

### 3 PLANT OPERATING CONDITIONS

Unless otherwise stated, the plant operating conditions were normal at the time of testing. See Advanced Composting Technologies of Australasia Pty Ltd's records for complete process conditions.

### 4 TEST METHODS

All sampling and analysis was performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

Parameter	Sampling Method	Uncertainty*	NATA Accredited	
			Sampling	Analysis
Temperature	ISO 10780	8%, 2%, 7%	✓	NA
Carbon dioxide	USEPA 3A	13%	✓	✓
Oxygen	USEPA 3A	13%	✓	✓
Odour flux	AS4323.4	Analyte specific	✓	✓
Hydrogen sulfide	Ektimo (ETC) 500	not specified	✗	✗

\* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

### 5 QUALITY ASSURANCE/ QUALITY CONTROL INFORMATION

Ektimo (EML) and Ektimo (ETC) are accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website [www.nata.com.au](http://www.nata.com.au).

Ektimo (EML) and Ektimo (ETC) are accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025. – General Requirements for the Competence of Testing and Calibration Laboratories. ISO/IEC 17025 requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Compliance Manager.

NATA is a member of APLAC (Asia Pacific Laboratory Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through the mutual recognition arrangements with both of these organisations, NATA accreditation is recognised world –wide.

A formal Quality Control program is in place at Ektimo to monitor analyses performed in the laboratory and sampling conducted in the field. The program is designed to check where appropriate; the sampling reproducibility, analytical method, accuracy, precision and the performance of the analyst. The Laboratory Manager is responsible for the administration and maintenance of this program.



## 6 DEFINITIONS

The following symbols and abbreviations may be used in this test report:

STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
VOC	Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
TOC	The sum of all compounds of carbon which contain at least one carbon to carbon bond, plus methane and its derivatives.
OU	The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).
PM <sub>2.5</sub>	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PM <sub>10</sub>	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
BSP	British standard pipe
NT	Not tested or results not required
NA	Not applicable
D <sub>50</sub>	'Cut size' of a cyclone defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. The D <sub>50</sub> method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D <sub>50</sub> of that cyclone and less than the D <sub>50</sub> of the preceding cyclone.
D	Duct diameter or equivalent duct diameter for rectangular ducts
<	Less than
>	Greater than
≥	Greater than or equal to
~	Approximately
CEM	Continuous Emission Monitoring
CEMS	Continuous Emission Monitoring System
DER	WA Department of Environment & Regulation
DECC	Department of Environment & Climate Change (NSW)
EPA	Environment Protection Authority
FTIR	Fourier Transform Infra Red
NATA	National Association of Testing Authorities
RATA	Relative Accuracy Test Audit
AS	Australian Standard
USEPA	United States Environmental Protection Agency
Vic EPA	Victorian Environment Protection Authority
ISC	Intersociety committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
APHA	American public health association, Standard Methods for the Examination of Water and Waste Water
CARB	Californian Air Resources Board
TM	Test Method
OM	Other approved method
CTM	Conditional test method
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
NIOSH	National Institute of Occupational Safety and Health
XRD	X-ray Diffractometry





## ACTA Composting Proposal Information Sheet

July 2019

PLANNING

10 JUL 2019

### Composting and Past Issues

Compost is formed when organic materials, such as leaves, grass trimmings, paper, wood, crop residue and animal manure, are broken down by various microorganisms, including bacteria and fungi. Natural composting occurs on a continuous basis in the natural environment. Organic matter is metabolized by microorganisms and consumed by invertebrates (e.g. worms). The resulting nutrients are returned to the soil to support plant growth.

Traditionally, composters have formed the organic material into windrows, or long piles. These piles have needed to be turned on a regular basis to ensure sufficient air is introduced into the pile. If this does not occur, then larger piles are likely to become anaerobic and produce hydrogen sulphide (rotten egg gas). A large anaerobic compost pile can generate significant off-site odours.

The problem with the turning process is that high levels of odour can be generated during the turning, as the piles are being disturbed. It becomes an even bigger odour problem if organic materials such as manure or animal remains are in the compost mix. The turning of partially rotted manure or animal carcasses can create an extremely high level of odour.



Above: Compost windrows and a small windrow turner in operation. Note the steam (and odour) rising off the pile as it is turned.

### What is ACTA's Process and How is it Different?

ACTA has developed its proprietary "ACTAvator" mixture which is mixed in with green waste (shredded leaves, wood bark, grass clippings and garden waste produced by local councils) and one of the waste streams (grease trap, abattoir waste or hatchery waste). A more detailed description of each waste type and where it comes from is given below.



These ingredients are placed in a sloping concrete ramp and mixed with a front end loader. The mixed material is placed on the composting area in an elongated pile and then covered with a layer of already composted material. This outer layer has been found to act as an insulating layer and keep in the heat. This improves the composting process and more effectively pasteurises the material (i.e. destroys any disease bearing organisms along with killing any seeds present in the mixture). This cover also reduces the odour from the pile. EPA officers have watched the mixing of several piles containing different wastes during the RD&D and carried out down wind observations during this phase. Their reports have confirmed the effectiveness of this covering in significantly reducing the odour (a more detailed discussion of odour is provided below).

The ACTAvator is made of a bi-product of the human food chain, the remains being a husk, berry, bran product, which is mixed with chicken manure. The use of the ACTAvator allows the piles to be left undisturbed for the approximately 10 week composting period. This differs from the classic composting process described above, as no turning of the pile occurs. This significantly reduces the odour from the piles and avoids partially composted organic wastes being exposed to the air.

As part of the RD&D, EPA required the food by-product used in the ACTAvator to be tested for a large number of chemical compounds and heavy metals to assess whether it contained any hazardous materials. Given this material is a produced during the processing of food destined for human consumption, this was unlikely. The laboratory testing conformed there were no hazardous materials present in the material used to produce the ACTAvator.

After the 10 week composting process, the material is moved to the screening area on the site, where it is passed through a rotary screen to remove sticks and clumps, to produce the final screened product for sale. Oversize compost like small sticks and clumps are put back into future piles and eventually break down.



Above: Front end loader forming a fresh compost pile during the ACTA RD&D





Above: Finished ACTA product after screening

#### **The Wastes to be Processed and What Currently Happens to Them**

The wastes to be used include:

- Green waste
- Chicken Manure
- Grease Trap Waste
- Abattoir Waste
- Hatchery Waste

**Green waste** is generated by local councils. This material consists of tree pruning undertaken by councils along with green waste curb-side collection from various townships. The material is normally chipped to produce the material used by councils on road reserves and municipal gardens. ACTA will be sourcing its green waste from Geelong City Council, which produces a significant amount of green waste. Councils tend to have an over supply of green waste and are often looking for organisations which can take this material. ACTA is currently holding discussions with Golden Plains Shire, which is based in Bannockburn to also use locally collected green waste.

**Chicken manure** is generated in significant quantities by the large number of chicken sheds located in the region surrounding the ACTA site. The chicken manure is often mixed with rice hulls or straw, which is placed in the shed floors as bedding material for the chickens (referred to as poultry litter). These sheds need to be cleaned regularly, which results in tens of thousands of cubic meters of this material stockpiled on sites in the region. The chicken litter and raw chicken manure is sold to local farmers who spread it across local paddocks. This practice is known to generate high levels of odour that can be detected several kilometres away, depending on the amount of material being spread and the weather conditions. The material is also unpasteurised and contains very high levels of E-coli along with salmonella.



**Grease trap waste** is sourced from restaurants, cafes, hotels and food outlets. A grease interceptor trap needs to be installed in these establishments to remove excess amounts of fats, oils and grease before wash water from kitchens can be discharged to sewer. These interceptors need to be periodically pumped out to remove the build up of grease. In Victoria, EPA waste regulations require all grease trap waste to be reused or recycled in some manner. It is therefore common for grease trap waste to be composted. The grease trap waste to be used by ACTA is collected in Geelong and surrounding areas.

**Abattoirs** generate a significant amount of waste material. Because this waste is still valuable to the abattoirs, it is rendered (placed in large enclosed cookers) to extract tallow. High quality tallow from fat and fatty tissue (edible tallow) is often used to make the better quality soaps, while lower quality tallow (inedible tallow) is often used in pet and animal feed (the smell from dog and cat biscuits is typically a tallow smell). At the end of the rendering process, the resulting sludge needs to be disposed of and is normally sent to landfill or for composting. The waste also includes wash down water. ACTA has received this waste from an abattoir located in Melbourne's outer west and is currently in discussions with other abattoirs closer to the composting site.

**Hatchery waste** consists of broken eggs, egg shells, dead chicks and wash water from the hatchery. All these wastes are normally deposited in a skip and taken to landfill. ACTA will receive this waste from Turi Foods located just south of Bannockburn.

The last three wastes (grease trap, abattoir and hatchery) are regulated by the EPA. They can only be transported by EPA licensed waste transporters and tracked using EPA's waste tracking system.

In summary, the various waste streams are either:

- an issue to council due to the large volume generated (green waste);
- are reused on surrounding farms, but pose an odour and health issue (chicken manure and poultry litter);
- need to be reused or recycled by EPA regulations (grease trap waste); or
- are sent to landfill and are a wasted resource (abattoir and hatchery waste).

Composting these materials will help to reduce the issues associated with the current practices and produce a valuable soil additive.

### **The RD&D Trial**

ACTA carried out its first small scale trial in the region in 2013. This consisted of single small piles on farmers properties (approximately 4 m diameter and 2 - 2.5 m high) to assess the effectiveness of the ACTA process to break down wastes such as hatchery waste, chicken manure and chicken carcasses. The trial was successful and observed by EPA and local council representatives. However, the EPA was concerned the small size of the trial would make it difficult to extrapolate to a larger commercial facility. Therefore, the RD&D was proposed, which EPA assessing officers suggested should be of a commercial scale.

The RD&D also specified a comprehensive testing program to assess the various waste streams, the activator and the final product to determine if there were any hazardous materials present and also if the final product passed the EPA composting requirements and the requirements set out in the Australian Standard for composting. The RD&D also required odour sampling and testing to be carried out for each wastes type shortly after mixing, 2 weeks after mixing and at the end of the composting process, in order to assess the change in odour emissions over the composting period. Down wind odour observations were also required at various stages of the composting cycle, such as during the mixing of the waste, activator and green waste and during the pile formation, to assess how far the downwind the odour could be detected. All sampling and testing personnel along with sampling procedures were EPA approved.



The testing found the finished product passed the requirements set out by the EPA and the Australian Standard and produced a soil additive which is pasteurised (i.e. free of disease and weeds) and beneficial to soils.

At the end of the trial, there was 6,000 - 6,500m<sup>3</sup> of finished product on the site. The current commercial proposal is to process 50,000m<sup>3</sup>/year of materials (combination of green waste, grease trap, hatchery and abattoir). A significant amount of the waste is water that will evaporate and the green waste tends to break down during composting. It has therefore been found that the initial volume decreases by approximately a third during the composting process. Hence, the site will produce approximately 34,000 m<sup>3</sup> of finished product per year. As the composting process takes about 10 weeks, there will be 5 composting cycles over a year. Therefore, the amount of material on site at any point in time (if all the material was fully composted) would be 34,000m<sup>3</sup>/year ÷ 5 cycles/year = 6,800m<sup>3</sup>. Therefore, the RD&D trial was of a very similar scale to the proposed commercial facility as required by EPA.

During the RD&D trial, there was one large front end loader in use and a part time operator. The commercial facility will also have only one large front end loader, but a full time operator. Therefore, only one operation could be carried out at a time during the RD&D phase and the same will be true during the commercial phase. Hence, the commercial phase cannot have multiple odour generating operations occurring at the same time and will be comparable to the RD&D operations.

#### **Odour Emissions and Odour Control**

One of the significant potential impacts which can occur from composting is off-site offensive odours. EPA therefore required ACTA to carry out odour testing of emissions to determine the amount of odour being generated by the composting processes. EPA also advised that in their experience, the majority of odour from a compost pile discharges from the top of the pile with lower odour coming from the sides and foot of the pile. Therefore, odour measurements were made at the top of the sample piles (on average, the piles were 20m long, 5m wide and 3m high). A number of downwind observations were also made of various operations (such as opening the pile and exposing freshly composted material) to determine how far downwind the odour could be detected and therefore how much odour was being emitted.

The above information was used to model the emissions from the site. A number of conservative assumptions were made during the modelling. For example, it is known the majority of the odour is emitted from the top of the piles and decreases as we move down the side of the pile. However, it is unclear how the odour varies across the pile. Therefore, it was assumed the odour measured at the top of the pile was occurring across the entire pile footprint. Also, it is known that when a pile of compost is moved, the odour is highest when it is first moved and decreases over time. However, how quickly the odour decreases was not known. Therefore, it was assumed that compost piles that had been moved and were awaiting screening had a constant odour that did not decrease.

There was concern that these conservative assumptions would result in an over estimation of the downwind odour predicted by the model. Therefore, a qualified and independent external odour expert was approved by the EPA to carry out downwind odour observations of various activities to determine how far the odour could actually be detected. This real world down wind monitoring served as a "reality-check" of the modelling results.

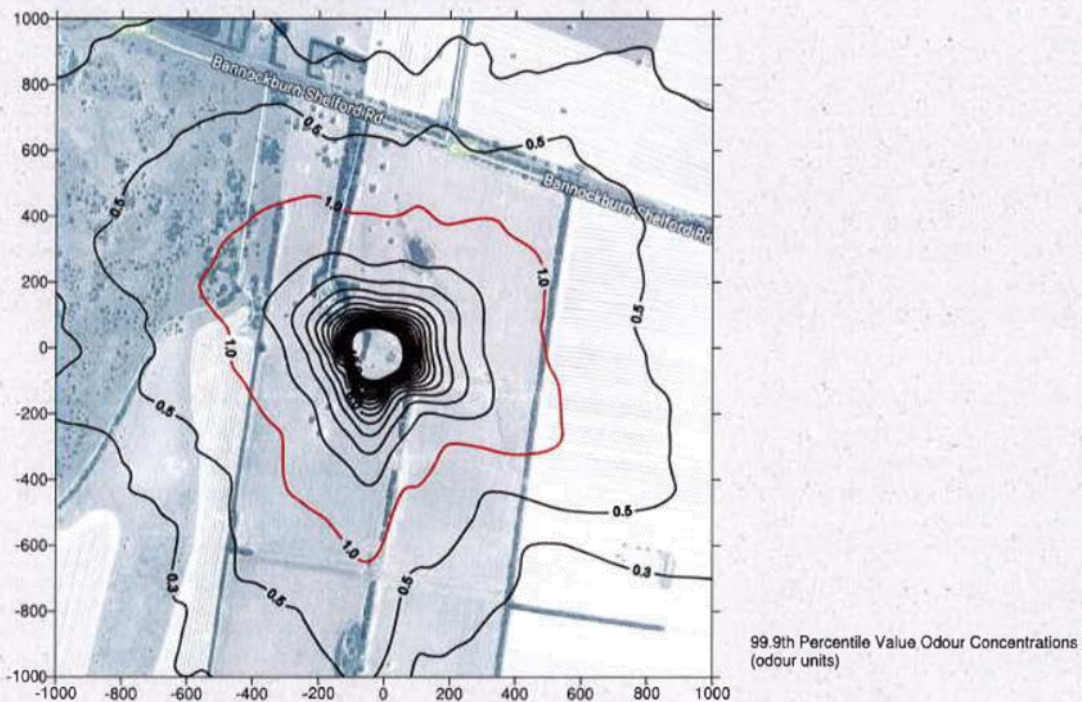
The downwind observations found that mixing of the waste material and moving of composted material on the site were the most odorous activity and could be detected up to 300m downwind. When no activities were occurring and the site was near capacity, the odour could only be detected 250 - 300m from the site boundary (Bannockburn-Shelford Road is over 600m from the site). Mixing and forming of each pile takes approximately 15 minutes, after which the odour decreased.



The real world observations were made during light wind conditions, which typically result in higher levels of downwind odour<sup>1</sup>. When these observations were compared to the model's predictions, it was found that the model was predicting downwind odours approximately double those actually observed. Due to the very conservative assumptions made during modelling, this is not surprising. It also supports the need to check model results against real world observations.

The modelling can still be used to view how the odours will spread around the site. In the modelling plot shown below, observations found that worst case odours could be just detected as far as the 2 odour unit contour (the contour just inside the red contour). Therefore, there is minimal risk of odours being detected beyond the site.

**ACTA Bannockburn Greenwaste Composting Odour Modelling  
2016 Meterological File**



In order to avoid odours being detected off-site, ACTA will need to ensure wastes brought onto the site are mixed immediately upon receipt. ACTA will also need to ensure that piles are formed and covered with already composted material as soon as possible to minimise odour. The site's wastewater pond will also need to be emptied regularly to prevent water becoming anaerobic and generating odorous hydrogen sulphide (rotten egg gas).

**Protection of Waterways and Groundwater**

The site will be sloped towards the wastewater pond, therefore any run-off will be retained on-site. In the event of a major and sustained rain event, the surrounding land slopes very slightly towards the south. The northern boundary of the site is surrounded by a soil mound. Therefore, any overland flow from the land to the north of the site will not be able to run onto the site due to the soil mound. A second mound will also be placed on the western boundary to prevent any run-off

<sup>1</sup> The odour emitted from a pile over short time periods is constant, therefore a higher wind speed results in a larger amount of air moving across the pile and diluting the odour more while a low wind speed results in a smaller amount of air moving across the pile and diluting the odour less, causing a higher downwind odour level



from entering the site. The ability of compost piles to absorb rainfall and release it through evaporation and emptying of the pond after rainfall (by using the water to irrigate compost piles) will avoid the risk of wastewater migrating from the facility.

The closest ephemeral creeks are Sandy Creek (1.5 km to the east) and Stony Creek (1km to the west). The closest creek holding water down slope of the site is Native Hut Creek approximately 3.5 km to the south. In all cases, water would need to flow across open ground, which means there would have to be a catastrophic failure of the wastewater pond for any wastewater to reach the creek.

The site is located on heavy clay. Clay liners are often used to contain contaminants due to its low permeability. Prior to the RD&D, a 4m excavation was made to investigate the depth of the clay. The underlying soil was found to be heavy clay which continued below the depth of the excavation.

A review of the Victorian Government's groundwater database found a number of coal investigation bores from the 1980s to over 200m depth. It also identified a number of groundwater investigation bores around the old Teesdale Tip 3.8 km NW of the site from the early 1990s that were 24m - 38m in depth. However, there was no groundwater depth or groundwater quality data available. Discussions with local farmers found they were unaware of anyone in the vicinity using groundwater.

In summary, investigations of the site have found there are at least several metres of clay underneath the site. Rainwater falling onto the site will be absorbed by the compost piles or drain to the site pond. The absence of standing water on the site and the prompt pumping out of the site pond, along with the underlying clay, will prevent any adverse impact on the groundwater, irrespective of its depth.

#### **The Location OR "Why Here?"**

In order to produce compost that farmers can afford, the product needs to be supplied at the lowest cost possible. Transportation is both a major environmental and financial cost to both waste companies and purchasers of compost

The current location is ideally sited as the raw materials are either local (chicken manure and hatchery waste), provided from nearby Geelong and surrounds (green waste and grease trap), or is far closer than its current disposal location (the abattoir waste currently is transported to Gippsland Water's facility at Dutson near Sale for composting – a 490 km round trip). The users of the finished compost are also local or close by, namely the various farms surrounding the composting site.

Locating the composting facility close to the raw material sources and the end users also significantly decreases the distance that heavy vehicles need to travel and the resultant impacts on the environment, community and infrastructure, as shown below:

##### **Hatchery waste:**

Currently disposed at Cleanaway landfill at Ravenhall. Round trip – 180km

Round trip to ACTA site – 22km

##### **Grease Trap:**

Currently disposed at Camperdown Compost. Round trip – 254km

Round trip to ACTA site – 62km



**Abattoir Waste:**

Currently disposed at Gippsland Water's facility at Dutton. Round trip – 490km  
Round trip to ACTA site – 164km

Chicken manure is transported and used by local farmers, therefore the transport distances for this material are similar. Also, the green waste from Geelong is sent to multiple users in and around Geelong. Therefore, the distance to the ACTA site compared to the current average distance may be similar or slightly larger. As discussed above, ACTA is attempting to source local green waste to reduce transport distances even further.

In summary, if one load of each waste type listed above is received at the ACTA site compared to where it is currently being disposed of, it will save in excess of 600km of heavy vehicle travel and all the associated impacts.

**Can the ACTA Process Spread Disease and Weeds?**

An issue that needs to be considered when using animal wastes and plant material to produce compost is the potential to spread diseases and weeds. The Victorian EPA composting guidelines and the Australian Standard for composting require very low levels of E-coli and no detectable levels of Salmonella and various other pathogens in the finished product. The Australian Standard also specifies that temperatures greater than 55°C for at least 3 days is sufficient to kill off the E-coli, Salmonella, pathogens and weeds, to produce a pasteurised material suitable for sale.

The RD&D required extensive temperature monitoring, with both continuous temperature monitors in the centre of the trial piles and daily manual temperature measurements at 0.3m and 1m depth in multiple locations around the pile. The results showed the temperature of the piles increased quickly to above 55°C and stayed well above this temperature for weeks.

Due to the unique nature of the ACTA process (static composting compared to the usual turned composting), the EPA also required samples to be taken from each trial pile and tested for E-coli, Salmonella, the target pathogens and weeds. The testing found the piles passed the EPA requirements and the requirements of the Australian Standard.

Based on the extensive monitoring and testing, it can be concluded that the final ACTA product is safe and has little if any potential to spread disease or weeds.

Another possible means of spreading disease is through vermin that might dig into the piles when freshly formed and carry away some portion of the untreated waste. The ACTA piles have been trialled in the area since 2013, commencing with the small scale piles on farmers properties'. The piles have been regularly inspected, especially during the RD&D where daily manual temperature measurements were required. At no stage was any excavating of the piles by vermin noted. It is unclear if this is due to the presence of the activator, the outer layer used to keep in the heat (which may mask any odour of the waste), or the temperatures, which increase very quickly (the piles are usually over 40°C within hours of the pile being formed).

If any vermin were noted in the future, an approved baiting program could be quickly implemented, as is done at other composting facilities.



# Designing, constructing and operating composting facilities



Environment Protection Authority Victoria

Publication 1588.1\* June 2017

\* This replaces publication 1588 issued March 2015

Guideline

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## Designing, constructing and operating composting facilities

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### 1. Introduction

#### 1.1. Scope and purpose of the guideline

The scope of this guideline is restricted to thermophilic, aerobic composting processes only. It does not cover the entire range of organic waste processing activities that are scheduled under A07 in the Environment Protection (Scheduled Premises) Regulations 2017. It does not cover vermiculture/vermicomposting, anaerobic digestion, dehydration or the composting of contaminated wastes for the purpose of bioremediation.<sup>1</sup>

This guideline provides information on thermophilic, aerobic composting operators' obligations under laws administered by the Environment Protection Authority Victoria (EPA) and provides suggestions on how to comply. Specifically it:

- provides composting operators with advice on how to design, construct and manage composting facilities in a manner that protects human health and the environment in Victoria
- will be used to inform EPA decision making for facilities that require research, design and demonstration approvals, works approvals and licences
- will be used by EPA as a guide for how premises could resolve issues of non-compliance.

#### 1.2. Legal status of the guideline

This guideline contains information and recommendations for meeting the legislative requirements for composting in the:

- Environment Protection Act 1970 (EP Act)
- State Environment Protection Policies (SEPPs)
- Environment Protection (Industrial Waste Resource) Regulations 2009 (IWR Regulations)
- Environment Protection (Scheduled Premises) Regulations 2017 (Scheduled Premises Regulations 2017).

The guideline itself is advisory only and is not the source of any mandatory legal requirements.

#### 1.3. How to use this guideline

If you are a composting operator:

- section 3 explains the legislative requirements under the EP Act and subordinate instruments
- sections 4 to 9 provide recommendations on how to meet the legislative requirements.

This guideline may also be used by planning authorities, EPA, the Victorian community, residential developers and others to understand EPA requirements and recommendations for new and existing composting facilities.

## 2. What is composting?

Composting is the microbiological transformation of organic materials under controlled aerobic conditions. There are two phases to the thermophilic composting process:

- pasteurisation which generates heat within the material to significantly reduce the number of viable pathogens and plant propagules
- maturation which sees the decline in microbial activity and an increase in biological stability of the organic material.

These phases are discussed further in section 7 below.

A combination of feedstock (organic wastes), siting and process factors determine the level of risk that composting facilities pose to the environment, human health and amenity. Best practice design and operation of facilities can minimise many of the potential impacts.

Australian Standard 4452: 2012 – Composts, Soil Conditioners and Mulches (AS 4454: 2012) is a voluntary standard for the production of composts, soil conditioners and mulches. The standard provides information on the composting process as well as product standards. This guideline has been informed by elements of the 2012 edition of the standard that relate to environment protection. If there are changes to these standards the most recent version of AS 4454 can be used by industry alongside this guideline.

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<sup>1</sup> More information on bioremediation is available in EPA Publication IWRG622.1 Soil Remediation Technologies in Victoria.



## Designing, constructing and operating composting facilities

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### 3. Legislative requirements for composting

#### 3.1. Environment Protection Act 1970

The EP Act establishes the powers, duties and functions of EPA and enables the issuing of works approvals, licences and permits. The Act also sets out 11 Principles of Environment Protection including, for example, the principle of the wastes hierarchy and the principle of integrated environmental management. The guideline Application of the Environment Protection Principles to EPA's Approvals Process (EPA Publication 1565) outlines how these principles should be considered in the context of works approval applications.

The EP Act also sets out provisions in relation to litter, which require that no litter leaves a site. Compost product leaving the site that has high levels of physical contamination (above recommended levels stated in section 8 of this guideline) could also be considered litter.

The EP Act also requires that industry not emit odours that are offensive to human beings, for example, in residential areas or public open spaces adjacent to a residential area. This is further defined in the SEPP (Air quality management).

#### 3.2. State environment protection policies

##### 1.1.1 Requirement for best practice

The SEPPs set out, among other things, requirements for industry including those for the best practice management of emissions and discharges to air, land, surface water or groundwater. Compliance with SEPP best practice is a legal requirement under the EP Act.

This guideline provides suggestions on how a thermophilic, aerobic composting facility can demonstrate best practice. The Demonstrating Best Practice Guideline (EPA publication 1517) provides details on how applicants can undertake their own assessment of best practice to demonstrate that their proposal meets the relevant requirements.

##### 1.1.2 SEPP (Waters of Victoria) (SEPP (WoV))

SEPP (WoV) states that:

- EPA will not approve a discharge where a discharge would pose an environmental risk to beneficial uses and where best environment practice has not been adopted (Clause 28(3)(c))
- chemicals including biocides, fertilisers, oil and fuel, other hazardous substances and prescribed industrial wastes need to be managed to minimise environmental risks to beneficial uses (Clause 37(1)).

##### 1.1.3 SEPP (Groundwaters of Victoria) (SEPP (GoV))

SEPP (GoV) states that an operator:

- must take all practicable measures to prevent pollution of groundwater
- must protect the beneficial use of the groundwater of the area
- may be required by EPA to conduct an assessment of groundwater quality to determine any existing groundwater contamination or any potential risk to groundwater quality and beneficial uses.

##### 1.1.4 SEPP (Prevention and Management of Contamination of Land) (SEPP (PMCL))

SEPP (PMCL) states that the beneficial uses of land protected by the policy are:

- (a) maintenance of natural ecosystems, modified ecosystems and highly modified ecosystems
- (b) human health
- (c) buildings and structures
- (d) aesthetics
- (e) production of food, flora and fibre.

There is the potential for these beneficial uses to be impacted by composting operations.

##### 1.1.5 SEPP (Air Quality Management) (SEPP (AQM))

SEPP (AQM) requires that all air emissions be controlled by the application of best practice (Clause 18(3)(c)).

For odour SEPP (AQM) requires that:

- emissions of mixed odorous substances need to be minimised and controlled to ensure that the beneficial uses of the environment are protected (Schedule A. 8)
- the odour detection threshold is met at and beyond the boundary (Schedule A. 8).



## Designing, constructing and operating composting facilities

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A facility can undertake a risk assessment if it believes it will contribute to a better understanding of the impact of the activities on the beneficial uses (defined in clause 9 of SEPP (AQM)). In addition, EPA may use the findings of a risk assessment in making statutory decisions or determining whether a generator of emissions complies with the policy (as stated in clause 16 of SEPP (AQM))

For dust SEPP (AQM) requires that:

- particles at PM<sub>10</sub> from point sources have a design criteria of equal to or less than 0.080 mg/m<sup>3</sup> (for composting this point source would primarily be the trommel)<sup>2</sup>.

Protocol for Environmental Management: Greenhouse Gas Emissions and Energy Efficiency in Industry

The Protocol for Environmental Management: Greenhouse Gas Emissions and Energy Efficiency in Industry (PEM) (EPA Publication 824) is an incorporated document under SEPP (AQM) and requires implementation of best practice with respect to greenhouse gas emissions and energy consumption. This means selecting and operating energy-efficient machinery for the process.

The PEM outlines:

- the steps that EPA requires works approval applicants to follow. They are:
  1. estimate energy consumption
  2. estimate direct greenhouse gas emissions
  3. identify and evaluate opportunities to reduce greenhouse gas emissions
  4. submit documentation that shows steps 1–3 in works approval application.
- how existing facilities can regularly review their greenhouse gas emissions
- the audit requirements for licence holders that use energy.

### 3.2.1. SEPP (Control of Noise from Commerce, Industry and Trade (SEPP (N-1)))

SEPP (N-1) requires noise emissions to not exceed the noise limits for the area. Noise limits are determined based on land use zoning using a method set out in SEPP (N-1). The policy also requires the quietest equipment available to be used where new or replacement equipment is being installed.

SEPP (N-1) does not apply to regional areas. Operations in these areas are managed through two noise guidelines:

- EPA Publication 1411 Noise from Industry in Regional Victoria (NIRV)
- EPA Publication 1413 Applying NIRV to Proposed and Existing Industry.

### 3.3. EPA approvals

The Environment Protection (Scheduled Premises) Regulations 2017 (Scheduled Premises Regulations 2017) prescribe the premises that are subject to works approval and/or licensing by EPA.

#### 1.1.6 Works approval and licensing

Applicants proposing to build a composting facility should complete EPA's works approval proposal form and pathway form<sup>3</sup>. This enables EPA to determine what level of assessment is required for the proposal and the most appropriate approval pathway. The different approval pathways for composting are:

- works approval and licence or
- research, development and demonstration approval.

EPA issues a licence following the construction of a facility in line with the works approval. A licence covers the operation of the site, and sets operating conditions, waste discharge limits and waste acceptance conditions, as appropriate. Licence conditions are consistent with the requirements of the EP Act, SEPPs and EPA regulations.

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<sup>2</sup> Gas volumes are expressed at 25°C and at an absolute pressure of one atmosphere 101.325 kPa

<sup>3</sup> For more information on the approvals processes and pathways available see EPA's Approvals proposal form and pathway guidelines, (EPA Publication 1560)



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The two types of premises in the Scheduled Premises Regulations 2017 that cover composting (and the triggers for when a works approval and licence are required) are:

- Organic waste processing (A07) – Premises on which organic waste is processed by aerobic or anaerobic biological conversion and which—(a) accept more than 100 tonnes or 200 cubic metres of organic waste in any month; or (b) accept more than 70 tonnes or 140 cubic metres of organic waste in any month and produce more than 50 tonnes of pasteurised material, compost or digestate in any month; or
- PIW management (A01) – Storage, treatment, reprocessing, containment or disposal facilities handling any prescribed industrial waste not generated at the premises (regardless of the size of the operation). Liquid waste is PIW as defined in IWR regulations.

Premises that process organic waste generated at the premises and retain the processed organic waste on the premises are exempt from works approval and licensing. The EP Act and SEPP requirements still apply for sites not requiring works approval and licensing.

A composter must apply for a works approval if they plan to accept organic waste that exceeds the thresholds outlined in the Scheduled Premises Regulations 2017. They must then apply for a licence to operate. These thresholds include accepting more than 100 tonnes (or 200 cubic metres) of organic waste in any given month. The 100 tonnes in any month cannot be averaged out over months. A composter would also trigger the threshold if they accepted 70 tonnes (or 140 cubic metres) and produced more than 50 tonnes of pasteurised material, compost or digestate in any month. This is regardless of whether onsite materials have been used to produce the 50 tonnes of pasteurised material, compost or digestate.

### 1.1.7 Research, development and demonstration

EPA may ask an applicant to gather more evidence on the operation to inform a works approval application. Research, development and demonstration (RD&D) approvals can be a mechanism to gather this information through a pilot program.

For example an RD&D would be important for composting operations to gather evidence when:

- the proposed pasteurisation method is not in line with the method outlined in section 7 of this guideline
- an applicant wants to process new feedstocks in an unproven technology
- data needs to be obtained to demonstrate compliance with SEPPs for the purpose of a works approval.

EPA will inform an applicant if the proposed facility requires an RD&D approval. More information on this process is available in EPA Publication 1369 Research, Development and Demonstration (RD&D) Approval Guidelines.

### 1.1.8 Adding new feedstocks

Where a licensed, operating composting facility seeks to accept and treat new feedstocks (for example, wastes suitable for composting that are currently not on the premises licence of a site), the operator must discuss their intentions with EPA and seek approval and a licence amendment, as outlined in section 3.3. The assessment of the risk will be based on the:

- change in volume of material processed
- type of composting operation and current licence category
- feedstocks already listed on the licence
- risk category associated with the new feedstock (see Table 4)
- impact of the new feedstock on the potential for odour generation
- current levels of compliance of the facility
- impact on the end product (see Section 8).

In some cases, it will be assessed that the new feedstock poses little risk of not meeting SEPP requirements and the licence can be amended to include the new waste. If that is not the case, the proponent will be advised whether an RD&D or a works approval should be sought. The applicant will need to demonstrate that the risks to the environment and human health are acceptable and that the process is capable of handling the additional feedstock and that it will have a beneficial impact on the product.

### 1.1.9 Fees

Scheduled facilities are required to pay an annual licence fee. The fee is based on the volume of waste accepted and/or produced by a premises per year. These are prescribed by the Environment Protection (Fees) Regulations 2012 (as amended by the Environment Protection (Scheduled Premises) Regulations 2017), and are outlined below in Table 1.



## Designing, constructing and operating composting facilities

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Table 1 – processing capacity and associated fee units

Acceptance and production thresholds	Fee <sup>4</sup>
accept up to 3600 tonnes or 7200 cubic metres of organic waste, or produce up to 1800 tonnes of pasteurised material, compost or digestate per year	140 fee units
accept more than 3600 and up to 12 000 tonnes or more than 7200 and up to 24 000 cubic metres of organic waste, or produce more than 1800 and up to 6000 tonnes of pasteurised material, compost or digestate, per year	297.5 fee units
accept more than 12 000 and up to 36 000 tonnes or more than 24 000 and up to 72 000 cubic metres of organic waste, or produce more than 6000 and up to 18 000 tonnes of pasteurised material, compost or digestate, per year	490.25 fee units
accept more than 36 000 tonnes or 72 000 cubic metres of organic waste, or produce more than 18 000 tonnes of pasteurised material, compost or digestate, per year	910.25 fee units

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<sup>4</sup> Current value of fee units can be found on EPA's website ([epa.vic.gov.au/our-work/compliance-and-enforcement/fees-and-penalties](http://epa.vic.gov.au/our-work/compliance-and-enforcement/fees-and-penalties))

## Designing, constructing and operating composting facilities

### 4. Location and siting

As composting facilities have the potential to impact human health, amenity and environment, location and siting are important factors that should be considered by both potential operators and planning authorities. This section provides guidance for determining location and siting of a facility. This guideline can also be used by local government when considering potential changes to land use near existing composting facilities. Note that this is guidance only: it does not guarantee that nearby sensitive land uses will not experience amenity impacts.

As part of the works approval assessment, EPA considers feedstocks, technology, meteorological and topographic factors and proximity to sensitive land use when determining suitability of a composting facility location. EPA recognises that the composting industry in Victoria is growing and new technologies are being investigated. This advancement in technology will lead to options for sites to be located in industrial zones with reduced buffer distances.

Composting facilities should not be situated on land liable to flooding and should be sited at least 100 metres from surface waters.

#### 4.1. Separation distances

'Separation distance' means the distance between the premises and the sensitive land use, for example, land used for a residential dwelling (other than a caretaker's house on industrial or commercial premises), hospitals, schools, caravan parks or other similar use involving the presence of individual people for extended periods). More information on separation distances can be found in EPA Publication 1518 Recommended Separation Distances for Industrial Residual Air Emissions.

Separation distances are required for composting facilities to protect sensitive land users being affected by odour generated in instances of upset conditions (for example, equipment failure, accidents or abnormal weather conditions).

While separation distances are a way to reduce impacts of odour emissions from upset conditions, they are not an alternative to preventing odour from occurring in the first place.

#### How to calculate your separation distances

1. Identify the differences between the proposed facility from the appropriate reference facility.
2. Identify:
  - a. appropriate method for calculating distance (section 4.1.3)
  - b. meteorology
  - c. topography.
3. Discuss the need for odour modelling with EPA.
4. Undertake odour modelling where necessary, covering all aspects of the process (for example, feedstock receipt, pre-treatment, turning/aeration and maturation) as well as the pathways for odour dispersion.

#### 1.1.10 Meteorology

The following meteorological factors, including the seasonal fluctuations, should be considered when selecting a location for a composting facility:

- rainfall
- hydraulic flow/liability of flooding
- wind strength and direction
- temperature.

#### 1.1.11 Topography

Analysis of the topography of the project area and surrounds helps to determine the potential pathways for the transportation of odour, noise and other impacts. For example, sensitive land uses that are located downslope in a drainage valley may increase the risk of odour impacts and would need to be taken into account in calculating an appropriate separation distance.



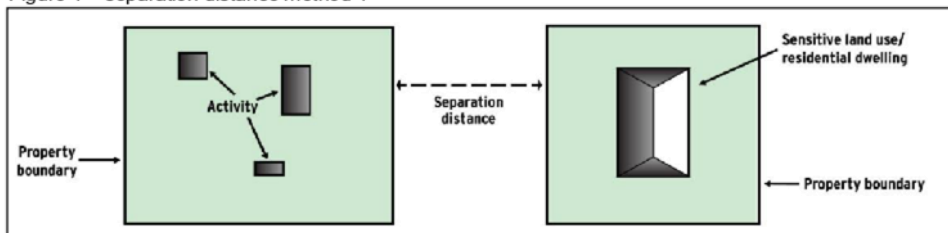
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1.1.12 Calculating separation distances

There are two acceptable methods for calculating a separation distance and a proponent should state which method has been used. Method 1 is generally the most appropriate, and if method 2 has been used, the proponent must provide the reason why this is appropriate.

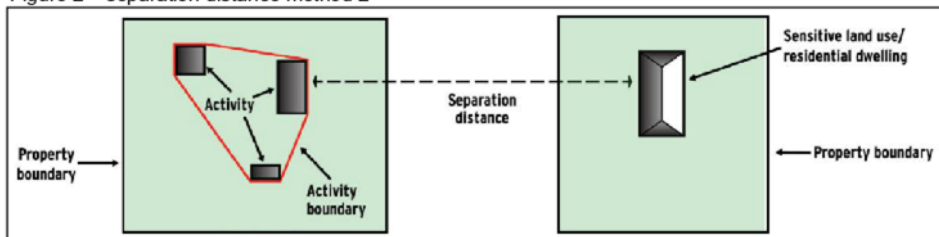
Normally, the separation distance should be measured from the boundary of the premises to the boundary of the sensitive land use (method 1) as per Figure 1. This gives the operator flexibility to relocate equipment and expand their operations within the premises. It also recognises the existence of multiple sensitive receptors within a sensitive land use zone and affords the maximum opportunity to develop any part of the zone without encroaching on the industry. It is appropriate to use the sensitive land use boundaries when there is no existing land use, for example, a property zoned residential with dwelling yet to be constructed.

Figure 1 – separation distance method 1



In some cases, for example, in sparsely populated areas, the separation distance can be measured from the activity boundary of the emission source to the sensitive receptors as per Figure 2. The activity boundary is an imaginary boundary that encloses all activities, plant, buildings or other sources from which residual emissions may arise.

Figure 2 – separation distance method 2



This method may be appropriate where there are only a few sensitive receptors, usually in rural settings, which are located outside of a sensitive land use zone and the activity area will not change. The distance required for odour dispersion should be within the property boundary of the facility.

A facility should site infrastructure within the premises to minimise potential impact on sensitive receptors. For example where the site is bounded by sensitive receptors on one or two sides then it would be advisable to locate the high impact process areas on the opposite side on the site. In addition, aspect, contour, and natural topography should be taken into consideration as these parameters may offer natural attenuation or if ignored, amplification of potential impacts.

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4.2. Examples of separation distances

The following two examples provide separation distances for two different types of facilities. The separation distances are based on feedstocks, process design and site capacity. Given the variation in composting facilities the recommended separation distances are only provided as a guide to protect against beneficial uses and upset conditions. Separation distances for both the reference facilities assume predominantly flat or slightly undulating topography and standard meteorology.

Table 2 – reference facility 1

Types of feedstock	Technology being used	Size of the plant	Recommended separation distance (metres)
Green waste Vegetable organics Grease inceptor trap waste	Open air receival	1,200 tonnes per annum	>300
		14,000 tonnes per annum	>500
	Enclosed aerobic composting with secondary odour capture and treatment equipment  Open air maturation	36,000 tonnes per annum	>800
		55,000 tonnes per annum	>1,000
		75,000 tonnes per annum	>1,200
		90,000 tonnes per annum	>1,400

Table 3 – reference facility 2

Types of feedstock	Technology being used	Size of the plant	Recommended separation distance (metres)
Green wastes	Open air receival	1,200 tonnes per annum	>600
		14,000 tonnes per annum	>1,100
	Open turned windrow Open air maturation	36,000 tonnes per annum	>2,000
		50,000 tonnes per annum	>2,000

Where a greater separation distance is not possible, the design should be upgraded or other controls applied to meet the separation distance available. For example, for reference facility 1 it might be assessed that the highest risk of odour is the open air receival and that if an enclosed receival area was developed the recommended separation distance could be reduced.



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### 5. Managing feedstock

The appropriate management of feedstock is an important part of protecting the environment, human health and amenity. The main factors that influence the risk associated with a particular feedstock are its potential to:

- generate offensive odours
- attract vermin and vectors
- generate harmful leachate, which could contaminate surface water, land and groundwater
- contain harmful pathogens
- contain plant pests and propagules.

These risks can lead to non-compliance with the SEPPs. For example harmful leachate could impact the beneficial uses protected in SEPP (WoV), SEPP (GoV) and SEPP (PMCL).

#### 5.1. Feedstock categories

The categorisation approach adopted by EPA ranks feedstock into four categories from lowest to highest potential risk of harm to human health and the environment.

Table 4 – feedstock categories

Category	Risk level	Waste types	Definitions and examples
1	Lowest	Garden and landscaping organics	Grass, leaves, plants, branches, tree trunks and tree stumps
		Untreated timber	Sawdust, shavings, timber offcuts, crates, pallets, wood packaging
		Natural organic fibrous organics	Peat, seed hulls/husks, straw, bagasse and other natural organic fibrous organics
2	Medium	Municipal source separated kerbside garden waste	Grass, leaves, plants, branches, tree trunks and tree stumps
		Biosolids and aged manure	Biosolids that meet treatment grades T1 to T3 <sup>5</sup> . Aged manure that has a dry matter greater than 35%
3	Medium to high	Dewatered sewage sludge and fresh manures	Dewatered sewage sludge (does not meet the T1 to T3 standards), animal manure and mixtures of animal manure and animal bedding organics
		Other natural or processed vegetable organics	Vegetables, fruits and seeds and processing wastes, winery, brewery and distillery wastes, food organics excluding organics in category 4
		Mixed source separated kerbside (Garden waste/food waste – FOGO)	Grass, leaves, plants, branches, tree trunks and stumps, vegetables, fruit and meat
		Grease interceptor trap wastes	Grease trap waste with less than 10% solids
4	Highest	Liquid organic wastes (excluding grease interceptor trap waste with less than 10% solids)	Liquid food waste and liquid food processing wastes (including sludges), liquid animal wastes (blood) and paunch (sludge), grease trap with greater than 10% solids
		Meat, fish and fatty foods	Animal mortalities, parts of carcasses, bone, fish and fatty processing or food

<sup>5</sup> As defined in EPA Guidelines for Biosolids Land Application (EPA Publication 943)

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### 5.2. Prescribed industrial waste feedstocks

Liquid organic wastes are prescribed industrial wastes (PIW) and are required to be transported in line with the EP Act and IWR Regulations. PIW can only be processed at a facility authorised by EPA to accept the wastes. Liquid organic waste would fall under one of the following waste codes:

- K100 – animal effluent and residues
- K120 – grease interceptor trap effluent
- K200 – food and beverage processing wastes, including animal and vegetable oils and derivatives.

PIWs that are not listed in the feedstock categories (Table 4) are not considered as appropriate for aerobic composting due to the increased risk to the environment and risks of dilution and impact on the final product. In some cases, the composting process can be used for bioremediation of some PIW provided tight controls are in place; this is out of the scope of this guideline.

### 5.3. Recommended technology types

The risks associated with specific categories of waste need to be managed throughout the composting operation, from its receipt through to the end product, including the wastewater generated. Table 5 specifies the recommended composting technology for each feedstock category. Operators need to ensure the feedstock they intend to use is appropriate for the chosen technology. The categories 2, 3 and 4 feedstocks should be processed as soon as practicable and the most odorous wastes should not be stored for more than 48 hours.

Table 5 below recommends technologies that are most appropriate for the four categories of waste so as to not breach SEPP requirements.

Table 5 – recommended feedstock to composting technology types

Feedstock category	Recommended technology requirements		
	Open environment	Enclosed or covered environment	Enclosed with secondary odour control
1: Lowest potential risk of harm to human health and the environment	Yes	Yes	Yes
2: Medium potential risk of harm to human health and the environment	Yes	Yes	Yes
3: Medium to high potential risk of harm to human health and environment	No	Yes	Yes
4: Highest potential risk of harm to human health and the environment	No	No	Yes

Open environment – Low risk wastes can be processed in open air composting methods where the process can be kept aerated. This may not be appropriate in locations where there are insufficient separation distances for upset conditions.

Enclosed or covered environment – Medium risk wastes can be processed in enclosed or covered systems that provide a level of engineered control through the enclosure, as well as a limited level of control over the odour emissions.

In different locations the requirements for enclosed and covered may vary. In some situations, covered environment can include material covers or an appropriate layer of mature compost.

Enclosed with secondary odour controls – Higher risk wastes require a higher level of engineered odour controls as process management alone is not sufficient to effectively minimise risks of odour impact. The most common type of secondary odour control for composting is biofilters.



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### 6. Recommendations for best practice design and operation

This section provides recommendations for the design and operation of composting facilities in order to meet the legislative requirements summarised in section 3. These are not mandatory requirements and an applicant can undertake their own best practice assessment to demonstrate compliance.

#### 6.1. Surface water, groundwater and land contamination

Composting can result in the contamination of groundwater, surface water and land when water that has come into contact with organic matter during any part of the composting operation (contact water<sup>6</sup>) escapes via seepage or run-off into the local environment. Contact water includes the contaminated stormwater and any run-off from the composting process. It also has a high biological oxygen demand, which can impact on freshwater ecosystems by reducing the available oxygen.

##### 1.1.13 Recommended design and operational measures

Unlicensed discharge of liquid waste or contact water from the composting facility to surface waters, groundwater or land is an offence under the EP Act. Water at a composting facility must be carefully managed, particularly from areas used for feedstock receipt and storage, feedstock pre-processing and mixing, processing (pasteurisation and maturation), post-screening and product storage.

Preventive infrastructure can include appropriately engineered:

- sealed surfaces for feedstock receipt, mixing and processing, and for product and other bulk materials storage
- liquid mixing pit, where excessively moist feedstock is mixed with drier feedstock to achieve the desired moisture content
- bunding and interception drains around the perimeter of the process and storage areas
- wastewater storage tanks or pond.

EPA may require groundwater monitoring bores to be established on premises, for example, when a site is accepting liquid organic wastes. These are used for assessing groundwater quality, including identifying any changes in groundwater quality.

##### Sealed surfaces

All process areas should be sealed using suitable, stable, low-permeability construction material, strong enough to support the weight of the composting material as well as movement of trucks and mobile equipment. Concrete is considered as best practice, however clay can also be appropriate if it meets required standards.

Where process areas are sealed using clay, the impermeable clay layer should:

- have a hydraulic conductivity of less than  $1 \times 10^{-9}$  m/s using both fresh water and 50,000 ppm NaCl solution. (Australian Standard (AS) 1289.6.7.1: 2001 Methods of Testing Soils for Engineering Purposes details how hydraulic conductivity testing should be performed<sup>7</sup>.)
- be covered with a suitable material to physically protect the clay from desiccation and subsequent cracking and from physical damage from composting activities, vehicle movements and removal (scraping) of compost mass during or after processing.

The surface of the process areas should be graded to carry surface run-off to collection drains. The grade should be between 2 and 4 per cent to provide sufficient fall and to avoid erosion from excessive flow rates. These areas should drain to the contact water collection system at the premises.

##### Liquid mixing pit

Liquid mixing pits are used to prevent contamination of surrounding soil and groundwater from liquid feedstocks or excessively moist feedstocks. They can also be a source of odour. The pits should:

- be completely impervious (for example, made of concrete with high-density polyethylene (HDPE) liner)
- have associated drainage infrastructure
- be fully bunded to prevent spillages from the mixing pits polluting nearby land or surface water.

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<sup>6</sup> Contact water is also referred to as leachate in other documentation on composting

<sup>7</sup> Best Practice Environmental Management Siting, Design, Operation and Rehabilitation of Landfills (EPA Publication 788.3)

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### Bunding and interception drains

Wastewater may be managed by separation, containment and reuse, or by disposal. The premises should be designed to separate surface water run-off from 'clean' stormwater catchment areas and contact water from 'process' areas. This separation can be achieved using strategically located cut-off drains, bunds (barriers) and water-sensitive design of the premises. For example a site could align process pads along contour lines so that water collected from clean areas automatically drains into a different storage area to that from process areas.

Where required, the premises should have bunding that enables all contact water to be collected and directed to storage points. Further guidance on bunding is available in Bunding Guidelines (EPA publication 347).

### Contact water storage

Contact water should be captured, pre-treated (for example, using a silt trap) and directed to a storage structure, such as a tank or pond that prevents pollution of the underlying land and groundwater. It can be reused during the early stages of the composting process but should not be added to the composting material after it has been pasteurised, as it may contaminate the material.

When designing a contact water flow and storage system, an operator should undertake a water balance calculation to determine how much contact water will be generated in a rainfall event. Overflow connection to sewer is advised for contingency management, with an appropriate trade waste agreement from the local water corporation.

The storage structure should:

- be sufficient in capacity to accommodate run-off from the total process area resulting from a one-in-20-year storm event
- have sufficient built-in redundant capacity to accommodate contact water during periods of persistent rainfall, and when process needs are low
- be lined to provide a hydraulic conductivity of less than  $1 \times 10^{-9}$  m/s using both fresh water and 50,000 ppm NaCl solution. Australian Standard (AS) 1289.6.7.1: 2001 details how hydraulic conductivity testing should be performed<sup>8</sup>
- maintain a minimum freeboard depth to protect against overtopping
- be maintained in an aerobic state in order to minimise the generation of odour from the nutrient-rich water.

In order to minimise the hydraulic load on the wastewater storage structure, the process area should, where practicable, be minimised to limit the volume of stormwater caught.

The operator of the composting facility needs to be able to demonstrate that the level of environmental protection provided by the wastewater catchment and storage infrastructure is sufficient to meet regulatory and licensing requirements.

### Clean stormwater capture and storage

EPA recommends clean stormwater is captured and stored for reuse onsite wherever possible (for example, for moisture adjustment of curing compost mass, firefighting, wheel washes, etc.). The catchment for clean stormwater may include roofs, private vehicle parking areas, administration and amenities areas and other areas in which potentially contaminating materials are absent. The surface of the 'clean' areas should be gravel or sealed to limit entrainment of sediment by the stormwater.

The storage infrastructure for the clean stormwater (for example, tank, pond) should have sufficient capacity to accommodate run-off.

## 6.2. Odour

A consequence of the uncontrolled breakdown of organic materials (for example, when decomposition occurs anaerobically) is the production of a wide range of odorous chemical compounds. Some of these compounds are highly odorous and extremely offensive to humans (for example, hydrogen sulfide), whilst others are perceived as reasonably benign. The odour compounds that are generated at composting premises can result in odour impacts beyond the boundary of the premises. Odour is one of the most common causes of community pollution reports relating to composting operations.

Odour can be generated from various sources on the premises, which can be separated into continuous odour sources and discontinuous (event) odour sources. The following are examples of potential odour sources:

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<sup>8</sup> Best Practice Environmental Management Siting, Design, Operation and Rehabilitation of Landfills (EPA Publication 788.3)



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### Continuous odour sources

- Raw organics: On receipt feedstocks can be odorous if they have begun to decay.
- Product: The stockpiling of the product can become odorous if it is not well managed.
- Composting process: Breakdown of organic material generates volatile organic compounds (VOCs). If the recipe and the process is well managed the VOCs are less offensive and less prevalent.
- Contact water and leachate: The storage of contact water can become especially odorous if it turns anaerobic.

### Discontinuous odour sources

- Machinery: Machinery and vehicles may become vectors for odour associated with material stuck to surfaces or wheels.
- Turning/aeration: Odour can be generated in the mixing and preparation phase as it breaks up any zones of anaerobic decay in raw feedstocks. The aeration of the organics being processed, either through aeration systems or turning, can be the peak odour generation point at the facility.
- Screening and movement of feedstock and compost.

#### 1.1.14 Recommended design and operational measures

The design and operation of a compost facility will affect odour emissions and whether it complies with SEPP (AQM) objectives.

The following are recommended measures compost facilities can use to meet the SEPP (AQM) requirements:

- fit and maintain appropriate odour control equipment
- develop and implement an odour management plan as part of an Environmental Management Plan (refer to section 9)
- create a balanced compost recipe that enables key parameters to be met for oxygen, temperature, carbon/nitrogen ratio and pH levels (refer to section 7)
- train staff to prepare and process material according to best practice.

### Odour control infrastructure

The requirement for odour control infrastructure is dependent on the feedstocks and technology being used by the facility. A review of best practice odour control equipment and a rationale for selecting specific equipment for a site should be included in a works approval application<sup>9</sup>.

- For enclosed facilities, odour control equipment such as biofiltration can be installed to filter the odorous components of the composting emissions.
- An open facility may need to enclose operations and build suitable odour control equipment to minimise odours if, once operating, the facility fails to meet SEPP (AQM) criteria.
- To reduce the risk of odour generation from the contact water collection pond, anaerobic conditions should be prevented.

### Odour management plan

The purpose of an odour management plan is to proactively reduce the potential for odour generation as well as to have a reactive plan for managing odour during upset conditions. An odour management plan may include the following:

- an inventory of all sources of odour
- odour sources and controls under normal conditions
- odour monitoring and recording regime
- odour management during upset conditions
- routine maintenance of odour control equipment (where installed).

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<sup>9</sup> Demonstrating Best Practice Guideline (EPA Publication 1517)

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### 6.3. Dust and bioaerosols

Bioaerosols are airborne particulates and/or water droplets that may contain bacteria, fungi and fungal spores, pathogens or other micro-organisms. Bioaerosols may be generated during the movement or agitation of materials at any stage of the operation. This is most likely to occur when dust is also produced.

Dust may be generated at composting sites:

- by movement of materials by front-end loaders and delivery trucks
- during storage, grinding, mixing and screening of feedstocks and products
- from the turning of composting materials (although this is less likely due to the normally high moisture content of compost – dust in this case, but can however indicate insufficient moisture content in the composting mass, which may require adjustment)
- from stockpiles.

#### 1.1.15 Recommended design and operational measures

Site layout should be designed to minimise generation and spread of dust. Once a site is operating there are several dust suppression activities that can be put into practice when needed, including:

- covering dusty materials or applying a light water spray
- enclosing fixed mechanical equipment used to process the raw and finished materials
- suction-sweeping machines to maintain dust-free sealed surfaces
- applying a light water spray before or during turning.

Excessive amounts of water for dust suppression should be avoided to prevent undue run-off or water-logging of the organic material, as this may increase the likelihood of anaerobic conditions.

Provided good management practices are followed, the concentration of bioaerosols in the neighbourhood and workplace should not increase significantly above background levels.

### 6.4. Animal and human health

Vermin, birds, water and wind can act as vectors to transport waste, weeds and/or pathogens offsite. This can be a potential risk to the environment, biosecurity, amenity and human health. Compost facilities can also act as habitats for populations of pests to proliferate.

Proper pasteurisation of the compost material is crucial in order to eliminate most of the human, animal and plant pathogens and plant propagules. Some spores and weed seeds may survive the compost process if the temperature/time relationship is not suitable and if the pasteurisation is not uniform.

Human and plant pathogens

Possible pathogens of concern are:

- viruses (for example; hepatitis, enteric viruses)
- bacteria (for example; faecal coliforms, Salmonella spp., Legionella, epidermal and respiratory pathogens)
- protozoa (Cryptosporidium, Giardia)
- helminths (parasitic worms; tapeworms, roundworms and flukes).

Weeds, weed seeds and plant propagules

Garden organics are likely to contain weeds, weed seeds or plant propagules. The spread of noxious weeds can have a negative impact on the environment as well as on human health. This can be a problem onsite as well as offsite if the organic waste has not been properly processed or has been recontaminated prior to leaving the premises.

#### 1.1.16 Recommended design and operational measures

To reduce the risk of pathogen transmission, the compost facility operator should ensure that:

1. every part of the material is effectively pasteurised
2. the product does not become recontaminated
3. appropriate quality assurance is conducted and required standards are met.

Best practices to avoid re-infection of the product include:

- separation of the feedstock and product handling equipment, vehicles and areas



## Designing, constructing and operating composting facilities

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- washing of machinery between use for handling untreated feedstock and compost product
- not applying contact water to composted material after it has gone through the heat treatment stages for pathogen control.

A compost facility operator should confirm pathogen reduction procedures by testing the compost for pathogens:

- at the start of production of each new product type
- every time there is a significant change in feedstock or processing procedures.

Compost derived from animal excreta or offal, unsegregated municipal solid waste, sewage sludge or other wastes with a high pathogen risk should be regularly tested for pathogen content. Compost derived from sewage sludge should be tested in line with the EPA Guidelines for Environmental Management – Biosolids Land Application (EPA Publication 943).

### 6.5. Noise

Noise nuisance from composting operations may arise from the use of both mobile and fixed machinery within the premises and from movements of transport vehicles servicing the premises.

#### 1.1.17 Recommended design and operational measures

Compost facilities may use the following measures to meet SEPP (N-1) requirements:

- select and maintain appropriate equipment for the facility
- fit and maintain appropriate mufflers on mobile equipment
- enclose noisy equipment
- provide noise attenuation screens where required
- develop and implement noise control strategies in the environmental management plan.

Noise impacts can also be reduced through management practices, including limiting the hours that a facility is operating. It may be necessary to avoid certain operations before 7 am and after 6 pm on weekdays, before 7 am and after 1 pm on Saturdays and throughout Sundays and public holidays.

Note that any changes to facility operating hours to reduce noise need to be consistent with existing planning permits, processing contracts and collection contracts held by councils.

### 6.6. Litter

Litter, from contamination of feedstock, vehicles entering or leaving the facility, or from other sources, can be wind-blown into the surrounding areas and can impact on the local amenity. Windblown litter must be prevented from leaving the premises. Any litter that does escape from the premises must be cleaned up immediately.

#### 1.1.18 Recommended design and operational measures

Composting premises should be suitably designed to prevent litter from leaving the premises, this can include fences and moveable litter screens combined with regular clean up of the premises.

To minimise the risk of litter being spread offsite, procedures for decontamination of feedstocks and other materials should be in place and any visible litter on vehicles should be removed prior to leaving the premises.

The environment management plan should include a plan to monitor and clean up any litter that moves offsite.

Any rejected material or residual waste should be stored appropriately and removed and disposed of in a timely manner so that it does not spread offsite and become litter. Disposal must be in accordance with requirements for the most offensive waste in the feedstock, or as otherwise agreed with EPA.

### 6.7. Greenhouse gas emissions

Greenhouse gas emissions at a composting facility are generated through:

- the use of machinery and vehicles onsite
- electricity used for forced aeration and automated systems.

#### 1.1.19 Recommended design and operational measures

The opportunities to reduce greenhouse gas emissions will be dependent on the type of composting technology being used and will include using efficient vehicles, machinery and technology.

EPA considers greenhouse gas emissions when assessing an application for a new composting facility.

## Designing, constructing and operating composting facilities

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### 6.8. Fire

Fire at composting operations can arise from a number of sources, including:

- spontaneous combustion occurring as a result of the piles overheating. Overheating can occur as a result of piles being made too high or restricted airflow through the pile
- a spark igniting the piles from cigarettes, lightning strikes, bushfires and potentially other activities occurring on the premises
- fragments and shards of glass acting like a magnifying lens.

Fire can pose a risk to the local air quality and human health, the facility and surrounding residential and industrial uses.

#### 1.1.20 Recommended design and operational measures

A fire contingency plan should be prepared for the composting operations. The plan should, at a minimum, identify the areas where a fire might occur, conditions that might lead to a fire and measures to prevent and control fires.

Appropriate fire control equipment and water supplies must be maintained at the premises. The appropriate fire authority should be consulted regarding facility layout, suitable fire prevention and control measures and to agree on a plan of action to be followed in the event of a fire.



## Designing, constructing and operating composting facilities

### 7. Composting process

The composting process is separated into two phases, pasteurisation and maturation. The two phases have different processing parameters. These are described in the following two sections.

#### 7.1. Pasteurisation

In the Scheduled Premises Regulations 2017, 'pasteurised material' is defined as organic material with reduced pathogens and plant propagules following exposure to heat.

Pasteurisation is an important part of the active composting phase during which the number of plant and animal pathogens (organisms responsible for diseases) and plant pests and propagules (viable regenerative plant materials or seeds) are significantly reduced.

This section outlines pasteurisation criteria that are important to facilitate effective pasteurisation which assists in achieving a minimum impact on the environment (odour generation, contamination of water etc.). EPA may use these criteria to provide advice to a compost facility (licensed or un-licensed) on how to minimise offsite impacts.

Table 6 – key processing parameters for pasteurisation

Processing parameters for pasteurisation	Ideal range or ratio	Description
Nutrient balance (carbon to nitrogen ratio)	25:1 and 35:1	The nutrient balance of primary interest in creating a blend for composting is the carbon to nitrogen ratio. Feedstock with high nitrogen content should be blended with a carbon-rich feedstock to provide a starting carbon to nitrogen ratio between 25:1 and 35:1. Low carbon to nitrogen ratios can lead to nitrogen levels surplus to the microbes' needs and will result in the release of odorous nitrogen to the atmosphere in the form of ammonia gas.
Total moisture	optimum level 45–60 %	Total moisture contents between 45 and 60 % are important for effective pathogen and weed control during the thermophilic stage of composting. Microbial activity virtually stops if the moisture content drops below about 30 %.
Oxygen content	>10 %	Aerobic composting requires a minimum oxygen concentration of 5 %, with an optimal concentration of around 10 %. The availability of oxygen in the composting pile is influenced by porosity, moisture content, bulk density, windrow size or bed depth and frequency of turning. A lack of oxygen will likely result in the release of odorous methane gas.
pH	between 6.5 and 8.0	Maintenance of the composting material at a relatively neutral pH (6.5 to 8.0) supports the required microbial activity and fosters more complete composting. A lower (more acidic) pH, coupled with anaerobic conditions, can foster an environment that is associated with production of odorous compounds such as sulfides, amines, ammonia, and volatile fatty acids. At a pH higher than 7.5, gaseous losses of ammonia are more likely to occur.
Porosity and bulk density	400 – 600 kg/m <sup>3</sup>	Porosity indicates the degree to which a feedstock is permeated with cavities or pores. This measure is usually expressed as per cent of the total volume, and ideally porosity in a composting mass should range between 45–65 %. Bulk density, on the other hand, describes the mass of matter per unit bulk matter. The ideal bulk density of composting material is 600 kg/m <sup>3</sup> . The bulk density and porosity of the feedstock have a great influence on oxygen availability. Anaerobic conditions are more likely to occur with low porosity and high-density feedstock. Piles should be made to between a height of 1.5 metres and 3 metres to minimise the effects of compression, yet enable the material to heat up sufficiently and also to allow oxygen to move throughout the pile.
Temperature	55°C–75°C	The temperature reached by the composting material influences the rate of decomposition and therefore oxygen demand, microbial population and overall propensity to generate odorous compounds. The desired pasteurising temperature range is from 55°C to 75°C.

## Designing, constructing and operating composting facilities

EPA has adopted the pasteurisation processes and parameters verified (and published) by the United States Environmental Protection Agency<sup>10</sup> and required as a process criteria in Australian Standard (AS) 4454: 2012 Composts, Soil Conditioners and Mulches.

Table 7 – Time/temperature ratio for pasteurisation

Process type	Type of wastes	Time/temperature ratio
Open windrow composting	Low-risk wastes	Appropriate turning of the windrow so that the whole mass is subjected to a minimum of three turns with the internal temperature reaching a minimum of 55°C for three consecutive days before each turn.
	High-risk wastes	The core of the compost mass shall be maintained at 55°C or higher for 15 days or longer, during which the windrow shall be turned a minimum of five times.
Enclosed composting	All wastes	The whole mass should be maintained at 55°C or higher for a minimum of three consecutive days. (To meet this, the material will need to be in the enclosed vessel for longer to ensure it gets to and maintains temperature.)

Scheduled composting operators may use demonstrated methods of pasteurisation or, alternatively, seek EPA approval to use practices that are not listed above. All composters are encouraged to follow these parameters or approved alternative processes.

### 1.1.21 Demonstrating pasteurisation

Pasteurisation is achieved when the feedstocks have been exposed to the appropriate time/temperature ratio and the product meets the standards in Table 8 below.

Table 8 – pathogen and plant propagules reduction performance standards for alternative methods of pasteurisation

Parameter	Standard
Enteric viruses <sup>11</sup>	<1 PFU per 10 grams total (dry weight)
Helminth ova ( <i>Ascaris</i> sp. and <i>Taenia</i> sp.)	<1 per 4 grams total dry solids
<i>E. coli</i>	<100 MPN per gram (dry weight)
Faecal coliforms <sup>12</sup>	<1,000 MPN per gram (dry weight)
<i>Salmonella</i> spp.	Absent in 50 grams of final product (dry weight)
Destruction of noxious weeds (viable plant materials and propagules)	Nil (germination) after 21 days incubation

MPN = most probable number. PFU = plaque-forming unit

## 7.2. Alternative processes of pasteurisation

Any proposed alternative method of pasteurisation should guarantee that the elimination of plant propagules and reduction of human and animal pathogen numbers meets the same level as the approved methods.

A proponent for an alternative method of pasteurisation should speak with EPA about demonstrating the process through an RD&D approval. More information on this process is available in EPA Publication 1369 Research, Development and Demonstration (RD&D) Approval Guidelines.

Some alternative processes (time/temperature requirements) that guarantee the same level of pathogen reduction as stated in AS 4454: 2012 have been tested in Australia and overseas. Evidence of these tests could, in some cases, be used by an applicant to apply directly for a works approval application.

<sup>10</sup> US EPA, 2003, Environmental Regulations and Technology Control of Pathogens and Vector Attraction in Sewage Sludge (Including Domestic Septage) Under 40 CFR Part 503

<sup>11</sup> Biosolids Land Application – Guidelines for Environmental Management (EPA Publication 943), April 2004

<sup>12</sup> AS 4454: 2012 – Australian Standards Compost, Soil Conditioners and Mulches



## Designing, constructing and operating composting facilities

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EPA recommends alternative processes demonstrate they can meet the standards listed above in Table 8; these are based on AS 4454: 2012 and EPA Guidelines for Biosolids Land Application (EPA Publication 943). Where possible, NATA (or equivalent) accredited laboratories should be used.

### **7.3. Maturation**

Maturation is the second stage of the composting process where the microbial activity slows and the compost begins to stabilise to an extent that it can be safely used on land and to come into direct contact with plants without any negative effects.

Once the pasteurisation phase is complete the process will start to move into the maturation phase, which is characterised by declining temperatures within the pile and decreasing moisture levels.

AS 4454: 2012 outlines a variety of methods to demonstrate the level of maturity of the product. These include reporting the details of the processing conditions and a variety of laboratory tests that can be undertaken by NATA-accredited laboratories.

## Designing, constructing and operating composting facilities

### 8. Compost product standard

A compost product should meet the contamination requirements listed in Section 8.1. Compost that does not meet these requirements can sometimes be acceptable if made for a very specific use, as outlined in section 8.2.

The operator is responsible for ensuring that the composting process produces a genuine product suitable for its intended purpose. Where a compost product does not meet the requirements listed below and has no designated use, it should be considered as a waste. A facility operator whose product causes pollution not only risks fines but also endangers the viability of the business with potential liability for damages and cleanup costs.

A product testing regime (along with the feedstock analysis regime) should be established as part of the environment management plan (refer to section 9).

#### 8.1. Product requirements

The chemical and physical contaminant limits appropriate for compost designated for unrestricted use are listed in tables 9 and 10. Appropriate pathogen limits are presented in Table 8.

The limits for chemical and physical contamination are consistent with AS 4454: 2012 - Composts, Soil Conditioners, and Mulches.

##### 1.1.22 Chemical contaminants

Chemical contaminants which are not present in the feedstock may be excluded from the specification and testing regime, however reasoning for excluding these contaminants should be documented and provided to EPA when requested. Contaminants may change with different batches depending on the feedstocks.

For guidance on testing product using biosolids as a feedstock, refer to EPA publication 943 Guidelines for Environmental Management: Biosolids Land Application.

Table 9 – chemical contaminants limits for unrestricted use

Contaminant	Unrestricted use upper limits Dry weight basis (mg/kg)	Contaminant	Unrestricted use upper limits Dry weight basis (mg/kg)
Arsenic	20	DDT/DDD/DDE	0.5
Cadmium	1	Aldrin	0.02
Boron	100	Dieldrin	0.02
Chromium	100	Chlordane	0.02
Copper	150	Heptachlor	0.02
Lead	150	HCB	0.02
Mercury	1	Lindane	0.02
Nickel	60	BHC	0.02
Selenium	5	PCBs	Not detectable (detection limit (0.2mg/kg))
Zinc	300		

##### 1.1.23 Physical contamination

The contamination of feedstocks varies depending on their origin. Most contamination should be removed in the pre-processing stage as remaining physical contamination can have an impact on the quality of the final product and can be difficult to remove at a later stage. The table below outlines physical contamination limits, as specified in AS 4454: 2012.

Table 10 – physical contamination limits

Physical contaminants	Percentage of dry matter w/w
Glass, metal and rigid plastics	≤0.5
Plastics – light and flexible or film	≤0.05



## Designing, constructing and operating composting facilities

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### 8.2. A product – not a waste

There are a number of pieces of legislation (EP Act, SEPP (PMCL) and IWR regulations) that prohibit or control the disposal to land of various wastes – such as municipal waste, prescribed waste, sewage sludge and litter. Composts, soil conditioners and mulches produced from suitably composted materials that meet the general requirements of AS 4454: 2012 (outlined in this guideline under sections 7.2 Pasteurisation and 8.1 Product requirements) are regarded as a genuine product and not as a waste. Compost that does not meet these general requirements can sometimes be acceptable if made for a very specific use. EPA may grant approval for land application of a particular waste product after suitable processing where:

- it does not constitute an environmental hazard in the proposed application
- it is fully pasteurised
- a particular need is satisfied in its use and
- appropriate controls are in place to ensure these criteria are always met.

#### 1.1.24 Product classification

The output from a composting operation ceases to be waste if it can be classified as a product. Products are classified based on a range of factors. These include the protection of the environment, animal and human health, and the end users' needs. The definitions provided in AS 4454: 2012 for the following three products have been reproduced below as the three classifications that EPA describes products as:

**Pasteurised product:** An organic product that has undergone pasteurisation as defined in section 7.1.1 but is relatively immature and lacking biological stability.

**Compost:** An organic product that has undergone controlled aerobic and thermophilic biological transformation through the composting process to achieve pasteurisation and reduce phytotoxic compounds, and has achieved a specified level of maturity for compost (as stated in AS 4454: 2012 Appendix N).

**Mature compost:** An organic product that has undergone controlled aerobic and thermophilic biological transformation through the composting process to achieve pasteurisation and exhibits lower levels of phytotoxicity and a higher degree of biological stability (as stated in AS 4454: 2012 Appendix N).

If the product is being blended with other materials to create a product for a specific end market it should still meet one of these product requirements before blending to ensure that at a minimum pasteurisation has occurred.

## Designing, constructing and operating composting facilities

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### 9. Environmental management plan

An environmental management plan (EMP) can assist facilities in addressing the environmental issues outlined in this guideline and in demonstrating compliance with EPA requirements. It can also help to identify any problems with the process that may lead to an instant of non-compliance. A well-developed and implemented plan can minimise the impact a change in staff, feedstock supplies or weather will have on the compost process.

The EMP should include a plan to address environmental risks at each stage of the process. The actions required will vary depending on the type of facility and the way it is designed.

The EMP should also include a monitoring plan for the feedstock, process and the products. This will provide quality assurance for the process and product as well as assisting in preventing environmental impacts. For example, identifying that the moisture content of the pile has dropped can assist in reducing the potential generation of dust.

Odour issues can be addressed either within the EMP or in a separate odour management plan. Odour is the reason for the majority of community complaints about composting facilities and it is important that facilities have a clear plan to manage offensive odours.

EPA officers may request an EMP is developed as part of a notice to address an issue of non-compliance.

#### 9.1. Waste characterisation

The characterisation of the incoming feedstocks is important in understanding the wastes that are being accepted, what waste code they are covered by (when appropriate), and the processing requirements for the different waste streams. It also enables a site to reject loads that are contaminated or do not meet the facility's requirements.

#### 9.2. Monitoring plan

The elements that are important in the composting recipe remain important throughout the pasteurisation and maturation phases. These need to be monitored as part of a monitoring plan for the premises. The requirements for a monitoring plan vary depending on the category of waste being accepted and the associated technology. Enclosed designs are able to have real-time monitoring for the many parameters whereas for the lower order technologies the monitoring plan will need to articulate when and what will be monitored, and how this will be done. Monitoring for the parameters listed in section 7.1 will ensure that the optimal conditions for pasteurisation are being maintained and will minimise the generation of offensive odour.

#### 9.3. Product testing

Products should be tested in accordance with this guideline or AS 4454: 2012 to demonstrate that the feedstocks and processes being employed are able to meet the required standard. Once this has been clearly established the product testing should be adjusted to suit the ongoing management and quality assurance requirements of the premises. If significant changes are to be made to the feedstocks being processed, an increase in product testing may be recommended.

## Designing, constructing and operating composting facilities

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### 10. Definitions

**Aerated static windrow/pile** – Forced aeration method of composting in which a free-standing pile is aerated by a fan blowing air through perforated pipes located beneath the pile.

**Aerobic** – In the presence of oxygen.

**Agitated bed or tunnel** – Material is placed into a controlled environment. Air is forced through the material, which is also mechanically mixed.

**Anaerobic** – In the absence of oxygen. Composting systems subject to anaerobic conditions often produce odorous compounds and other metabolites that are partly responsible for the temporary phytotoxic properties of compost. Anaerobic conditions are employed in anaerobic digestion systems.

**AS 4454: 2012** – Australian Standard 4454:2012 for Composts, Soil Conditioners, and Mulches. A manufacturing standard that provides quality assurance on the process and product.

**Biochemical oxygen demand (BOD)** – The quantity of oxygen used in the biochemical oxidation of organic matter in a specified time, at a specified temperature, and under specified conditions. Normally five days at 20°C unless otherwise stated. There is a standard test used in assessing the biodegradable organic matter in municipal wastewater.

**Biosolids** – Biosolids are organic solids derived from the sewage treatment processes that are in a state that they can be managed to sustainably utilise their nutrient, soil conditioning, energy, or other value (if they achieve minimum EPA standards for classification as T3 and C2 biosolids). The solids that do not meet these criteria are defined as sewage sludge.

**Carbon to nitrogen ratio (C:N ratio)** – The ratio of the weight of organic carbon (C) to that of total nitrogen (N) in an organic material.

**Compost** – An organic product that has undergone controlled aerobic and thermophilic biological transformation through the composting process to achieve pasteurisation and reduce phytotoxic compounds, and achieved a specified level of maturity required for compost.

**Composting** – The process whereby organic materials are microbiologically transformed under controlled aerobic conditions to achieve pasteurisation and a specified level of maturity.

**Contact water** – Water that has come from or in contact with organic materials and contains dissolved or suspended organic matter.

**Contamination** – Contaminants within this context include physical and non-biodegradable materials (metals, glass, plastics, etc.), chemical compounds and/or biological agents that can have a detrimental impact on the quality of any recycled organic products manufactured from source-separated compostable organic materials.

**Liquid mixing pit** – Impervious (normally concrete) storage structure designed to mitigate the risk of spills during receipt of excessively moist feedstocks and mixing with drier feedstocks.

**Maturation** – The final stage of composting where the temperature is shown to decline and stabilise to an extent that it can be safely used on land and to come into direct contact with plants without any negative effects.

**Mulch** – Any organic product (excluding polymers that do not degrade, such as plastics, rubber and coatings) that is suitable for placing on soil surfaces to help conserve moisture or restrict weed growth.

**Pasteurisation** – A process whereby organic materials are heat-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 biological stability.

**Separation distance** – The space between the composting facility and neighbouring sensitive receptors.

**Soil conditioner** – Any composted or pasteurised product, including vermicast, manure and mushroom substrate, that are suitable for adding to soils. This also includes products termed 'soil amendment', 'soil additive', 'soil improver' and similar, but excludes polymers that do not biodegrade, such as plastics, rubber and coatings. Soil conditioners may be either 'composted soil conditioners' or 'pasteurised soil conditioners'.



Designing, constructing and operating composting facilities

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11. Appendix 1: Checklist

This checklist summarises the specific environmental issues which need to be addressed by a composting facility. The checklist should be used when developing a facility as well as on an ongoing basis to ensure EPA requirements are met.

Issue	Guideline reference
Do you need a works approval and licence? Does your facility : <ul style="list-style-type: none"> <li>• accept more than 100 tonnes or 200 cubic metres of organic waste in any month? or</li> <li>• accept more than 70 tonnes or 140 cubic metres of organic waste in any month and produce more than 50 tonnes of pasteurised material, compost or digestate in any month?</li> <li>• intend to process prescribed industrial waste?</li> </ul>	<a href="#">Section 3</a>
Does the facility have an appropriate separation distance?	<a href="#">Section 4</a>
Is the technology selected for the facility appropriate for the feedstocks?	<a href="#">Section 5</a>
Does the design of the facility meet the requirements for: <ul style="list-style-type: none"> <li>• sealed surfaces</li> <li>• mixing pits</li> <li>• bunding and drainage</li> <li>• contact water management</li> </ul>	<a href="#">Section 6</a>
Does your facility have an operational environmental management plan?	<a href="#">Section 9</a>



Golden Plains Shire Council  
PO Box 111  
BANNOCKBURN VIC 3331  
Attention: Leigh Page

PLANNING  
-9 July  
11 11 2019

Dear Sir/Madam

**PLANNING APPLICATION No.:** P19-081  
**VICROADS REFERENCE NO:** 29137/19  
**PROPERTY ADDRESS:** 607 BANNOCKBURN-SHELFORD ROAD, BANNOCKBURN

**Section 52 – No objection**

Thank you for forwarding the above planning permit application pursuant to Section 52 of the Planning and Environment Act 1987.

VicRoads has considered the application and has no objection to the proposal.

Should you have any enquiries regarding this matter, please contact [swrresponse@roads.vic.gov.au](mailto:swrresponse@roads.vic.gov.au)

Yours sincerely

Greg Hayes for  
**SAM PIRROTTA**  
MANAGER PLANNING  
SOUTH WESTERN REGION  
PO Box 775  
Geelong Vic 3220

cc Applicant



**CMA Reference No:** CCMA-F-2019-00308

**Document No:** 01

**Council No:** p19-081

**File No.:** STP/02-0003

**Date:** 8 May 2019

Ms Sarah Fisher  
 Planning Team Leader  
 Golden Plains Shire Council  
 PO Box 111,  
 Bannockburn Vic 3331

[planning@gplains.vic.gov.au](mailto:planning@gplains.vic.gov.au)

Dear Sarah

**CMA Reference Number:** CCMA-F-2019-00308  
**Section:** LGAOTH - Other LGA Application  
**Location Street:** 607 Bannockburn-Shelford Road Bannockburn Vic 3331  
**Cadastral:** Lot 2 and 3, TP552584

I refer to your enquiry dated 12 April 2019, received at the Corangamite Catchment Management Authority on 12 April 2019.

Below is the Authority's understanding of the application:

**The applicant(s),** Simon Atkinson  
**Represented by** Rodenburg Waste Solutions  
**Propose the following;**  
**Proposed Development Type:** Other Business/Commercial  
**Proposed Development Description:** Development of composting works

The Authority's assessment indicates that the property is covered by the following Zones and Overlays in the Golden Plains Shire Council Planning Scheme;

**Zone(s):** Farming Zone, Road Zone - Category 1

**Overlay(s):**







The Authority does not have any flood mapping available for this property. This does not mean that the property will not flood. Mapping indicates that a designated waterway is present adjacent to the proposed composting depot location. While a site inspection has not been completed, aerial photography indicates that this waterway is a constructed drainage channel of minimal ecological value. The waterway still provides an important drainage function for the landscape and needs to be considered before development proceeds.

The Authority notes that the proposed composting depot will be contained within an earthen bund, with surface water drainage to be directed to a clay lined storage dam adjacent to the composting pad. The storage dam has been designed to withhold a 25 year ARI rainfall event for 24 hours. Excess water will be used to irrigate the compost piles, thus retaining storage capacity on the dam.

The Authority considers that the measures contained in the 'Composting Depot Environment Management Plan' (Rodenburg Waste Solutions, January 2019 Rev 1) will satisfactorily protect the nearby designated waterways.

In light of the above information the Authority **does not object** to the proposed development.

Should you have any queries, please do not hesitate to contact our office on (03) 5232 9100 or [floodinfo@ccma.vic.gov.au](mailto:floodinfo@ccma.vic.gov.au). To assist the CMA in handling any enquiries please quote **CCMA-F-2019-00308** in your correspondence with us.

Yours sincerely,

Dr Geoff Taylor  
Floodplain Statutory Manager

Cc: Information Redacted

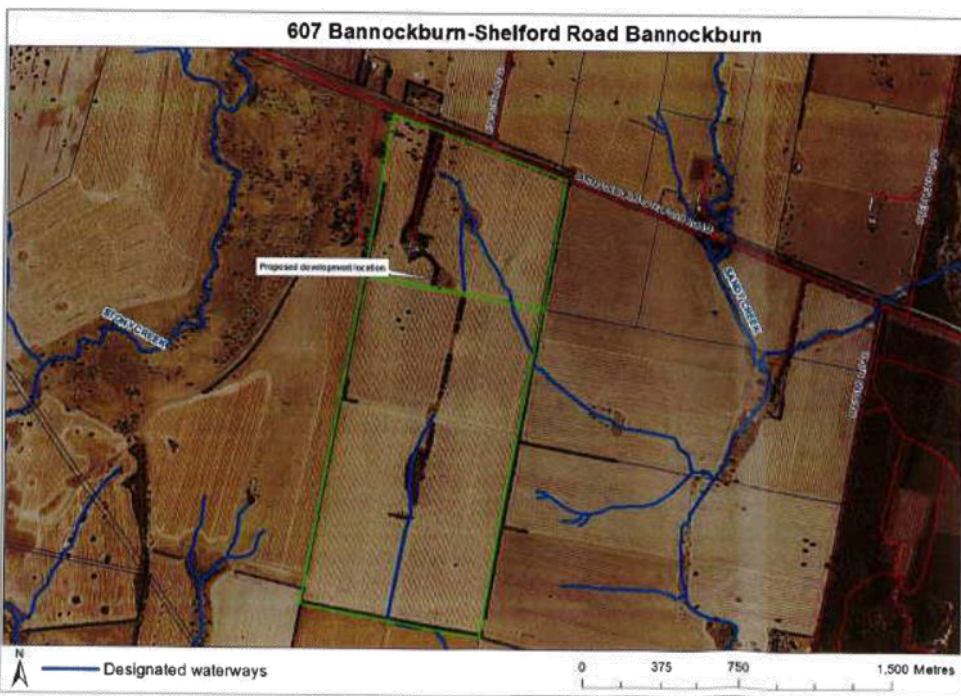


Figure 1. Subject property (green outline) showing designated waterways (blue lines).



The information contained in this correspondence is subject to the disclaimers and definitions attached.

### Definitions and Disclaimers

1. The area referred to in this letter as the 'proposed development location' is the land parcel(s) that, according to the Authority's assessment, most closely represent(s) the location identified by the applicant. The identification of the 'proposed development location' on the Authority's GIS has been done in good faith and in accordance with the information given to the Authority by the applicant(s) and/or Council.
2. While every endeavour has been made by the Authority to identify the proposed development location on its GIS using VicMap Parcel and Address data, the Authority accepts no responsibility for or makes no warranty with regard to the accuracy or naming of this proposed development location according to its official land title description.
3. **AEP** as Annual Exceedance Probability – is the likelihood of occurrence of a flood of given size or larger occurring in any one year. AEP is expressed as a percentage (%) risk and may be expressed as the reciprocal of ARI (Average Recurrence Interval).  
  
Please note that the 1% probability flood is not the probable maximum flood (PMF). There is always a possibility that a flood larger in height and extent than the 1% probability flood may occur in the future.
4. **AHD** as Australian Height Datum - is the adopted national height datum that generally relates to height above mean sea level. Elevation is in metres.
5. **ARI** as Average Recurrence Interval - is the likelihood of occurrence, expressed in terms of the long-term average number of years, between flood events as large as or larger than the design flood event. For example, floods with a discharge as large as or larger than the 100 year ARI flood will occur on average once every 100 years.
6. **LIDAR** (Light Detection And Ranging) is an optical remote sensing technology which measures the height of the ground surface using pulses from a laser. LIDAR can be used to create a topographical map of the land and highly detailed and accurate models of the land surface.
7. No warranty is made as to the accuracy or liability of any studies, estimates, calculations, opinions, conclusions, recommendations (which may change without notice) or other information contained in this letter and, to the maximum extent permitted by law, the Authority disclaims all liability and responsibility for any direct or indirect loss or damage which may be suffered by any recipient or other person through relying on anything contained in or omitted from this letter.
8. This letter has been prepared for the sole use by the party to whom it is addressed and no responsibility is accepted by the Authority with regard to any third party use of the whole or of any part of its contents. Neither the whole nor any part of this letter or any reference thereto may be included in any document, circular or statement without the Authority's written approval of the form and context in which it would appear.
9. The flood information provided represents the best estimates based on currently available information. This information is subject to change as new information becomes available and as further studies are carried out.

### References

1. Guidelines for Development in Flood-prone areas. Melbourne Water 2007.  
[http://www.melbournewater.com.au/content/planning\\_and\\_building/information\\_for\\_developers/guidelines\\_for\\_developers.asp?bhcp=1](http://www.melbournewater.com.au/content/planning_and_building/information_for_developers/guidelines_for_developers.asp?bhcp=1)
2. Australian Rainfall and Runoff Revision Project 10 – Appropriate Safety Criteria for People April 2010.  
[http://www.arr.org.au/wp-content/uploads/2013/Projects/ARR\\_Project\\_10\\_Stage1\\_report\\_Final.pdf](http://www.arr.org.au/wp-content/uploads/2013/Projects/ARR_Project_10_Stage1_report_Final.pdf)
3. Australian Rainfall and Runoff Revision Project 10 – Appropriate Safety Criteria for Vehicles February 2011.  
[http://www.arr.org.au/wp-content/uploads/2013/Projects/ARR\\_Project\\_10\\_Stage2\\_Report\\_Final.pdf](http://www.arr.org.au/wp-content/uploads/2013/Projects/ARR_Project_10_Stage2_Report_Final.pdf)

30/4/2019

Leigh Page  
Statutory Planner  
Golden Plains Shire Council  
2 Pope St  
BANNOCKBURN VIC 3331

Reference: 5009513

Dear Mr Page

**RE: Planning Permit Application P19 - 081**  
**PROPOSAL: Proposed Composting Facility.**  
**PREMISES ADDRESS: 607 SHELFORD-BANNOCKBURN RD,**  
**BANNOCKBURN VIC 3331.**

Thank you for your correspondence in relation to the above planning permit application, referred to EPA on 12/4/2019.

The proposal is for Use and Development of a Compost Facility which is expected to receive up to 50,000m<sup>3</sup> of organic waste. This is a scheduled activity (A07, Organic Waste Processing) under the Environment Protection (Scheduled Premises and Exemptions) Regulations 2017, and therefore the proposal requires works approval. Accordingly, we are a referral authority under Section 55 of the Planning and Environment Act 1987.

The potential environmental impacts from the proposed works will be fully assessed by EPA through a works approval application.

EPA does not object to Council issuing a planning permit; however, the proponent should apply for and be issued with a works approval from the Environment Protection Authority, or written confirmation that a works approval is not required, prior to any works beginning.

Given the anticipated environmental risks involved with the proposal, council may wish to include the following conditions on any permit issued;

- Offensive odours must not be discharged beyond the boundaries of the premises.
- Nuisance dust and/or airborne particles must not be discharged beyond the boundaries of the premises.
- Noise emitted from the premises must not exceed the recommended levels as set out in Noise from Industry in Regional Victoria (NIRV; EPA Publication 1411, 2011) or as amended.
- Stormwater contaminated with effluent must not be discharged beyond the boundary of the premises.
- A secondary containment system must be provided for liquids which if spilt are likely to cause pollution or pose an environmental hazard, in accordance with the EPA Publication 347 Bunding Guidelines 1992 or as amended.
- The applicant must install bunds and/or cut-off drains around the boundary of operational area to prevent contaminated run-off entering into a waterway.

EPA recommends Council should consider the above prior to deciding to issue or object to the planning permit.



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PLANNING  
-1 MAY 2019



Ref: P19-081



## Memo

**To:** GPSC Planning – Leigh Page  
**From:** GPSC Works - Matthew McIntyre  
**Date:** 23 April 2019  
**Re:** P19-081 The Use and Development of the Land for Industry (Composting Facility)  
607 Bannockburn-Shelford Rd, Bannockburn  
Referral

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As requested in your internal referral dated 12 April 2019 I have reviewed application.

As I understand:

- There is an existing facility on site that was subject to Planning Permit P14-007.
- The existing facility was a demonstration project for the purposes of validating the composting process.
- The facility proposes a composting depot with the blending of selected organic feedstocks, green waste and a compost activator with the blended material formed into long windrows up to 4m in height.
- Proposal appears to require expansion to the existing facility with an increase in the wastewater storage pond volume and area, the static pile pad area and a relocation of the wet organics facility.
- The applicant states that the process does not require the turning of the formed piles eliminating a source of odour and dust.
- Expected traffic as advised by the applicant is 8 truck movements (4 trips) per day.

I have essentially provided the same conditions as in P14-007 with an additional condition regards provision of construction plans.

Works Department conditions are required and shown below:

### Entry Works

- Prior to commencement of use an all weather access road must be constructed, formed and drained or existing access upgraded with dimensions adequate to accommodate transport and emergency vehicles to the satisfaction of the Responsible Authority.
- Prior to commencement of use vehicle crossing on Bannockburn-Shelford Road must be provided or existing vehicle crossing upgraded by provision of a crushed rock drive entry and culvert conforming to requirements of Golden Plains Shire Council contained in Infrastructure Design Manual (IDM) and to the satisfaction of Responsible Authority. (Not required if Vicroads provide similar condition).
- Prior to commencement of use suitable provision for turning vehicles must be provided along Bannockburn-Shelford Road conforming to requirements of Austroads Guide to Traffic Engineering – Part 5: Intersections at Grade and to the satisfaction of Responsible Authority. (Not required if Vicroads provide similar condition).
- All vehicle movements must be designed to allow all vehicles to drive forward when entering and leaving the property to the satisfaction of the Responsible Authority.

● Page 1 of 2

Drainage

- The property must be drained to the satisfaction of the Responsible Authority.
- The permit holder must ensure that the site is developed and managed to minimise the risk of stormwater pollution through the contamination of runoff by chemicals, nutrients, sediments, waste compost or gross pollutants in accordance with currently accepted best practices.
- Prior to commencement of use the applicant must install bunds and cut off drains around the boundary of the treatment facility to prevent contaminated runoff from entering into any waterway or onto adjoining land.
- All discharge from the treatment facility and within the bunded area must be collected and reused on site.

Car Parking

- Prior to commencement of use sufficient car parking must be provided to accommodate all staff and delivery vehicles.

Surface Works

- Prior to commencement of use all vehicular access roads, loading and unloading areas and car parking must be constructed with all weather surfaces to the satisfaction of the Responsible Authority.

Waste/Compost Material

- The facility shall process no more than the volume and tonnage approved by the Responsible Authority and EPA.
- Records must be kept as to the volume of materials being brought to, stored and processed on site.
- Materials to be composted to be limited to that approved by the Responsible Authority and EPA.
- All vehicles transporting material must have a fully secured and contained loads so that no wastes are spilled or dust or odour is created to the satisfaction of the Responsible Authority.
- The loading and unloading of goods must only be carried out on the composting pad area.
- All garbage and remnants of solid waste material that are not part of the compost materials which are used or produced on the site must be stored or removed from the site in such a manner to avoid any nuisance, pollution or offence to the satisfaction of the Responsible Authority.

Construction Plans

- Prior to commencement of any construction works associated with the development detailed construction plans, drainage computations and specifications to the satisfaction of the responsible authority must be submitted to and approved by the responsible authority

Works Department will not consent to commencement of the use until such time as the applicant provides satisfactory evidence of compliance with the above conditions.

If you have any queries please contact the writer.

End

- Page 2 of 2

Information Redacted

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**From:** Information Redacted  
**Sent:** Tuesday, 23 April 2019 11:49 AM  
**To:** Information Redacted  
**Cc:** Information Redacted  
**Subject:** P19-081 The Use and Development of the Land for Industry (Composting Facility)  
607 Bannockburn-Shelford Rd, Bannockburn  
**Attachments:** P19-081 Engr Cond 607 Bannockburn Shelford Rd Bannockburn Composting Facility.pdf; P19-081 Engr Cond 607 Bannockburn Shelford Rd Bannockburn Composting Facility.doc

Hi Infor  
mation

As requested in your internal referral dated 12 April 2019 I have reviewed application.

As I understand:

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- The existing facility was a demonstration project for the purposes of validating the composting process.
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- The applicant states that the process does not require the turning of the formed piles eliminating a source of odour and dust.
- Expected traffic as advised by the applicant is 8 truck movements (4 trips) per day.

I have essentially provided the same conditions as in P14-007 with an additional condition regards provision of construction plans.

Works Department conditions are required and shown attached.

Regards





Internal Referral

**Attention: NATURAL RESOURCE OFFICER**

To: [Redacted] Information Redacted

From: [Redacted]

Date Referred: 12 April 2019  
P19-081

Subject: The use and development of the land for industry  
(Composting Facility)

Lot 2 & 3 TP552584  
607 Bannockburn-Shelford Road, Bannockburn

**Referral for Planning Permit  
IN19-368724AE**

**\*\*PLANNING PERMIT REFERRAL\*\***

Please find attached a copy of the above planning application and a locality map. Please review this application thoroughly to determine if any natural resource department conditions would apply.

Your prompt assessment would be greatly appreciated.

Natural Resource Department Comments	
From: Bram Muller	Date: 15/ 04/19
Planning Permit Referral	<input type="checkbox"/> No Natural Resource Department Conditions required on the Planning Permit.
	<input type="checkbox"/> Natural Resource Conditions are required on the Planning Permit and attached.
	<input type="checkbox"/> Further information is required, the details of information sought is listed below.
Other Comments / Further Information Required: Large native tree within proposed composting site, if removal proposed they will require a NVIM report for a scattered large old tree and offset the vegetation loss. If to be retained than Tree Protection Zone as per Australian Standard AS4970-2009 Protection of Trees on Development Sites needs to be in place.	

If you have any queries with this referral, please contact [Redacted] Information in the Planning Department.

Many Thanks  
[Redacted] Information Redacted

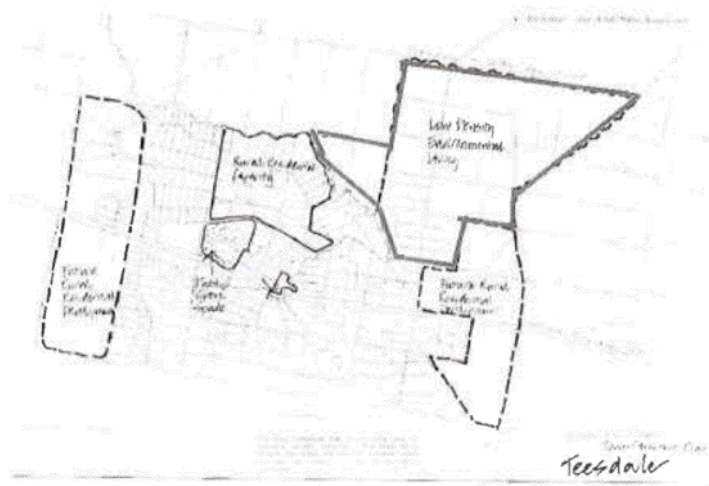
# Memo

**To:** Information  
**From:** Information  
**cc:** Name  
**Date:** 27/08/2019  
**Re:** Referral to Strategic Planning P19-081 (composting facility)

Strategic Planning has considered the proposed facility and provides the following advice in relation to future planning for Teesdale.

### Existing Direction

The only area currently identified for future greenfield residential development that is not an existing residential zone is located in the vicinity of the former Teesdale tip. This land (depicted in the map below outlined in red) is over 2.7km from the compost facility site boundary. The facility is not considered a threat or risk to this land.



**Future Direction**

Strategic Planning is preparing a new structure plan for Teesdale and anticipates completion in early 2020.

So far only a background report has been prepared and no strategic direction has been provided.

The background report has identified that significant existing residential land supply exists (both greenfield and infill) and there would be minimal/marginal justification for the provision of any additional greenfield residential land at this stage.

It is understood that the buffer distance for compost facilities varies based on EPA guidelines, however even if the compost facility reduces the capacity for the identification of additional residential growth areas east of the town, there would be options for growth in other directions if Council chose to pursue these options.

With regard to commercial development, the background report has recognized that there are minimal commercial facilities in Teesdale considering the size of the town. Whilst there is extensive land located in the Township Zone that could be utilised for commercial purposes, the vast majority of the land is already in use for residential purposes. It is plausible that additional commercial land may be identified, and whilst the location for any such land is not known, the eastern side of town is an area that appears plausible at face value.

The compost facility is not considered a concern in relation to possible future commercial land because:

- The site boundary for the facility is approximately 2km from the eastern edge of the town.
- Commercial land uses are generally not sensitive land uses. However, restrictions on use type could potentially be implemented prohibiting sensitive land uses in the buffer to the land fill (if commercial land was identified nearby and it extended into the buffer).