sought clarification on the TDS for medium (<13,000 ppm) and large (<3,000 ppm) and whether this is intentional.

**Response:** The criteria is intentional and reflects the improved performance of a composite liner.

- A moderate number of submissions questioned co-disposal of low-level contaminated waste in cells that are designed and constructed in accordance with the 'large' landfill classification.

**Response:** The EPA has considered the comments and has further clarified that low-level contaminated waste soil is only permitted to be co-disposed into a 'large' landfill cell (unless existing conditions permit otherwise).

- One comment sought clarification as to whether the landfill classification should have regard to cumulative environmental effects of sites that receive small quantities of waste over a significant period of time.

**Response:** The EPA has responded to this comment by further refining the intended use (service use).

To provide a theoretical working interpretation of the landfill classification system and how it will be assessed in relation to existing approvals, the following example is provided in the text box.

A site currently classified as a large 'L' landfill receives 200,000 tonnes of waste per annum. The site is designed with an approved compacted clay liner and does not incorporate a composite lining system as specified in the revised landfill classification system. The site is located in an area of poor groundwater quality, with TDS >13,000 ppm and no beneficial reuse of groundwater. The site currently co-disposes of asbestos, commercial and industrial waste, municipal solid waste and waste soils.

Can this site continue to operate in accordance with its existing approvals, or will it need to separately dispose of asbestos waste and implement a composite lining system?

**EPA assessment:** The site is classified as 'large' based on the volume of waste it is receiving. The classification specifies a composite base and side liner for large landfills, however after reviewing other risk factors (TDS and beneficial re-use) it is unclear whether a composite base and side liner is necessary. A review of existing groundwater monitoring reports confirms that the site is not impacting on the receiving groundwater.

The EPA considers the risk factors and agrees that the site can continue to operate in accordance with its existing design approval. Furthermore, the landfill classification does not exclude co-disposal of asbestos waste and the site operator does not want to build a separate cell for the disposal of asbestos only. The site has had a long history of non-compliance with its licence conditions relating to the receipt and disposal of asbestos. The EPA makes a strong recommendation that a separate asbestos cell be considered to remove the operational issues and risks resulting from the co-disposal of asbestos waste. The EPA will monitor the situation over a 12-month period. Where complaints regarding the disposal of asbestos continue and are validated, the EPA will impose a condition on the licence requiring the construction of a separate asbestos cell in accordance with the landfill classification system.

**Appendix 2 – Minimum requirements for compacted clay liners**

**6 comments seeking clarification**

The minimum requirements for compacted clay liners were transferred from the existing guideline. The EPA has considered all related submissions received and undertaken several amendments to this section of the guideline to provide further clarification.

**Specific comments included:**

- Add a dot point 'design needs to consider future tie-ins, including safe and practical access, extent or works in the tie-in zone, waste filling plan, edge bunds, protecting the integrity of the materials in the tie-in zone, surface water management.

**Response:** Additional information has been included.

- References to calcium carbonate content and dispersion are incomplete.

**Response:** Further clarification has been included.

- Additional clarification is required in relation to permeability – sample preparation and saturation, triaxial cell pressures and head.

**Response:** Additional clarification has been included.

- It is accepted practice in SA that Hilf compaction methodology (AS1289 5.7.1) can be used as well as Standard compaction (AS 1289 5.1.1) as part of the compaction control CQA methodology.

**Response:** Additional clarification has been included.

- It is accepted practice in SA sites that the moisture criterion for side liners is standard OMC±2%. This is due to safety reasons for earthworks machinery working on slopes. The moisture variation criterion applies to floor liners.

**Response:** Further clarification has been included.

**Appendix 3 – Minimum requirements for geosynthetic materials in liners**

**19 comments seeking clarification**

The content contained in Appendix 3 comprises new information outlining the minimum requirements associated with the use of geosynthetic material in landfill construction. The majority of comments received were from consultants and manufacturers of geosynthetic materials. The EPA acknowledges the voluntary input from this group of stakeholders which has contributed to the content in the published guideline.

The comments received were specific and highly technical. Where reasonable the EPA has made amendments to the guideline and updated references. Where comments were highlighting potential changes in existing published standards through current research, the guideline was not amended as research needs to be tested and proven.

The EPA has intentionally made reference to external technical standards in contrast to adopting current published standards within the body of the guideline. This is to remove the potential redundancy of the guideline where technical standards change on a continuous basis.

**Appendix 4 – Minimum requirements for leachate collection**

**3 comments seeking clarification**

The requirements for leachate collection have been further strengthened and clarified in relation to feedback received on this section of the guideline. In particular, the design of the leachate collection layer must provide sufficient capacity for pumps and disposal paths to remove the leachate; and the lateral flow of the drainage blanket must make allowance for clogging over time, to support a maximum 300-mm leachate head as measured at the sump. The following additional clarification has been included:

- Leachate sumps must be designed to allow for the increased heads that are required to allow for the pumping and removal of leachate, and
- the design flow capacity of the leachate collection system pumps should be based on a modelled peak daily leachate flowrate of the operating cell following placement of one lift of waste and also include any runoff from batters and adjacent areas contributing to the cell.

Further clarification has also been included in relation to the leachate pond design and construction to the same performance standard as the landfill cell baseliner design. For restricted landfill facilities a single, composite liner, with leakage detection may be appropriate. Site-specific approvals will be assessed on a case-by-case basis. Furthermore, the guideline has also been clarified to confirm that no leachate drainage and extraction layer are required to be included during the leachate pond construction.

**Appendix 5 – Minimum requirements for capping systems**

**5 comments seeking clarification**

A low number of submissions discussed capping systems, however further clarification has been incorporated into the guideline in response to these specific concerns:

- HPDE geomembranes are excluded for use in capping systems.

- The EPA has adopted some of the design principles established under the *Guidelines for the Assessment, Design, Construction and Maintenance of Phytocaps as Final Covers for Landfills (WMAA 2011)*. Variations to these requirements will be considered on a case-by-case basis in consideration to the risks presented at the site.
- The 1.5-m thick cap is a physical separation layer and is a minimum.

**Appendix 6 – Minimum construction quality assurance requirements**

**6 comments seeking clarification**

The comments received in relation to Appendix 6 were minor and editorial in nature, including updating references to external Australian Standards and providing definitions for acronyms, including ‘IQA’. The EPA has updated the guideline accordingly.

**Appendix 7 – Suggested parameters for leachate, surface water, groundwater and landfill gas monitoring at landfill facilities**

**7 comments seeking clarification**

The EPA has considered the comments received in relation to Appendix 7, which incorporates a number of suggested measures for monitoring at landfill facilities. These suggested measures are provided as guidance only as the EPA acknowledges that many landfill sites have developed site-specific monitoring programs based upon the undertaking of landfill gas risk assessments.

A moderate number of comments were received in relation to the receipt and management of PFAS impacted wastes and associated disposal criteria. The guideline is informed by national guidance that is being developed under the PFAS National Environment Protection Measure to facilitate a nationally consistent approach to PFAS management at landfill facilities. The EPA has amended the guideline where appropriate.

**Specific comments included:**

- In situ and when not depressed by leachate extraction – suggest this is clarified, given the leachate head should be retained at <300 mm, the head may be considered as always ‘depressed by leachate extraction’.

**Response:** This table has been amended accordingly.

- List of parameters to test for appear to be intended to match for leachate and groundwater. Mercury is not in the leachate list. Should BOD and TKN be included as leachate indicator parameters in groundwater?

**Response:** The list of indicator parameters for leachate and groundwater are similar but not identical. Mercury has been added to leachate, however BOD and TKN have not been included in groundwater as they are not considered necessary – BOD is an indicator parameter in leachate and nitrite, and nitrate are included in both leachate and groundwater.

- Consideration should be given to referencing to other guidelines (eg CIRIA or NSW EPA Hazardous Ground Gas) in relation to assessing the risk posed by ground gases. Concentration of ground gases can be high, but the risk may be low if there is no flow. The threshold values have potentially significant implications for design and control measures. Considerations include the thresholds, methodology and location of monitoring follow-up actions.

**Response:** The EPA has introduced indicator parameters for landfill gas which are suggested measures. The landfill gas risk assessment that is required to be undertaken at all landfill facilities should include consideration for monitoring methodology, thresholds and follow-up actions, in light of the site-specific risks identified through the landfill gas risk assessment.