Environment Protection Authority

Compost guideline

Public consultation

EPA South Australia

Compost guideline

Public consultation

The EPA seeks your views for the appropriate conduct of composting works in accordance with the *Environment Protection Act 1993*. This consultation paper may also be obtained from its website.

All submissions received by the EPA during the consultation period will be acknowledged and treated as public documents unless provided in confidence, subject to the requirements of the *Freedom of Information Act 1991*, and may be quoted in EPA reports. Comments may be forwarded by mail, facsimile or email to:

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Comments are required to be submitted by Friday, 9 November 2012

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Disclaimer

This publication is a guide only and does not necessarily provide adequate information in relation to every situation. This publication seeks to explain your possible obligations in a helpful and accessible way. In doing so, however, some detail may not be captured. It is important, therefore, that you seek information from the EPA itself regarding your possible obligations and, where appropriate, that you seek your own legal advice.

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Abbreviations and definitions

100-year floodplain	Land where the chance of flood occurring in any given year is at least one in 100
(The) EP Act	*Environment Protection Act 1993*
Aerobic	In the presence of air (oxygen)
AHD	Australian Height Datum in metres is the reference level for defining reduced levels adopted by the National Mapping Council of Australia. The level of 0.0 m AHD is approximately mean sea level
Anaerobic	In the absence of air (oxygen)
APVMA	Australian Pesticides and Veterinary Medicines Authority
AS	Australian Standard
As Constructed Report (ASR)	An 'As Constructed Report' is a documentation of work performance, Construction Quality Control (CQC) and Construction Quality Assurance (CQA) associated with a construction project.
Bioremediation	An accelerated process using micro-organisms (indigenous or introduced) and other manipulations to degrade and detoxify organic substances to harmless compounds, such as carbon dioxide and water, in a confined and controlled environment.
Biosolids	Stabilised organic solids derived totally or in part from wastewater treatment processes which can be managed safely to utilise beneficially their nutrient, soil conditioning, energy or other value. The term biosolids does not include untreated wastewater sludges, industrial sludges or the product produced from the high temperature incineration of sewage sludge. It should also be noted that many other solid waste materials are not classified as biosolids, eg animal manures; food processing or abattoir wastes; solid inorganic wastes; and untreated sewage or untreated wastes from septic systems/sullage wastes.
Carbon:Nitrogen Ratio	The ratio of the weight of organic carbon (C) to that of total nitrogen (N) in an organic material
Compost	Pasteurised material resulting from the controlled microbiological transformation of compostable organic waste under aerobic and thermophilic conditions for not less than six weeks.
Composting	The controlled process whereby compostable organic wastes are pasteurised and microbiologically transformed under aerobic and thermophilic conditions for a period not less than six weeks, including the pasteurisation phase.
Composting works	The conduct of works at which mushroom or other compost is produced or is capable of being produced at a rate exceeding 200 tonnes per year.
Controlled waste	Waste as defined in the *National Environment Protection (Movement of Controlled Wastes between States and Territories) Measure 1998*

Construction Quality Assurrance (CQA)	Construction Quality Assurance is third party verification of quality. The objectives of a CQA plan is to ensure that the construction materials used, construction methods and completed works comply with the approved technical specifications.
Construction Quality Control (CQC)	Construction Quality Control is a measure taken by the installer or contractor to ensure compliance with the installation specifications.
DEWNR	Department for Environment, Water and Natural Resources
EIP	An environment improvement program for the purposes of the *Environment Protection Act 1993*
EPA	South Australian Environment Protection Authority
Feedstocks	Wastes approved by the EPA for composting
Green waste	The vegetative portion of the waste stream arising from various sources including waste from domestic and commercial premises and municipal operations.
Hazardous waste	Listed waste having a characteristic described in Schedule A list 2 of the National Environment Protection (Movement of controlled waste between States and Territories) *Measure.* Hazardous waste includes any unwanted or discarded material (excluding radioactive material) which because of its physical, chemical or infection characteristics can cause significant hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed.
Kerbside collected green waste	Green waste collected during the regular domestic council waste collection
Leachate	A liquid that has percolated through and/or been generated by decomposition of waste material. It includes water that comes into contact with waste and is potentially contaminated by nutrients, metals, salts and other soluble or suspended components and products of decomposition of the waste
Liquid waste	Waste classified as liquid waste in accordance with the assessment process set out in the guideline *Liquid waste classification test* (EPA 2003)
Listed waste	Waste listed in Part B of schedule 1 of the *Environment Protection Act 1993*
Moisture holding capacity	The ability of the compost to absorb and hold water
Mulch	Dry green waste that has been processed by way of chipping, shredding or similar mechanical process, but does not contain putrefying material. The *Australian Standard 4454–2012 for compost, soil conditioners and mulches*, specifies properties for mulch including that it needs to be pasteurised. Pasteurisation reduces the risks from pathogens and plant propagules.
Organic waste	Component of the waste stream derived from living organisms (including wood, garden, food, animal, vegetative and natural fibrous material wastes and biosolids)
Pasteurisation	A process whereby organic materials are treated to significantly reduce the numbers of plant and animal pathogens and plant propagules

Pasteurised product	An organic product that has undergone pasteurisation but is relatively immature and lacking in stability
PIRSA	Department of Primary Industries and Resources South Australia
Quarantine waste	Quarantine waste means material or goods of quarantine concern as determined by the Australian Quarantine and Inspection Service (AQIS) and which is subject to and or identified under Commonwealth Legislation *(Quarantine Act 1908)* and associated regulations and proclamations
Sensitive use	As defined in section 3(1) of the *Environment Protection Act 1993*, sensitive use means – a use for residential purposes; or b use for a pre-school within the meaning of the *Development Regulations 1993;* or c use for a primary school; or d use of a kind prescribed by regulation.
Source separation	Physical sorting of the waste at the point of generation into specific components suitable for resource recovery from the residual component
Stormwater	Means rain or melted precipitation that runs off land or structures on land
Structural integrity	The ease in which the feedstock will break down during the compost process
Surface waters	Means (a) marine waters; and (b) all other waters in the state other than underground water
Waste	As defined in section 3(1) of the *Environment Protection Act 1993***,** waste means– – any discarded, rejected, abandoned, unwanted or surplus matter, whether or not intended fro sale or for recycling, reprocessing, recovery or purification by a separate operation from that which produced the matter; or – anything declared by regulation (after consultation under section 5A) or by an environment protection policy to be waste, whether of value or not.
Wastewater	As defined in clause 3(1) of the *Environment Protection (Water) Quality Policy 2003***,** wastewater means waste principally consisting of water, and includes wash down water, cooling water, effluent, irrigation run off and contaminated stormwater.
Wastewater management system	As defined in clause 3(1) of the *Environment Protection (Water) Quality Policy 2003***,** wastewater management system is a system designated and operated for the purpose of collecting and managing waste water so as to minimise any adverse impacts of the waste water on the environment.
Water Quality Policy	*Environmental Protection (Water Quality) Policy 2003*

1 Introduction

Composting is the *controlled process whereby compostable organic wastes are pasteurised and micorbiologically transformed under aerobic and thermophilic conditions for a period not less than six weeks, including the pasteurisation phase*[1]. The composting process is one in which micro-organisms (and small animals) break down plant material and similar organic matter to produce a humus-like final material, in conjunction with carbon dioxide, water and heat.

The conduct of composting works is a prescribed activity of environmental significance for the purposes of clause 6(3) of Schedule 1 of the *Environment Protection Act 1993* (the EP Act). Composting works that produce, or are capable of producing in excess of 200 tonne of mushroom or other compost per annum require a licence in accordance with section 36 of the Act.

The EPA supports the appropriate use of composting as an effective way to recover valuable resources from specific waste streams, which would otherwise be sent to landfill. In 2010–11 the composting industry diverted in excess of 637,000 tonnes of waste from landfill in South Australia[2] which supports South Australia's Waste Strategy 2011–15[3].

The benefits of the end-use application of compost include:

- building of soil carbon
- creation of biologically healthy soils
- application of compost reduces fluctuations in soil temperature
- increased water holding capacity of soil.

Purpose

This guideline relates to the conduct of a composting facility.

It sets out the EPA's expectations for the appropriate conduct of composting works in accordance with the EP Act. Compliance with this guideline will be relevant to the EPA's assessment of whether a person has complied with the EP Act (including environment protection policies).

Scope

This guideline applies to:

- the operators and managers of existing composting facilities who currently hold a licence in accordance with section 36 of the EP Act
- applications to extend or amend existing composting facilities that trigger development as defined under the *Development Act 1993* or as required by an existing condition of licence
- proposed composting facilities.

This guideline is applicable to composting operators, developers, planning authorities and regulatory bodies and provides guidance on site selection, development, operation and closure of composting facilities for responsible environmental management and requirements under the EP Act.

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1 Definition taken from EPA Guideline, *Waste definitions (2009).*

2 Figures obtained from ZeroWaste SA (ZWSA) Organics Industry Survey 2010–11.

3 South Australia's Waste Strategy 2011–15 has two objectives: (a) to maximise the useful life of materials through reuse and recycling and (b) to avoid and reduce waste. The overall aim of the strategy is to reduce waste to landfill by 35% by 2020 and reach a milestone of 25% reduction by 2014.

This guideline applies to the design, operation and closure of composting facilities incorporating the following production processes:

- open windrow
- mushroom substrate
- vermiculture[4].

This guideline does not apply to the following production processes:

- Bioremediation: see *Soil bioremediation* (EPA 2005).
- Biosolids: see *draft South Australian biosolids guideline for the safe handling and reuse of biosolids* (EPA 2007). Where biosolids are used as a feedstock in composting the requirements specified in the biosolid guideline will be applicable.
- Mulching, spread and shred applications of green waste, and the direct application of manure to land[5].

How the EPA will use this guideline

The EPA will use this guideline:

- as the basis for preparing comment or direction on development applications for proposed composting facilities under the Development Act 1993
- when making regulatory decisions under the EP Act relating to composting works.

This guideline recognises that existing and proposed composting facilities are each subject to a different suite of individual site-specific circumstances. The guideline sets the accepted standard for the design, construction, operation and closure of composting facilities. In applying the guideline, the EPA will take into account the specific facts surrounding the proposed or existing composting facility.

Use of this guideline by the EPA will assist in maintaining consistent minimum environmental standards appropriate for particular site circumstances.

Regulatory and technical basis for this guideline

The principal legislation addressing pollution in South Australia is the EP Act. This guideline has been developed to advise industry on how the EPA will seek to apply section 25 and mandatory provisions of environmental protection policies, in particular:

- section 25 – general environmental duty
  - which imposes a general environmental duty on all persons undertaking an activity that may pollute to take all reasonable and practicable measures to prevent or minimise any resulting environmental harm.
- section 10 – objects of the Act
  - to promote the principles of ecologically sustainable development, including avoiding, remedying or mitigating any adverse effects of activities on the environment
  - to require persons engaged in polluting activities to progressively make environmental improvements which improvements will increase in practicality through technological and economic developments.

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[4] In-vessel composting is not currently undertaken within SA. Where in-vessel composting is proposed to be undertaken within this state, approval by the EPA will be based on compliance with the requirements of this guideline (excluding section 3, design criteria)

[5] Although these activities fall outside the scope of this guideline, individuals must comply with the EP Act and relevant environment protection policies where they are directly applying a waste, such as chicken manure to land.

- breach of a mandatory provision of the *Environment Protection (Water Quality) Policy 2003*, including
  - section 24(2) which requires

  An operator of composting works to ensure that –

  a the premises incorporate a wastewater management system; and

  b the system is effectively operating in respect of any wastewater generated at the premises while the premises are being used as composting works; and

  c waste generated at the premises is not discharged –

  i into any waters; or

  ii onto land in a place from which it is reasonably likely to enter any waters (including by processes such as seepage or infiltration or carriage by wind, rain, sea spray or stormwater or by the rising of the water table).

This guideline has been developed following the review and consideration of existing legislative requirements and guidance documentation including:

- Australian Standard 4454–2012 Compost, soil conditioners and mulches
- Draft South Australian biosolid guideline for the safe handling and reuse of biosolids
- *Standard for the production and use of waste derived soil enhancer* (EPA 2010)
- Soil bioremediation
- *Guidelines for separation distances* (EPA 2007)
- *Composting and related organics processing facilities* (NSW EPA 2004)
- *Environmental Guidelines for composting and other organic recycling facilities* (VIC EPA 1996).

This review was undertaken to ensure that the implementation of this guideline is consistent with existing published legislative requirements and guidelines.

2 Siting of compost works

Objective

Composting facilities should be located so as to reduce the potential risks of adverse environmental impacts and offsite nuisance impacts.

Minimum expectations

The conduct of composting works has the potential to generate offsite nuisance impacts including dust, noise and odour. The type of feedstocks to be received, the composting process employed at a site, the scale of operation and site topography are some of the factors that can influence the generation of offsite nuisance.

Separation distances will be assessed during the planning stage[6] only and will not be retrospectively applied to existing licensed facilities.

Separation distances should be determined to provide a basic level of environmental protection for the surrounding areas and take into consideration impacts which may arise from time to time as a result of accidents, abnormal weather conditions and equipment breakdown.

Separation distances are not an alternative to appropriate onsite management practices.

The EPA recommends that the operation of composting facilities is avoided in the following locations:

- 1,000 m to land that is for sensitive use
- Within the floodplain known as the '1956 River Murray Floodplain' or any floodplain subject to flooding that occurs, on average, more than one in every 100 years
- Within the Mount Lofty Ranges Water Protection Area and the South East Water Protection Area as declared under Part 8 of the EP Act
- Within 100 m of a bank of a major watercourse (eg Murray, Torrens and Onkaparinga Rivers), or within 500 m of a high-water mark.

Greater separation distances may be necessary based on site-specific conditions, including the environmental risk of the proposed operation or the technologies and processes employed. The EPA may require odour modelling to be undertaken at the planning stage to assess the potential for offsite nuisance impacts where the separation distances are close to the recommended minimum.

Existing composting facilities should be protected from encroachment from new developments. In the absence of site-specific risk information an effective buffer is 1,000 m between new developments and composting facilities, measured from the outer boundary of the area licensed to undertake composting.

The separation distance should be measured from the boundary of the composting activity (including the wastewater lagoon) at the site to the nearest receptor (refer Figure 1).

[6] Development applications lodged and referred to the EPA under the Development Act 1993 and Development Regulations 2008.

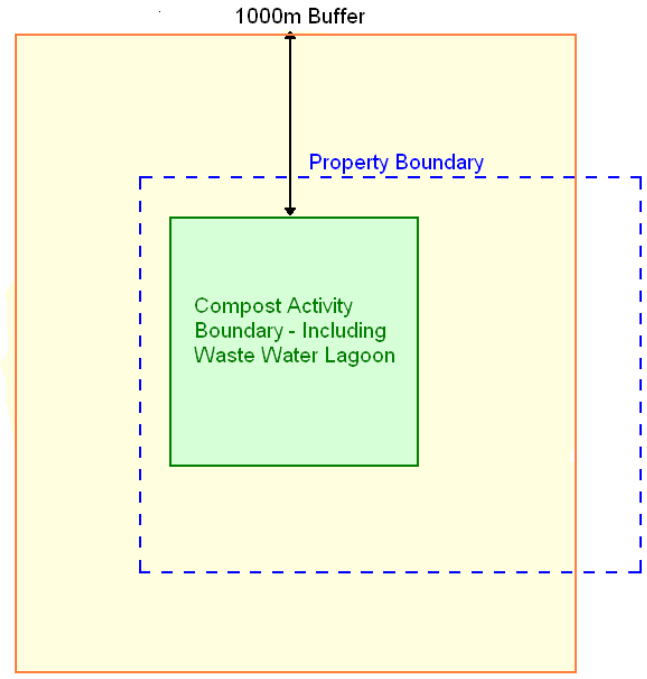

Figure 1 **Example of a 1,000-m separation distance from the active composting area of the site**

Further information regarding the siting of composting facilities can be obtained from Guidelines for separation distances.

3 Design of composting facilities

Windrow liner

Objective

Open windrow composting facilities should receive, store and process incoming feedstocks on a low permeability liner with a 2% minimum drainage gradient that directs wastewater to a leachate collection system. The liner should be constructed to minimise infiltration of leachate into the soil, subsoil, surface water and groundwater.

Finished compost product should be stored on a designated hardstand area that has a minimum 2% drainage gradient to direct the potentially nutrient rich runoff into a wastewater management system capable of removing the sediments and nutrients.

Minimum performance criteria for a compost liner are listed below. Please see Appendix 2 for the EPA's minimum design criteria.

Minimum expectations

1 The receipt, storage and processing of incoming feedstocks should be undertaken on a low permeability material such as compacted clay, asphalt or concrete over a sub-grade which is able to support, without sustained damage, the load of material on it and the load of any machinery used in the composting facility.

2 Technical specifications including design drawings, a Construction Quality Assurance Plan and Construction Management Plan should be submitted for assessment and approval by the EPA prior to commencing construction works.

3 A suitable protective layer should be maintained over the constructed liner so as to protect the constructed liner from damage as a result of day-to-day activities.

4 Prior to the use of the compost liner an As Constructed Report should be submitted to the EPA for assessment which details the requirements listed in Appendix 3.

5 The design of the compost facility should ensure access to all areas of the site irrespective of weather conditions.

6 The design and maintenance of a minimum 2% drainage gradient for all areas that receive, store and process feedstocks, and the orientation of windrows, to ensure the free drainage of leachate to a designated wastewater collection system.

7 Finished compost product should be stored on a designated hardstand area that has a minimum 2% drainage gradient to direct the potentially nutrient rich runoff[7] into a stormwater management system capable of removing sediments and nutrients.

8 A maintenance program should be implemented that is suitable to maintain the effective working condition of all working surfaces. Any compromise to the working surfaces identified should be repaired as soon as practicably possible. Records should be maintained of all inspection and repair work performed and made available to the EPA upon request.

[7] Finished compost product that has been processed in accordance with this guideline, and is ready for immediate sale, is not considered a waste. Therefore surface water that comes into contact with finished compost product is not considered leachate.

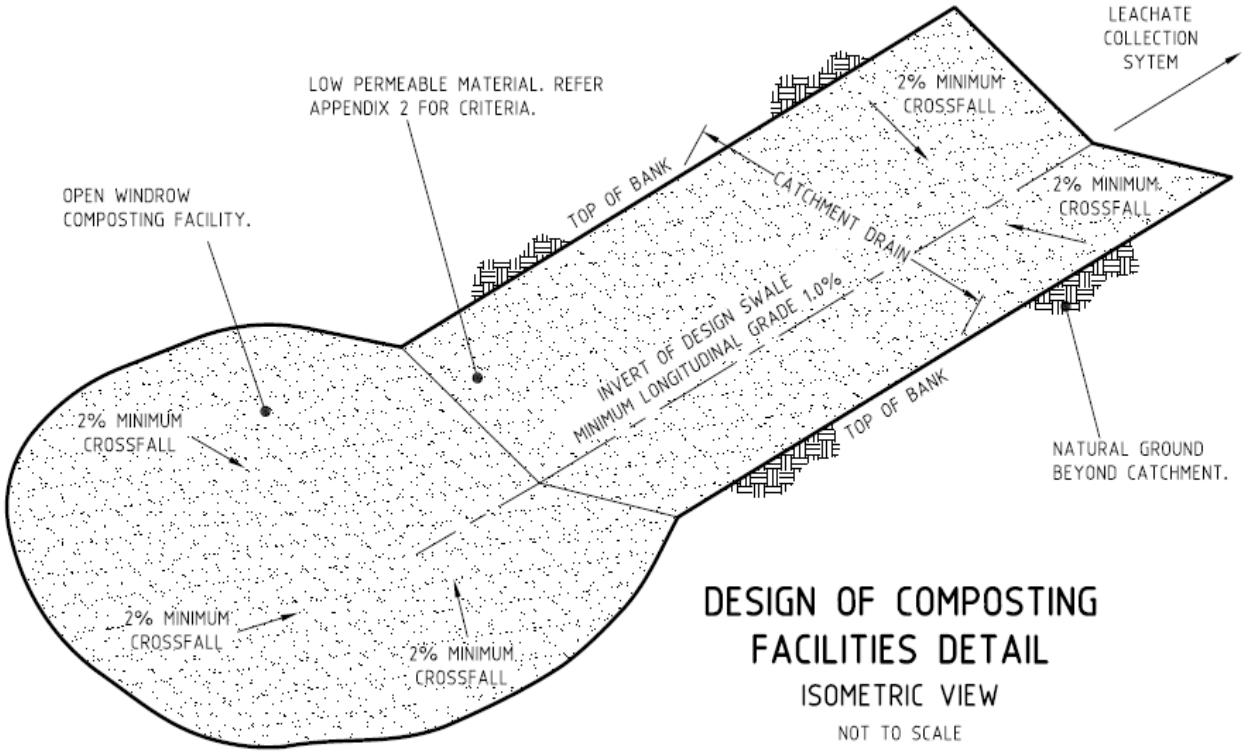

Figure 2 Design options for achieving drainage gradients

Design of wastewater management system[8]

Objective

Composting facilities must comply with clause 24 of the Environment Protection (Water Quality) Policy 2010. It is critical to design compost facilities to separate stormwater from wastewater (including leachate) management systems.

Minimum expectations

1 Wastewater from composting facilities is reasonably expected to contain elevated organics, nutrients, and to a lesser degree salts, metals and microbiological organisms which need to be appropriately managed so as to prevent impacts to the soil, subsoil, surface and groundwater.

2 Design of the wastewater management system should include an assessment of the following factors:

- the maximum potential leachate generation
- rainfall, climate conditions including storm events
- sampling and inspection access
- ongoing maintenance, including an assessment of potential odour.

To assist composting facilities to meet the minimum design criteria for their wastewater lagoons the EPA has developed a risk assessment matrix (Appendix 4) and suggested construction and lining categories (Appendix 5) so as to meet the general environmental duty and obligations under the Water Quality Policy.

[8] Wastewater management systems are designed to manage all leachate at the composting facility. This is different to the management of stormwater which is addressed under ‘Stormwater’ of this guideline.

Further information on the design and construction of wastewater lagoons can be obtained from draft guideline on wastewater lagoons.

Stormwater

Objective

Composting facilities should be designed to divert clean stormwater from pooling or draining towards areas where feedstocks and finished compost product are received, sorted, stored or processed.

Minimum expectations

1 Composting facilities should not have direct connection to stormwater systems.

2 Composting facilities should be designed to prevent clean stormwater from entering into areas where feestocks are received, stored and processed and areas where finished product is stored.

3 All stormwater which comes into contact with incoming feedstocks and compost windrows should be handled and treated as wastewater.

4 Composting facilities should have a separate stormwater management system which:

- is fit for purpose
- sized appropriately for site conditions
- suitably maintained.

5 Design criteria for the stormwater management system should consider:

- the 1–in–25 year recurrence interval
- 24-hour duration storm event for design of drainage features.

4 Incoming feedstocks

Objective

Incoming feedstocks should be categorised in accordance with Table 1. Feedstocks are classified on the level of potential risk they pose to the environment and/or human health. Composting facilities that use, or intend to use, higher risk feedstocks (Category B) should demonstrate compliance with the Standard for the production and use of waste derived soil enhancer.

Minimum expectations

Composting facilities should be managed to ensure:

- feedstocks are source segregated prior to receipt at the facility
- feedstocks have minimum physical inclusions and contamination
- feedstocks are categorised and managed in accordance with Table 1
- feestocks are not burnt at the premise
- written records are maintained for incoming feedstocks which include:
  - feedstocks characteristics
  - the quantities of each type of feedstock received at the premise
  - the source of each type of feedstock received at the premise
  - any contamination (physical and or chemical).
- Records are maintained and made available to the EPA upon request.

Table 1 Classification and management requirements for incoming feedstock

Category	Examples	Testing and quality assurance procedures	Acceptability
Category A	Includes green wastes, kerbside collected green waste (may include food waste), untreated timber, sawdust, pallets, branches, straw, peat, pulp, paper, cardboard, virgin soil, manures and sludges from primary production waste water management systems, sludges from food and agricultural processing wastewater management systems, wastes from preparation of meat and fish and other foods of animal origin, animal faeces, urine and manure, farmyard bedding, biosolids and	No requirement to test incoming feedsocks. Finished compost product should be tested in accordance with Table 2. Compost containing biosolids should be assigned a stabilisation and contamination grade in accordance with the Biosolids guideline for the safe handling and reuse of biosolids. Records should be maintained and made available to the EPA when requested.	Feedstocks should be incorporated into the windrow upon receipt at the compost site, (or if not practicable, within 48 hours of receipt) so as to avoid the generation of odour. Biosolids and/or unclassified sludges from sewage treatment works should be managed in accordance with the Biosolids guideline for the safe handling and reuse of biosolids. Street sweeping wastes and gross pollutant trap wastes that consist of material such as silt and sediments, and

Category	Examples	Testing and quality assurance procedures	Acceptability
	unclassified sludges from sewage treatment works.		from high-risk locations such as industrial areas, contaminated sites and surrounds or from the clean up of industrial or road accidents are not permitted.
Category B Mineral-based industrial residues	Including but not limited to mineral-based industrial waste; grease trap waste	Testing and product quality assurance will be required in accordance with the Standard for the production and use of waste derived soil enhancer. Records should be maintained and made available to the EPA when requested.	The feedstock must be homogenous and beneficial to the finished compost product. The feedstock need to be assessed in accordance with Type B WDSE as specified in section 5.3 of the Standard for the production and use of waste derived soil enhancer. Feedstocks should be actively managed upon receipt at the site so as to prevent the generation of odour and other nuisances.
Liquid waste As defined in Liquid waste classification test (EPA 2003)		Liquid wastes will fall into either Category A or B as specified in this table and the applicable QA processes will apply.	Feedstock should be received in a concrete bund, blended with suitable binding agents and incorporated into the compost windrow within 24 hours of receipt.
Prohibited wastes	Listed wastes (including products containing listed wastes), hazardous wastes, contaminated soil, non-biodegradable/non compostable plastic and medical waste.	NA	Incoming feedstock to be managed to identify, record and appropriately exclude any prohibited wastes. Prohibited wastes must be transported to a facility licensed to receive and/or dispose of that waste.

5 Quality assurance

Objective

Product quality assurance should be implemented to ensure that the composting processes are fit for purpose for the site's proposed use.

Minimum expectations

1 Compost facilities should be designed and operated to ensure that the whole mass of the windrow is subject to a minimum of three turns and the core temperature is maintained in excess of 55°C for three consecutive days to eliminate pathogens, weeds and seeds.

2 Where compost windrows contain biosolids and/or their sludges, the temperature should be maintained in excess of 55°C for 15 consecutive days and turned a minimum of five times.

Refer to the Biosolids guideline for the safe handling and reuse of biosolids for further information.

3 Manual and/or mechanical sorting is necessary for the removal of physical contaminants/inclusions such as litter, plastic, glass and stones.

4 Feedstock, oversized materials, screened contaminants and finished compost products should be stored in a separate designated area at the facility to avoid cross-contamination.

5 Residual waste and/or incoming feedstocks that are unsuitable for use in the composting process should be categorised in accordance with the *Current criteria for the classification of waste – including industrial and commercial waste (listed) and waste soil* (EPA 2010), prior to being removed offsite and transported to a suitably licensed facility to receive and/or dispose of that waste.

6 Finished compost product should be tested to demonstrate compliance with the criteria specified in Table 2.

Table 2 Contaminant testing for finished compost product[9]

Chemical contaminant	**Maximum concentration (mg/kg)**
Aldrin/dieldrin	0.02
Arsenic	20
Cadmium	1
Chromium	100
Copper	150
Lead	150
Mercury	1
Chemical contaminant	**Maximum concentration (mg/kg)**
Nickel	60
Zinc	300

[9] Testing criteria are taken from Australian Standard 4454–2012 (4th edition), Table 3.1(c) 'unrestricted use upper limits for chemical contaminants'.

Physical contaminant	% dry matter w/w
Glass, metal and rigid plastics	0.5
Plastics–light and flexible or film	0.05

7 Where composting facilities incorporate Category B feedstocks into their compost process, quality control processes should comply with sections 5.3 and 6 of the Standard for the production and use of waste derived soil enhancer.

8 Where biosolids are incorporated into the compost process, quality control processes should comply with the requirements of the Biosolids guideline for the safe handling and reuse of biosolids.

The EPA recommends that the following Australian Standards be adopted in setting environmental goals and quality parameters for compost products:

- *AS 4454–2012 Compost, soil conditioners and mulches*
- *AS4419–2003 Soils for landscaping and garden use*
- *AS 3743–2003 Potting mixes*
- *AS/NZS 5024 (INT)–2005 Potting mixes, composts and other matrices: examination for legionellae.*

6 Product Labelling

Objective

Compost should be appropriately labelled to ensure that a consumer is informed about the potential environmental and human health risks of the compost product.

Minimum expectations

1 Compost product should be protected to prevent contamination during transportation, handling and storage.

2 Compost products that are bagged should include an appropriate hazard warning which specifies the health risks, safety precautions, first aid and disposal requirements which are recommended for the compost product. The hazard warning should be appropriate to address the risks of compost which is made from organic materials and may contain living micro-organisms, including bacteria, fungi and protozoa.

3 Compost product that has total copper concentrations in excess of 60 mg/kg and less than 150 mg/kg should include a warning on the label which states that the product should not be used as a complete soil replacement or growing medium and specify the copper concentration. It should also state that copper may accumulate in soils and become harmful over time[10].

4 Compost product that has zinc concentrations in excess of 200 mg/kg and less than 300 mg/kg should include a warning on the label which states that the product should not be used as a complete soil replacement or growing medium and specify the zinc concentration. It should also state that zinc may accumulate in soils and become harmful over time[11].

5 Compost product should include information about recommended rates of application.

[10] See AS 4454–2012 section 5.3(h)

[11] See AS 4454–2012 section 5.3(h)

7 Environmental factors

Noise

Objective

The operator of a composting facility should manage and mitigate potential off site noise impacts in accordance with the EP Act and the *Environment Protection (Noise) Policy 2007* (Noise Policy).

The Noise Policy provides the legal framework for the assessment of noise issues. The level of acceptable noise generated from a compost facility will depend on a variety of factors, including but not limited to, the duration and level of the noise, time of day, zoning and proximity of sensitive receptors.

Minimum expectations

1 Composting facilities should be designed and operated so as to minimise offsite noise impacts.

2 Composting facilities should provide suitable separation distances around the facility and engineering or management controls for specific noise sources

3 Operating hours at composting facilities should be suited to the surrounding landuse

4 The conduct of a composting facility should not exceed the following limits at a noise affected premise as detailed in section 5 'Indicative noise levels' of the Noise Policy.

Table 3 Indicative noise limits

Zoning	Day (dBA)	Night (dBA)
General industry	65	65
Rural living	47	40
Residential	52	45
Rural industry	57	50
Light industry	57	50
Commercial	62	55
Special industry	70	60

5 Where a composting facility is located in a different zone to the sensitive receptor (ie industrial land and residential land, respectively) consideration to the predominant land use should be given when interpreting the indicative noise limits from the Noise Policy. Where there is no predominant land use, the mean of the respective noise limits shall be achieved[12].

[12] Refer to section 4(1)c) and 4(1)(b) of the Noise Policy.

Dust

Objective

The conduct of a composting facility should manage and mitigate offsite dust impacts so as to meet their general environmental duty as defined in section 25 of the EP Act.

Minimum expectations

1 Composting facilities should be designed and managed so as to reduce the generation of fugitive dust and airborne emissions.

2 All vehicle moving areas should be sealed so as to prevent the generation of dust. Where roads are not sealed measures should be implemented to reduce the generation of dust, including the use of water carts and restrictions to vehicle speed.

3 Vehicles that enter the productive areas of the site should exit the site via a wheel wash that is suitable of removing mud and other types of dirt from their tyres.

4 All vehicles transporting incoming feedstocks and finished compost product must be covered in accordance with section 14 of the Environment Protection (Waste to Resources) Policy 2010.

5 Stockpiles should be managed so as to prevent the occurrence of fire, and the generation of dust and or odour.

6 Where stockpiles are located within 5 m of the perimeter fence they should be maintained below the top of the fence.

7 Stockpiles should not be located within 2 m of the site boundary fence.

Further information on stockpile management can be obtained from the *Guideline for stockpile management: waste and waste derived product for recycling and reuse* (EPA 2010).

Odour

Objective

The operation of a compost facility should not exceed two odour units at the boundary of the premise so as to meet their general environmental duty as defined in section 25 of the EP Act.

Minimum expectations

Compost facilities should be designed and managed so as to:

- prevent pooling of stagnate leachate
- ensure windrows are aerated, either by forced aeration of static piles or timely regular turning of windrows
- maintain and monitor windrow temperatures to prevent the generation of anaerobic conditions
- ensure windrows are of a manageable size so that surface-to-volume ratios are maximised for passive aeration.

Vectors

Objective

Composting facilities should take all reasonable and practicable measures to prevent the attraction and harbourage of vermin so as to meet their general environmental duty as defined under section 25 of the EP Act.

Vectors are animals, insects or other organisms or carriers that carry weeds, organic materials and pathogens which need to be controlled for public health or aesthetic reasons.

Minimum expectations

Composting facilities should employ the following measures:

- frequent removal of waste contaminants, regular cleaning and maintenance of tipping areas, conveyor transfer points, stormwater and leachate ponds and sumps
- prevention of water pooling and stagnating
- control and minimisation of dust to reduce the migration of certain pathogens
- preventing access of vectors to rapidly biodegradable materials, through enclosure and appropriate storage conditions
- ensuring appropriate feedstock management including frequent turning and mixing, and minimised storage times

Litter

Objective

Composting facilities should take all reasonable and practicable measures to prevent litter escaping the premise and collect any litter that escapes from the premise on or before the close of each day's operation so as to meet their general environmental duty as defined under section 25 of the EP Act.

Minimum expectations

1 Litter generation and offsite migration should be minimised through selection of quality feedstocks, rejection of highly contaminated feedstocks, and litter control and collection programs in and around the facility, including all fences and approach roads.

2 Composting facilities should have a perimeter fence that is suitable for containing debris and dust on site.

3 Composting facilities should prevent unsightly conditions onsite and the migration of litter beyond the premises boundaries through:

   - appropriate feedstock quality assurance prior to receival onsite
   - regular inspection of incoming feedstocks, litter pick-up and cleaning of tipping floors, conveyor transfer points and of wheels of all vehicles leaving the site
   - covering all loads during transport of feedstocks and final product to and from the facility.

8 Records maintenance including environmental management plan

Objective

Composting facilities should maintain records relating to site activities that are capable of being audited and demonstrate compliance with all relevant sections of the EP Act, policies and guidelines so as to meet their general environmental duty as detailed under section 25.

Minimum expectations

1 Composting facilities should develop an environmental management plan which sets out the design, management and operation of the site including:

- site design and layout
- onsite processes
- management of feedstocks and compost product
- infrastructure and machinery
- leachate and stormwater management
- windrow and stockpile management
- odour, dust, noise, vermin and litter management
- product quality assurance and record keeping
- staff training
- complaints.

2 Composting facilities should review policies and procedures so that they are relevant and accurately reflect practices on site.

9 Closure of composting facilities

Objective

Upon cessation of the composting activity and prior to surrender of a licence, the site should be appropriately decommissioned to prevent an ongoing hazard to the environment, local amenity and/or health and safety of the people.

Division 6 of the EP Act outlines the requirements for the suspension, cancellation and surrender of environmental authorisations and includes a provision, as specified under section 56(2) which states:

a if satisfied that it is necessary for the protection or restoration of the environment–

i impose further conditions of the authorisation; and

ii approve the surrender of the authorisation on the holder of the authorisation satisfying the Authority that the conditions have been fulfilled or that satisfactory arrangements have been made for their fulfilment.

Minimum expectations

1 The licensee should remove all products, feedstocks, waste, bins and non-permanent infrastructure from the site upon closure.

2 The licensee should ensure that the final land surface controls erosion and protects local amenity regarding dust, odour, vectors and litter.

Appendix 1 Checklist

This self checklist has been developed for use by existing and potential composting facilities to help them understand their regulatory obligations and navigate through legislative requirements. It is recommended that the operation of a composting facility is reviewed on an annual basis against this checklist.

Regulatory outcome	Existing measures in place*	Guideline reference
Does your compost facility produce or is capable of producing in excess of 200 tonnes per annum of compost? *Ref: section 36 of the EP Act requires activities of environmental significance to hold an environmental authorisation. Section 6(3) Schedule 1 of the Act; Development Act 1993 (and Regulations 2008)*		Section 1: Introduction
Does your facility have a 1,000-metre separation to sensitive land uses? *Ref: section 25 general environmental duty and section 82 environmental nuisance*		Section 2: Siting of compost works Also refer to Guideline for Separation Distances
Does your compost facility have an effective pad liner to prevent harm to the soil and or groundwater? *Ref: part 2(8)(2)(e) Environmental Regulations 2008; section 25 general environmental duty*		Section 3
Does your compost facility have a wastewater lagoon designed to contain wastewater at the site? *Ref: section 24 Environment Protection (Water Quality) Policy; section 25 of the EP Act; part 2(8)(2)(e) Environmental Regulations 2008*		Section 3 Also refer to draft Lagoon Guidelines.

* Compost operator to summarise existing measures at facility.

Regulatory outcome	Existing measures in place*	Guideline reference
How does your compost facility manage stormwater? *Ref: section 25 of the EP Act; Part 5 section 40; and clauses 13 and 17 of the Environment Protection (Water Quality) Policy 2003*		Section 3 Stormwater pollution prevention code of practice for local, state and federal Government (EPA 1998)
Does your facility receive, or intend to receive: • agricultural based feedstocks • industrial based feedstocks • biosoilds and or their unclassified sludges? *Ref: section 25 of the EP Act*		Section 4 Industrial based feedstocks will need to demonstrate compliance with the Standard for the production and use of waste derived soil enhancer Biosolids and/or their unclassified sludges will need to be managed in accordance with the draft Biosolids guideline for the safe handling and reuse of biosolids
What quality control procedures and records do you maintain?		Sections 5 and 8
How does your compost facility manage offsite nuisance, including dust, odour, noise, vectors and litter? What abatement measures have you implemented? *Ref: sections 82 and 25 of the EP Act*		Section 7

* Compost operator to summarise existing measures at facility.

Appendix 2 Recommended design specifications for the construction of a compost liner

Medium	Clay	Asphalt/concrete
Protective layer	150 mm silty loam or other suitable material (k = 1.9 x 10^{-6} m/s)	N/A
Liner	• 300-mm thick compacted clay with a measured permeability of k<1x10^{-9} m/s, minimum 95% compaction or • 600-mm thick compacted clay with a measured permeability of K<1x10^{-8} m/s, minimum 95% compaction or • Other design that demonstrates equivalent performance (refer to Appendix 3) • Full time supervision by a suitably qualified consultant (refer to Appendix 3)	**Asphalt** 40 mm asphalt (0/11 grade) 100 mm asphalt (0/32 grade) **Concrete** Fine pour concrete top layer thickness to be based on quality requirements (wear, vehicle movements) 300-mm subgrade
Subgrade	300-mm subgrade prepared to ensure a stable platform for the maintenance of the liner integrity	300-mm subgrade prepared to ensure a stable platform for the maintenance of the liner integrity
Drainage	Minimum 2% drainage grades over the liner to the waste-water lagoon	
Maintenance	Inspection and repair of the liner system (including protective layer) on an as needs basis. Records should be maintained and made available to the EPA upon request. Any loss of integrity in the liner system should be repaired as soon as reasonably possible.	
Reporting	An 'As Constructed Report' should be submitted to the EPA for assessment and approval prior to commencement of operation and should include, as a minimum: • detailed design drawings • compliance with the Construction Quality Assurance Plan • compliance with the Construction Management Plan • isopatchyte survey with 10-m grid spacings.	

Appendix 3 'As Constructed Report' requirements

An 'As Constructed Report' should be submitted to the EPA for assessment and approval prior to use of the engineered liner. The following tests should form part of the 'As Constructed Report':

Item	Test method	Pre-qualification testing frequency	Frequency of field compliance testing	Acceptance criteria
Particle size distribution	AS 1289 3.6.1	3 per material source or one per 2,000 m^3		As provided below
Maximum particle size	AS 1289 3.6.1			40 mm
Particles passing 19-mm sieve	AS 1289 3.6.1			>90%
Particles passing 2.36-mm sieve	AS 1289 3.6.1			>70%
Particles passing 0.075-mm sieve	AS 1289 3.6.1			>30%
Atterberg limits	AS 1289 3.1.2, 3.2.1, 3.3.1, 3.4.1	3 per material source		As provided below
Permeability (remoulded)	AS 1289 6.7.3	2 tests per material source		≤1 x 10^{-9} m/sec (300-mm thick clay pad liner or ≤1 x 10^{-8} m/sec (600-mm thick clay pad liner or equivalent material)
Emerson class	AS 1289 3.8.1	1/2,000 m^3		Greater than or equal to 4
Calcium carbonate content	USEPA 6060B	1/2,000 m^3		<15%
Liquid limit	AS 1289 3.1.2			>30%
Linear shrinkage	ASS 1289 3.4.1			<8%
Dry density	AS 1289 5.1.1 or 1289 5.7.1		As provided in Table 8.1 of AS 3798–2007	Maximum not less than 95% MDD
Moisture content	AS 1289 5.1.1 or AS 1289 5.7.1		Same as for dry density testing	0% to +3% of the standard optimum moisture content (SOMC) or within a Hilf moisture variation of 0% to +3%

Item	Test method	Pre-qualification testing frequency	Frequency of field compliance testing	Acceptance criteria
Plasticity index	AS 1289 3.3.1			>10%
Permeability on undisturbed tube samples collected from the completed pad liner	AS 1289 6.7.3		2 tests per constructed pad liner	≤1 x 10^{-9} m/sec (300- mm thick clay pad liner or ≤ 1 x 10^{-8} m/sec (600 mm thick clay pad liner or equivalent material)

Appendix 4 Waste water risk assessment matrix

The EPA will publish an interactive Excel spreadsheet to calculate wastewater categories which will be available on the website.

Instructions: Select one category under each criteria by clicking 'Y' in the blue column opposite the category. Additional explanations are provided in Appendix 3. EPA officers could assist in completing the matrix provided the required information is supplied by the proponent.

SITE:

		Points	Yes/No	Score	Notes/Comments	Instructions
1	**Groundwater occurrence**					
1a	none	0				Select YES (Y) for the most appropriate scenario in blue cells
1b	confined	0.2				
1c	semi-confined	2				
1d	unconfined (covered)	6				
1e	unconfined	10				
2	**Aquifer type**					
2a	Clay or crystalline rock	0.25				Select YES (Y) for the most appropriate scenario in blue cells
2b	Silt, fractured rock or limestone	3.75				
2c	Sand,gravel or Fill	10				
3	**Minimum distance of groundwater from base of lagoon liner**					
3a	greater than 50m	0				Select YES (Y) for the most appropriate scenario in blue cells
3b	>20m to 50 m	0.1				
3c	>10m to 20 m	1				
3d	>5m to10 m	2				
3e	>2m to 5 m	6				
3f	2 m or less	10				
4	**Groundwater usage**					
4a	Not Likely	0.5				Select YES (Y) for the most appropriate scenario in blue cells
4b	Possible	2.5				
4c	Current	10				
5	**Groundwater salinity**					
5a	>10 000 mg/L	0				Select YES (Y) for the most appropriate scenario in blue cells
5b	>5000 to10000 mg/L	0.2				
5c	>1500 to 5000 mg/L	3				
5d	1500 mg/L or less	10				
6	**Nominal capacity of lagoon (excluding freeboard)**					
6a	Small (5ML or less)	0.2				Select YES (Y) for the most appropriate scenario in blue cells
6b	Medium (>5ML to 10ML)	1.2				
6c	Large (>10ML to 30 ML)	4.8				
6d	Very Large (>30ML)	10				
7	**Max lagoon water depth**					
7a	1m or less (evaporative)	0.2				Select YES (Y) for the most appropriate scenario in blue cells
7b	>1m to 3m (aerobic/facultative)	1.2				
7c	>3m to 6m (anaerobic)	4.8				
7d	deeper than 6m	10				
8	**Nature of wastewater (see Appendix 3A for definitions)**					
8a	contaminated stormwater	0.2				Select YES (Y) for the most appropriate scenario in blue cells
8b	treated wastewater	0.8				
8c	composting/landfill	4.2				
8d	organic/nutrient	4.2				
8e	reactive	6.4				
8f	hazardous	10				
			Rating			Select YES (Y) in the appropriate blue box if either of the scenarios in blue text apply
			Preliminary category			
	A. Is the lagoon located within 100m of a watercourse?					
	B. Is there potential groundwater that may intersect the base of lagoon liner?					
	RECOMMENDED CATEGORY					

EPA USE ONLY

FOR ASSESSOR: If result is not supported, notify officer (8204 2016)

Suggested Category and reasons:

ASSESSOR *(name and signature)* **:**

PEER REVIEWER *(name and signature* **):**

Category supported : _____ Date: _____

Appendix 5 Table of suggested construction and lining categories for wastewater lagoons

1 The EPA may consider approving an alternative lining technology or combination other than those suggested in this table provided the proponent can demonstrate that it would achieve a similar or better outcome than that prescribed under the relevant category.

2 High risk lagoons (eg those with large capacities or located in sensitive areas) may be required to submit an 'As Constructed Report' (ACR) as a condition of licence.

3 The EPA may consider approving a lower construction and lining category than the one determined from Appendix 3 if risk management measures are to be implemented with approval from the EPA.

	Ponds lined with clay materials		**Ponds lined with geomembrane materials**			
	Category 1	**Category 2**	**Category 3**	**Category 4**	**Category 5**	**Category 6**
Lining and quality assurance	**If clay is used** • Minimum 300-mm thick clay liner (or 2 layers with minimum of 150-mm compacted thickness each) • Clay materials should be of such quality to prevent infiltration of wastewater beyond the thickness of the liner **If GCL is used** • minimum 7-mm thick GCL. • 150 mm of sand cushion above the subgrade	**If clay is used** • Minimum 300-mm thick compacted clay liner with $k \leq 1x10^{-9}$ m/s* (or 2 layers with minimum of 150-mm compacted thickness each) • Construction Quality Assurance (CQA) Plan for clay lining that includes Level 1 supervision (in accordance with AS/NZS 3798–2007) unless other CQA measures are undertaken in accordance with AS 1289 and Appendix 4 with the approval of the EPA.	• 1-mm thick HDPE or greater# • Leakage detection required	• 1-mm thick HDPE or greater# • CQA Plan for HDPE placement • CQA Plan for subgrade preparation. • Leakage detection required	• Double HDPE lining (1-mm thick or greater for each liner) # with CQA plan for HDPE placement or • A combination of **HDPE liner** (1-mm thick or greater; with CQA Plan for HDPE placement as in category 4) and a **clay liner** (with CQA plan as in category 2) • CQA Plan for subgrade preparation	• Site generally not suitable for wastewater lagoon construction unless effective drainage control is put in place

	Ponds lined with clay materials		Ponds lined with geomembrane materials			
	Category 1	**Category 2**	**Category 3**	**Category 4**	**Category 5**	**Category 6**
		• CQA plan for subgrade preparation **If GCL is used:** • minimum 7-mm thick GCL • CQA plan for GCL placement • 150-mm sand cushion above the subgrade • CQA plan for subgrade preparation			• Leakage detection required	
Subgrade	Minimum 150-mm subgrade preparation to provide a sound and stable base for liner construction or installation. Subgrade preparation should include compaction until no rutting or pumping is observed. Workmanship should be supervised by a suitably qualified and experienced professional.					

* $1x10^{-9}$ m/s = 31.5 mm/year

\# Appropriate thickness of HDPE liner must be determined by the proponent's engineer/consultant based on wastewater characteristics, climatic factors and warranty considerations.