

Summary of submissions received during consultation on the draft Guidelines for Composting Works in South Australia (2007)

A total of 11 submissions were received during consultation on the 2007 draft of Guidelines for composting works in South Australia. Three submissions were received from industry, including licensees, four from consultants and four submissions from government.

Submissions received on each part of the guideline

Part	No of supporting submissions	No of opposing submissions	No of submissions seeking clarification
Introduction	–	–	5
Siting of composting works	–	–	–
Incoming feedstock management	2	2	2
Engineering design and implementation	2	4	8
Site layout and operation	–	–	1
Environmental management and monitoring	–	1	1
Decommissioning and rehabilitation	–	–	–
Appendix 1	–	–	–
Appendix 2	–	–	2
General comments on the guideline	–	2	4

General

The revised *Compost Guideline* is more succinct and simplified, outlining the minimum requirements for composting facilities to ensure they are operated in accordance with *Environmental Protection Act 1993* (EP Act) and related policies.

The compost industry is well established and recognised within South Australia which supports 34 licensed compost facilities. Where composting is undertaken in excess of 200 tonne per annum, the facility is required to be licensed in accordance with section 36 of the EP Act for Schedule 1, Prescribed activities of environmental significance.

Composting is a legitimate method of processing certain source separated waste into recognised products that have a ready available market. The compost guideline has been shaped and influenced by the submissions received earlier and is written to:

- ensure an adequate level of protection for both environmental and human health;
- ensure the consistent application of regulatory requirements throughout industry; and
- facilitate continued growth of the industry by providing clear regulatory requirements.

Since releasing the draft guideline for public comment in May 2007, the EPA has published the *Standard for the production and use of waste derived soil enhancer* (2010). The compost guideline must be read in conjunction with this standard where industrial and certain high-risk agricultural products are proposed to be utilised at a composting facility. The compost guideline will lead applicants and existing licensees to the appropriate reference.

In addition, the compost guideline should be read in accordance with other relevant standards and publications including:

- 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.

One comment requested the mandatory requirement to use transport certificates for cartage of compost feedstocks. The EPA has a system for recording the movement of certain wastes within South Australia. Waste tracking certificates apply to the transport, storage and disposal of listed wastes as described in Part B of Schedule 1 of the EP Act. Listed wastes are prohibited as feedstocks for compost and as such waste transport certificates are not applicable to the cartage of compost feedstocks.

Waste tracking forms record the movement of the following wastes:

- waste tyres
- intermediate landfill cover (contaminated soil)
- grease trap waste
- wool scouring waste
- water based paints
- waste oil
- oil/water mixtures

Grease trap and wool scouring wastes are two examples of feedstocks currently used in compost and their movement must be recorded in accordance with the requirements of the waste tracking forms. All other compost feedstocks currently fall outside the scope of tracking. The *Environment Protection (Waste to Resources) Policy 2010* (Waste EPP) Part 2, 'Waste management objective' includes provision for effective recording, monitoring and reporting with respect to waste transport, resource recovery and waste disposal. The requirements of the policy apply to all waste transporters.

Another comment stated that the guidelines were too onerous and if implemented there is the potential for an adverse impact on the smaller operators. The intent of the guideline is not to discriminate between small and large operators. The development of the guideline reflects a growing and diverging industry that needs to be effectively regulated through transparent requirements based on risk management practices.

Introduction

Concept	No of supporting submissions	No of opposing submissions	No of submissions seeking clarification
Scope	–	3	1
Objectives	–	1	–
Structure and content of the guideline	–	–	–
Establishing a composting works	–	1	2
Composting works classification	1	–	2

The complexity and necessity of the section on 'Establishing a composting works' was identified by one respondent. The EPA guideline, [Environmental Assessment Guides for Planners–Composting](#) (2007) and Planning SA guideline, [Guide for applicants: composting, organic fertiliser and soil conditioner works \(including some mushroom farms\)](#) [2007] detail the information required to be included in a development application for the conduct of a compost works. The revised compost guideline will refer individuals to these documents.

Several comments were received requesting development applications to be forwarded to Compost SA as the industry body, and Primary Industries and Resources SA (PIRSA) for the purpose of biosecurity considerations.

In relation to PIRSA being a referral agent for all compost applications, the EPA is a referral agency as specified in Schedule 8 Item 11 of the *Development Regulations 2008* and has the power to direct conditions of approval on development applications for compost works. The development application may also be referred to other agencies such as PIRSA, Department of Planning, Transport and Infrastructure (DPTI) and SA Health. The referral process is addressed in the Planning SA guideline as detailed above.

In relation to licence applications being forwarded to Compost SA, this is captured under section 39 of the EP Act which outlines the advertising process that the EPA must implement for all new licence applications. The EPA is satisfied that this process outlines the legislative requirements for notification of both the general public (including industry bodies) and adjacent landowners for new applications for environmental authorisations. This process provides a formal opportunity to provide comment.

One comment questioned the relevance of the first stated objective in the document: Explain the approval process for new sites. This issue has addressed above.

Comments were received requesting the draft guideline to include pasteurisation, spread and shred and raw manure applications because the green organics (compost) industry is unfairly regulated in comparison. The guideline has been developed to address requirements for activities that require an environmental authorisation as defined in Schedule 1, Part A 6(3) of the EP Act:

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.

The compost guideline has been developed for composting works and not the direct application of manures to land. In the Standard for the production and use of waste derived soil enhancer, 'Table 2–Guidance on use of solid and semi-solid organic wastes' does provide guidance on the direct application of manures to land. In addition, clause 17 of the *Environment Protection (Water Quality) Policy 2003* (Water Quality Policy) prohibits the discharge of listed pollutants, which includes waste, into any water or onto any land where it is reasonably likely to enter into waters.

One comment sought clarification about the expectations in relation to composting of biosolids. Compost that includes biosolids (or their sludges) as a feedstock must be processed and handled in accordance with the requirements outlined in the draft South Australian biosolids guideline for the safe handling and reuse of biosolids (2007) [Biosolid Guideline]. EPA approval must be granted in writing prior to the receipt of biosolids for the purpose of composting at a licensed compost facility.

Clarification was also sought in relation to the expectations for bioremediation. The EPA guideline, *Soil bioremediation (2005)* defines bioremediation as 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. Bioremediation is a targeted treatment process and is not considered the same as composting. The EPA classifies bioremediation as the conduct of a waste depot for the treatment of waste in accordance with section 3(3) of Schedule 1 of the EP Act.

A comment was received requesting the expansion on the section regarding composting works classification. Following review of this section the EPA noted that there were inconsistencies between the classification of a compost works and the suggested measures for liner systems and wastewater ponds, as detailed in Tables 3 and 4 of the draft composting guideline, respectively. The EPA has revised the technical specifications for the design of composting facilities.

There was a request to include definitions for moisture holding capacity and structural integrity of feedstock. Moisture holding capacity relates to the ability of the compost to absorb and hold water. Structural integrity of the feedstock relates to the ease in which the feedstock will break down during the compost process. The EPA has included these definitions in the revised guideline.

No comments were received in relation to the siting of compost works. However, the EPA *Guideline for separation distances* (2007) states that the recommended distance from sensitive land uses for composting activities is 1,000 metres, with weightings given to the surface roughness and terrain weighting factors for each site. The separation guideline is not intended for retrospective application and will not apply to existing composting operations. However it will be applicable to all new compost applications and applied during the development process.

Incoming feedstock management

Concept	No of supporting submissions	No of opposing submissions	No of submissions seeking clarification
Objectives	–	–	–
Incoming feedstock quality and selection	–	1	1
Carbon to nitrogen ration	–	–	–
Acceptability of feedstocks and contamination	–	2	–
Types of waste	1	1	–
Product quality assurance	–	2	1
Alternative methods of composting	–	–	–

The Standard for production and use of waste derived soil enhancer provides an appropriate framework to categorise compost feedstocks and therefore directs applicants and individuals to this guideline for a comprehensive overview of requirements.

The suitability of wastes for use as compost feedstocks will be assessed based on the following criteria:

- demonstration that the reuse is genuine and beneficial
- there is a current sustainable market available for the product
- must not cause harm to the environment or human health.

Refer to *Waste derived materials—guiding principles for determining approval processes and product standards* (2008).

Consistent with the standard, the EPA has produced the following table to categorise incoming compost feedstocks.

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	No requirement to test incoming feedstocks. 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 .	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

Category	Examples	Testing and quality assurance procedures	Acceptability
	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 unclassified sludges from sewage treatment works.	Records should be maintained and made available to the EPA when requested.	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 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.

Comments were received as to why painted timber is rejected as a feedstock. The EPA has excluded painted timbers as there is a risk that the paint may contain heavy metals, including lead and therefore introduce a contaminant into the compost process. The composting process does not break down heavy metals.

The compost guideline included a table proposing contamination limits for compost that was adopted from the Victorian EPA publication, *Environmental guidelines for composting and other organic recycling facilities* (1996). Several comments requested a review of the limit for zinc and copper.

Since the release of the draft compost guideline, the Australian Standard 4454: Compost, soil conditioners and mulches has been reviewed and includes contaminant limits for certain heavy metals. The EPA has adopted the same contamination limits from the AS 4454–2012.

One comment queried quality control processes and whether they extended to biosecurity issues. PIRSA should be consulted in relation to developing acceptable procedures to address biosecurity issues.

One comment sought clarification in relation to the handling of liquid and solid waste and whether they were required to be received in a concrete bay. The EPA requires liquid waste as defined by the guideline, *Liquid waste classification test* (2003) to be received in a concrete bund capable of containing the liquid. Where a feedstock is unable to be handled without first being stabilised by a bulking agent due to site-specific circumstances, the EPA will require it to be received in a concrete bund.

One comment requested the expansion of liquid wastes to explain their proper management and storage. Liquid wastes are typically highly odourous and therefore the EPA requires all liquid wastes to be blended with 24 hours with a suitable bulking agent prior to incorporation within the windrow. More specific requirements will be determined on a case by case basis depending on the quantity and type of liquid waste proposed to be used.

One comment sought clarification in relation to the requirement to assess and weigh incoming feedstocks and whether this necessitated a weighbridge. The EPA does not currently mandate the installation and use of weighbridges at composting facilities¹.

Engineering design and implementation

Concept	No of supporting submissions	No of opposing submissions	No of submissions seeking clarification
Objective	–	–	1
Required outcome	–	–	–
Key design factors	–	–	–
Suggested measures–Table 3 Liner design	–	3	3
Suggested measures–Table 4 Geotechnical parameters for ponds	–	1	3
Minimisation of biogas and odour emissions	–	–	–
Design specification, drawings and construction quality assurance	–	1	–

¹ Part 6 of *Environment Protection Regulations 2009* specify the requirements under which weighbridges are mandatory at waste depots that are licensed in accordance with section 3(3) of schedule 1 of the EP Act.

This section received 11 submissions and as a result has been revised to ensure that the following principles are met:

- 1 the primary design and operational outcome for the construction of a compost windrow pad should be to facilitate drainage of leachate and wastewater to a suitably constructed wastewater lagoon
- 2 the wastewater lagoon is the highest risk at a composting site as the windrow liner is designed to drain wastewater and leachate to this end point
- 3 the maintenance of the liner system is imperative to the ongoing performance of the liner system to both protect the liner and also act as an absorption layer to minimise leakage through the liner
- 4 the design options specified in the revised compost guideline must achieve an acceptable level of equivalence in terms of performance.

One comment suggested the EPA consult with other states in relation to their design requirements for liner systems to ensure consistency between states. The EPA reviewed the requirements specified by the Victorian and NSW EPA, and noted different approaches. NSW have recommended minimum design criteria for working systems, the working liner and the wastewater lagoon; whereas the Victoria guideline has specified outcomes to be achieved in relation to the design and operation of the compost facility. The revised design criteria in the compost guideline are consistent with NSW and Victoria.

One comment noted that no material properties were specified for constructed clay liners however the performance regarding hydraulic conductivity is specified. The EPA has revised the specifications to include pre-qualification and field compliance testing for all construction work, which incorporates material property tests.

Four comments questioned the classification for large compost facilities and sought an explanation as to where the information was derived from. The EPA has determined that the construction of a liner should not be determined by the quantity of feedstocks alone, as the type of feedstocks, climatic conditions and geological characteristics of a site are some of the risk aspects that should be considered in the construction of a site.

The revised compost guideline will require all licensed composting facilities to implement minimum design criteria that are suitable to minimise environmental harm. The compost guideline will draw on the specifications of the draft Wastewater lagoons² to determine the technical specifications for wastewater lagoons.

Three questioned the use of mulch or wood chips as a protective layer due to potential biosecurity issues. The protective layer should be designed to both protect the constructed liner and absorb moisture to minimise infiltration of leachate through the liner. The EPA has revised the specification for the protective layer accordingly. Where materials are proposed that may harbour a biosecurity issue the proponents will need to consult with PIRSA. The revised compost guideline specifies the outcome to be achieved by the protective layer only.

One comment stated that the purpose of the liner should not be restricted to protecting groundwater as it should also prevent contamination of the underlying soil. The design outcome of the liner and wastewater lagoon is to prevent contamination of surface waters, groundwater and soil during the operation and post-closure of composting facilities. The revised guideline has been amended to reflect this outcome.

Five comments were raised in relation to the requirements specified for construction quality assurance, including Level 1 supervision for clay construction works. The EPA has considered the financial implications of this requirement on industry and has revised its position to address industry concern while ensuring an adequate level of protection for the environment. The revised criteria require proponents to engage a suitably qualified consultant to undertake pre-qualification and field compliance testing in accordance with specified parameters for all construction works. It removes the requirement for engagement of a consultant under Level 1 supervision.

One comment stated opposition to the use of HDPE liners for wastewater lagoons as they are unable to be cleaned as with clay. The EPA notes that there are different maintenance requirements for clay and HDPE liners, however this should be accounted for in the day-to-day operation and maintenance of liner systems and not excluded as an option.

² The draft wastewater lagoon is currently being finalised and is anticipated to be released for consultation in late 2012.

Both clay and HDPE liners require ongoing maintenance and eventually replacement as they are finite in their functionality which will vary depending on site-specific circumstances.

One comment stated that the requirement for 600 mm compacted clay liner 10^{-9} m/s for large compost facilities is too onerous. The EPA has reassessed the construction requirements and undertaken modelling on constructed clay liners. The modelling was undertaken on two options:

- 300 mm 10^{-9} m/s
- 600 mm 10^{-8} m/s.

The modelling has demonstrated an acceptable level of equivalence and infiltration through the liner. The revised technical specifications for compost liners will reflect these specifications.

One comment stated that 1% drainage was sufficient. Where constructed clay surfaces are subject to daily works, including vehicle and machinery movement, the minimum drainage requirement is 2%. The modelling conducted on the two options for constructed clay liners was based on 2% drainage. Where drainage is reduced to 1% the day-to-day wear and tear from the operation of machinery and potential pooling of water increase the potential infiltration of water through the liner to unacceptable levels.

The revised technical specifications for the construction of compost liners are included in [Appendix 2](#) and 3.

Site layout and operation

Concept	No of supporting submissions	No of opposing submissions	No of submissions seeking clarification
Objectives	–	–	–
Required outcomes	–	–	–
Suggested measures	–	–	1
Feedstock management	–	–	–
Staff and training	–	–	–
Monitoring	–	–	–

One comment requested clarification for wheel washes to specify pressurised wheel washes. There are several types of wheel washes that can be employed for the purpose of washing vehicles exiting composting sites to prevent the movement of dust and mud off site. The EPA will consider the outcome required and the suitability of the proposed wheel wash when assessing a proposal.

Environmental management and monitoring

Concept	No of supporting submissions	No of opposing submissions	No of submissions seeking clarification
Objectives	–	–	–
Water quality protection	–	1	–
Air quality protection	–	1	1
Dust and other air quality issues management	–	–	–
Noise	–	–	–
Meteorological monitoring	–	–	–
Other environmental issues	–	–	–

One comment suggested including provision to capture on-site weather details, specifically wind speed and direction, to manage production activities to assist in responding to complaints. The EPA recommends the use of on-site weather stations and made reference to this in the meteorological monitoring section. The EPA recognises that on-site weather stations may not be necessary for all sites, particularly where there has not been any recorded complaints relating to off-site nuisance impacts and will not mandate such a requirement in the revised compost guideline.

One comment wanted to specify a maximum period for the storage of unprocessed feedstocks. The EPA has addressed this in the revised compost guideline and specified maximum periods for each category of feedstock which is based on an assessment of the potential risk to generate odour.

One comment raised concern in relation to the requirement to undertake groundwater monitoring at large composting sites. In the revised compost guideline the EPA does not distinguish between large and small composting facilities, and has removed the requirement to undertake mandatory monitoring at compost facilities.

Decommissioning and rehabilitation

Concept	No of supporting submissions	No of opposing submissions	No of submissions seeking clarification
Objectives	–	–	1
Suggested measures	–	–	–

One comment was received questioning the need for a chapter on post-decommissioning, stating that this would be classified as a contaminated site. Site contamination is defined in section 5B of the EP Act as:

- (1) For the purposes of this Act, site contamination exists at a site if—
 - (a) chemical substances are present on or below the surface of the site in concentrations above the background concentrations (if any); and
 - (b) the chemical substances have, at least in part, come to be present there as a result of an activity at the site or elsewhere; and
 - (c) the presence of the chemical substances in those concentrations has resulted in—

- (i) actual or potential harm to the health or safety of human beings that is not trivial, taking into account current or proposed land uses; or
- (ii) actual or potential harm to water that is not trivial; or
- (iii) other actual or potential environmental harm that is not trivial, taking into account current or proposed land uses.

The cessation of a scheduled activity, including the conduct of composting, does not necessarily result in a site be classified as contaminated³.

Prior to accepting closure, or surrender of a licence, the EPA will conduct a site inspection to identify any issues that need to be addressed on site. As an example this may include the removal of residual waste from the site to a facility licensed to receive that waste, securing the site and removing non permanent infrastructure. This process is separate to site contamination.

Appendices

Topics for inclusion in a compost environment management plan (CEMP)

No comments received on this section.

Glossary including acronyms

Two comments were received about the definitions needing to be cross referenced with other documents and guidelines within the EPA. *Waste Definitions* were updated in September 2009 and should be referenced for current waste definitions. The EPA will update existing licenses to reflect the current waste definitions.

³ Further information regarding site contamination can be obtained from the EPA website http://www.epa.sa.gov.au/environmental_info/site_contamination

Appendix 1 Recommended design specifications for the construction of a compost liner

Medium	Clay	Asphalt/concrete
Protective layer	150 mm silty loam or other suitable material ($k = 1.9 \times 10^{-6}$ m/s)	N/A
Liner	<ul style="list-style-type: none"> 300-mm thick compacted clay with a measured permeability of $k < 1 \times 10^{-9}$ m/s, minimum 95% compaction or 600-mm thick compacted clay with a measured permeability of $K < 1 \times 10^{-8}$ m/s, minimum 95% compaction or Other design that demonstrates equivalent performance (refer to Construction Quality Assurance and Testing Requirements) Full time supervision by a suitably qualified consultant (refer to Construction Quality Assurance and testing requirements) 	<p>Asphalt</p> <p>40 mm asphalt (0/11 grade) 100 mm asphalt (0/32 grade)</p> <p>Concrete</p> <p>Fine pour concrete top layer thickness to be based on quality requirements (wear, vehicle movements)</p> <p>300-mm subgrade</p>
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	<p>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:</p> <ul style="list-style-type: none"> detailed design drawings compliance with the Construction Quality Assurance Plan compliance with the Construction Management Plan isopachyte survey with 10-m grid spacings. 	

Appendix 2 'As Constructed Report' requirements

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 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
Particle size distribution	AS 1289 3.6.1	3 per material source or 2,000 m ³		As provided below
Maximum particle	AS 1289 3.6.1			40 mm

size				
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		$\leq 1 \times 10^{-9}$ m/sec (300-mm thick clay pad liner or $\leq 1 \times 10^{-8}$ 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%