

Specifications for compost blankets for erosion control

Introduction

This document is one of six specifications for the application of recycled organics in the following settings:

- 1. Horticulture**
- 2. Sporting fields and turf production**
- 3. Compost blankets for erosion control**
- 4. Biofilter establishment**
- 5. Pastures**
- 6. Landscaping.**

These specifications have incorporated the NSW Resource Recovery Orders (RROs) and Resource Recovery Exemptions (RREs) for compost and pasteurised garden organics which specify legal requirements in NSW under which it is permitted to use these recycled organic wastes on land. The conditions and limits stipulated in these regulations have been included. Note that the resource recovery orders and exemptions (RROs and RREs) only apply in NSW.

The basis of these specifications is Australian Standard AS 4454-2012 Composts, soil conditioners and mulches. This standard specifies the general physical and chemical characteristics of composted products that should be used as a minimum basis for selecting products. These specifications use AS4454 as the basis and recommend additional criteria where it is directly relevant to optimising performance.

These specifications provide guidance on the characteristics of composted recycled organics, and include information on:

- general characteristics and minimum acceptable contamination levels, for the six mentioned applications
- performance characteristics
- appropriate use and application recommendations.

These do not include specifications or details for other recycled organics products such as uncomposted manures, compost made with biosolids or solid or liquid food wastes.*

Compost specifications for compost blankets for erosion control

Composted mulch and compost soil conditioners can help reduce soil erosion. In a study conducted by the Department of Environment and Conservation NSW, compost-related erosion control methods physically protect soil from wind and rain, reduce runoff by 70-85% and reduce soil erosion by more than 90% on slopes up to 15%¹.

* Composts made with biosolids are managed under the Biosolids Order and have particular conditions that may not be suitable for use under the scope of these brochures.

1 Department of Environment & Climate Change NSW, Organics Fact Sheet: Reducing soil erosion with compost.

The most common form of compost-related erosion control methods is a compost blanket. A compost blanket is a layer of compost that is applied directly onto the soil. Often, seeds and plant additives are included to encourage vegetation growth which will become the main erosion prevention agent long-term. Some compost blanket products include a binder material to improve the compost adherence to the soil, especially before planting for to dense vegetation growth.

This specification is based on the specification developed by Hills Bark Blower and Penelope's Garden as part of the Specifying compost blanket use on new and existing NSW roadways project, funded through the NSW Environment Protection Authority Organics Market Development program.

General specifications

Composts that are intended to be used for erosion control in compost blankets should adhere to the criteria listed in the Compost Resource Recovery Order and Exemption and in AS4454.

The general product specifications for composts to be used in compost blanket applications are presented in Table 1.

Table 1 General product characteristics for compost used for compost blankets (Source: AS4454)

Characteristic	Unit	Target / typical range	Advice
pH _(1:5 water)	pH units	Range 5.5 – 8.0	If >8.0 determine total CaCO ₃ content
Electrical Conductivity (EC)	dS/m	< 6	High EC may limit application rates
Organic Carbon	% dry matter	15 - 25	Generally higher organic carbon is preferable for composts of equivalent maturity
Carbon: Nitrogen Ratio	(C:N)	Typically 10:1 – 25:1	C:N is typically higher for mulches used in orchards, lower for composts incorporated into soil in vegetable production

Acceptable contamination levels

Composts used in pastures should be as free as possible from all types of contamination. Acceptable contamination levels for compost for compost blankets must follow the maximum limits as set out in both the AS4454 and the NSW Compost RRO (Table 2). Compost not meeting the limits in Table 2 should be rejected due to possible environmental and human health risks. Most producers will supply a sample of their products if requested.

Table 2 Maximum acceptable level of contaminants for erosion control

Biological Contamination					
Plant Propagules		Unit	Recommendation		
Viable Plant Propagules		Number	Nil after 21 Days		
Vermicast Sieve Test		% Volume	Nil after 21 days for the fraction $\geq 90\%$ passing the 1.18 mm sieve		
Microbial Contaminant	Unit	AS4454 Limit ²		RRO Limit ³	
E. coli	MPN/g	–		<100	
Salmonella	cfu/g	Absent in 50g		Absent in 25g	
Faecal Coliforms	MPN/g	<1,000		<1,000	
Physical Contaminants					
Material		Unit	Recommended limit	AS4454 ⁴	
Glass, Metal and Rigid Plastic > 2mm		% dry matter (dm) (w/w)	≤ 0.25	≤ 0.5	
Plastic - light, flexible or film > 5mm		% dm (w/w)	≤ 0.025	≤ 0.05	
Stones and Lumps of Clay		% dm (w/w)	≤ 2.5	≤ 5	
Chemical Contaminants					
Heavy Metals	Unit	AS4454	Other Chemicals	Unit	AS4454
Arsenic	mg/kg	20	DDT/DDD/DDE	mg/kg	0.5
Cadmium	mg/kg	1	Aldrin	mg/kg	0.02
Boron	mg/kg	100	Dieldrin	mg/kg	0.02
Chromium	mg/kg	100	Chlordane	mg/kg	0.02
Copper	mg/kg	150	Heptachlor	mg/kg	0.02
Lead	mg/kg	100 ⁵	HCB	mg/kg	0.02
Mercury	mg/kg	1	Lindane	mg/kg	0.02

2 As specified in Australian Standard AS4454-2012

3 NSW Resource Recovery Order (RRO) 2016

4 Compost Order 2016 and the Pasteurised Garden Organics (PGO) order both require these limits for rows 1 and 2. PGO Order at: www.epa.nsw.gov.au

5 Note that this differs from AS4454 limit of 150mg/kg. Clause 43 of the Biosecurity Regulation 2017 sets 100mg/kg as the maximum allowed concentration for lead (Pb) in a fertiliser. Fertilisers include composts. Clause 44 of the Biosecurity Regulation 2017 also refers to label requirements on fertilisers that exceed 'trigger levels' for lead, cadmium and mercury of 20, 1 and 0.2mg/kg respectively. The label requirements advise that use of the product may result in the accumulation of those metals in the receiving soils. legislation.nsw.gov.au

Chemical Contaminants					
Nickel	mg/kg	60	BHC	mg/kg	0.02
Selenium	mg/kg	5	PCBs	mg/kg	0.2
Zinc	mg/kg	300			

Performance characteristics

For optimal performance, compost blanket products require additives in the form of:

- 1. Binder (e.g. Microblend⁶)** – usually made from natural ingredients that breakdown over time. This is a tackifier and enables the compost blanket to better adhere to a sloped surface. This is not necessary for effective erosion control⁷.
- 2. Cover crop seeds** – seeds of a cover crop as determined by local conditions, in most cases Japanese millet and rye is used or Native Seeds – a site-specific blend of native seeds.
- 3. Soil additives** – a site-specific blend of additives (e.g. lime, gypsum, water crystals, etc) usually based on soil laboratory test results from the site.

In most applications, providers of erosion control products such as compost blankets will adjust the composition of the compost to best suit the conditions of the site. These adjustments are usually made based on results from soil laboratory tests.

Compost maturity and stability

When applying erosion control products, such as compost blankets, it is particularly important that compost is properly composted and stable. Immature and unstable compost will deplete plant nutrients in the soil which will lead to less effective vegetation restoration. For compost-related erosion control methods where the compost is applied directly on top of the soil, it is highly recommended that only mature compost be used.

Table 3 below shows how AS4454 differentiates between composted and mature compost products using various technical measures of compost maturity:

- composted product must meet three of the criteria with at least one from Group A (Biological Activity) and one from Group B (Plant Growth)
- mature composts must meet four of the criteria with at least two from Group A (Biological Activity) and two from Group B (Plant Growth).

⁶ As used in the trademarked EcoBlanket product from Queensland provider Groundworks

⁷ E Charles Morris, *Comparison of Recycled Organic Compost Blankets with Hydromulch in Controlling Soil Erosion Under Simulated Rainfall*. The Department of Environment and Conservation NSW, 2007.

Table 3 Maturity criteria for composts

Parameter	Composted product	Mature compost
Group A - Biological Stability	Pass at least 1 out of 3	Pass at least 2 out of 4
Solvita® Maturity Index	≥ 5 or 6	≥ 7 or 8
Nitrogen Drawdown Index (NDI)	>0.2	> 0.5
Specific oxygen uptake rate (mg O ₂ /g BVS/hr) at 30°C	< 3	≤ 1
Carbon dioxide respiration (mg CO ₂ /g BVS/day) at 30°C	≤ 12	≤ 8
Dewar self-heating (°C)	≤ 20°C	≤ 10°C
Group B - Plant Growth Tests	Pass at least 1 out of 3	Pass at least 2 out of 4
Ammonium N (mg/kg)	< 200	< 100
Plant growth test (Bioassay)	Root length (mm)	> 60mm
	In-vitro germination and root elongation (% of control)	> 80%
	Seedling emergence (% of control)	emergence >80% vigour >85%
Ammonium to Nitrate ratio	< 3.0	< 0.5
Volatile Fatty Acids (moles/g dry mass)	< 1,000	< 200
NH ₃ volatile ammonia (gas) (ppm/4-hour test)	< 800 (≥ Solvita® 4)	< 100 (≥ Solvit ^{as} ® 5)

Use

Application process

In most cases, it is recommended that erosion control products are applied by licensed and trained professionals that specialise in their specific compost blanket products. The following steps outline the general steps that take place during such applications:

- 1. Site visit** – a site visit will first be conducted where measurements, photos, notes, and soil samples will be taken of the site.
- 2. Soil testing** – the soil samples will be sent to an accredited soil testing laboratory for analysis.
- 3. Amelioration of the compost blanket composition and seed selection** – composition of the compost, seed blend and soil additives will be adjusted based on results from the soil tests.
- 4. Site preparation** – weed infestations and their seeds must be removed from the site or rendered unviable before application of the compost blanket.
- 5. Application of compost blanket** – technicians will apply the compost blanket at the required depth, commonly through low-impact pneumatic blower trucks and other specialised equipment.
- 6. Aftercare** – the applicator will provide specific recommendations for aftercare based on their product.

Depth of application

Compost blankets need to be applied to an appropriate depth to be effective, however layers of the compost that are too thick may lead to further erosion especially if applied on heavy soil types that are prone to waterlogging. For products containing a binder (e.g. EcoBlanket), the recommended depth of application is 50mm on slopes of 1:2 or less. A 25mm blanket may be substituted, at the discretion of the Engineer, on slopes of 1:3 or less when the Isoerodent Factor (R Factor) for the project area does not exceed 120.

Additional application information

Additional guidance around use of compost for erosion control includes:

- composted mulches can be applied on soil surfaces around plants on slopes of up to 30%
- composted mulches should not touch plant stems to prevent stem rot
- it is recommended that erosion control products should be applied prior to rainfall season
- multiple compost-related erosion control products can be applied together to improve results.

Acknowledgements

MRA would like to acknowledge the authors of the original specifications that have been summarised in this report.

Disclaimer

This report has been prepared by MRA Consulting Group for NSW EPA. MRA (ABN 13 143 273 812) does not accept responsibility for any use of, or reliance on, the contents of this document by any third party.

Glossary

Terminology	Definition
AS 4454	Australian Standard 4454-2012: Composts, soil conditioners and mulches
EC	Electrical conductivity
NSW EPA	New South Wales Environment Protection Authority
RO	Recycled organics
RRE	Resource recovery exemption
RRO	Resource recovery order

NSW Environment Protection Authority

Email: info@epa.nsw.gov.au | Website: epa.nsw.gov.au

ISBN 978 1 922963 26 0 | EPA 2023P4448 | July 2023

The EPA **disclaimer** and **copyright** information is available on the EPA website.