In order to improve the environmental performance of indoor composting installations and reduce emissions to air and water, BAT is to use the construction and design techniques below.

BAT CONCLUSIONS SPECIFIC TO INDOOR COMPOSTING		
Section	**BAT**	**How the BAT requirements will be met at the O'Toole Composting facility**
1.1.3 Overview of indoor composting process steps	The typical process stages of an indoor composting operation with the principal functions of each step are listed below: • Feedstock acceptance and storage: - To formally accept waste - To provide adequate capacity for the feedstock - To prevent fugitive emissions - To blend feedstock's and balance conditions in the waste to optimise treatment • Pre-treatment of feedstock prior to composting (shredding, mixing, metal removal etc.): - To remove unwanted materials and contaminants - To physically prepare the feedstock for composting. • Composting: - To sanitise the feedstocks (i.e. eradicate pathogens or reduce them to acceptably low, sanitary levels). Mainly for processes treating animal by-products this is a dedicated step of the composting process. - To stabilise and mature the compost and produce the required outputs for end use. In indoor composting installations, part or all the composting process takes place indoor. Indoor systems allow greater control of both the composting process and release of its by-products to the environment. In this section we have only addressed the part of the process that takes place indoor. If any part of the operation takes place outdoor, please refer to section n. xxx on outdoor composting. • Post-treatment (sieving, particle size screening, ballistic separator, wind sifting, etc.): - To refine the compost (i.e. remove physical contaminants) and make it into one or more size grades for different markets. • Storage and utilisation: - To store the compost output ready for use. Further maturation of the compost can take place during storage.	All of these process stages are carried out at the O'Toole Composting Facility

1.1.1.2	Principal techniques and construction elements applied to indoor composting	
Section	**BAT**	**How the BAT requirements will be met at the composting facility**
Waste reception and storage area design	– The reception area is appropriately sized to accommodate the expected volume of waste, and a dedicated area for off-loading and inspections of input material loads, a dedicated quarantine area for unacceptable or rejected loads and any area allocated to pre-treatment. – When required, reception of putrescible wastes is carried out in an enclosed area – Where the waste reception area is required to be in an enclosed building it includes a building ventilation system and an emission abatement system that maintains the building under negative air pressure in order to minimise fugitive odour, and dust release from the building. – The reception area is designed to facilitate cleaning including drainage to allow discharge of wash waters into gullies and to a sump for use within the process or to be discharged into sewers. – All reception areas have an impermeable surface with self-contained drainage, to prevent any spillage entering the storage systems or escaping off-site. The design should prevent the contamination of clean surface water.	The waste reception and storage area design meets the BAT criteria
Vessel or enclosed building design	- Any vessel or enclosed treatment space is designed with sufficient capacity for waste to be treated within the retention time of the treatment process or the relevant treatment step. - The process is fully enclosed with an air abatement system. - Treatment areas have engineered impermeable surfaces with kerbed areas to allow collection of runoff and leachate. - Run off and leachate (dirty water) is collected in an engineered system, collected in a sump or lagoon and where possible kept separate from clean roof or yard water. - Air extraction should be designed and maintained to move and handle the volume of air to provide a clear working environment	All vessels and enclosed treatment spaces have been designed with sufficient capacity and meet the BAT criteria
Pre-treatment and post-treatment areas design	– All treatment areas have engineered impermeable surfaces with kerbed areas to allow collection of runoff and leachate as defined in section – Run off and leachate (dirty water) are collected in an engineered system and collected in a sump or lagoon. – When pre- and post- treatments are carried out in an enclosed area, capture, discharge and treat exhaust air.	Pre-treatment and post treatment areas have been designed to meet the BAT criteria

Waste storage	– Waste is stored under appropriate conditions in the quarantine area to avoid putrefaction, odour generation, the attraction of vermin and any other nuisance or objectionable condition. – Where required by the Regulator or relevant Competent Authority, the waste storage occurs inside an appropriate building. – When storage is enclosed, capture, discharge and treat exhaust air and wastewater – Storage provision may have to take into account situations where the land-bank may be unavailable for prolonged periods, for example, where the land is waterlogged or frozen.	Waste is stored under appropriate conditions so as to meet the BAT standards

In order to reduce the environmental risks of composting installations and to improve waste treatment performance, BAT is to have a good knowledge of the waste input and to use the management techniques below for waste acceptance, characterisation and traceability.

Section	BAT	How the BAT requirements will be met at the composting facility
Waste pre-acceptance procedures	– Waste is only accepted at the facility if suitable for composting. The plant operator establishes and maintains detailed written procedures for the acceptance and handling of wastes. These procedures provide for the pre-clearance and characterisation of waste types proposed to be accepted at the facility. – The procedure should contain the following items depending on the type of waste/installation ○ General information (contact details of the waste producer, processes producing the waste, conditioning characteristics of the waste, all relevant information necessary for planning waste handling) ○ Characterisation, which may involve sampling and testing or other type of assessment ○ Compliance with the proposed treatment ○ Delivery plan ○ Validation of the acceptance – Some waste streams may require periodic verification of the initial characterisation.	All waste entering the site must pass the onsite waste acceptance criteria before entering the facility

Waste acceptance procedures	– Waste is accepted at the facility from known customers or new customers subject to pre-acceptance procedures. – The operator should have clear and unambiguous criteria for the rejection of wastes or any actions to be taken to remove or reduce physical contaminants or any other unsuitable content prior to processing, together with a written procedure for tracking and reporting non-conformance. – Compliance verification: verify accompanying documents and compliance with acceptance criteria. Waste arriving at the facility are certified (as to source), weighed, documented and directed to the Waste reception area. The kind, origin and quantity of feedstock arriving at the installation is recorded at the weighbridge. – Unloading: have a clear procedure to ensure that accepted waste is unloaded in the right storage area – Where possible each load of waste arriving at the waste reception facility is inspected upon tipping within this facility. Only after such inspections the waste is processed for recovery. If the inspection indicates that the wastes fail to meet the acceptance criteria, then such loads are stored in a dedicated quarantine area and dealt with appropriately. – Ensure that gates to halls and bunkers open quickly during reception; operate gate air curtain system when gates open. Tip feedstock into open bunkers, reception area and pits quickly.	The facility has pre-acceptance procedures in place in order to make sure that all waste entering the site meets the strict criteria
Traceability	Generally applicable to biological treatments	There is a procedure in place that enables the traceability of the waste

In order to improve the environmental performance of composting installations, BAT is to adhere to an environmental management system to include the following features:

1.1.1.3	General management system of operational process with a view to enhance environmental performances	
Section	**BAT**	**How the BAT requirements will be met at the composting facility**
Operations and maintenance procedures	Effective operational and maintenance systems are in use for all aspects of the process especially where failure could impact on the environment, in particular there should be: – Control of operations that may have an adverse impact on the environment – A defined procedure for identifying, reviewing and prioritising items of plant for which a preventative maintenance regime is necessary – Documented procedures for monitoring emissions or impacts – A preventative maintenance programme covering all plant, whose failure could lead to impact on the environment, including regular inspection of major 'non-productive' items such as tanks, pipe work, retaining walls, bunds, ducts and filters. The maintenance system includes auditing of performance against requirements arising from the above and reporting the result of audits to top management. – Maintenance schedules are included in the management system. Repair should be initiated within the time frame specified in the plant's management system.	There are effective operational and maintenance systems in place in order to minimise the likelihood of system failures Documented procedures are in place for monitoring of emissions. A preventative maintenance programme is in place covering all plant.

Competence and training procedures	– The plant employs a suitable qualified and experienced facility manager who is designated as the person in charge. The facility manager or a nominated, suitably qualified and experienced deputy is present on the facility at all times during its operation.
	– The plant ensures that personnel who performs specific tasks is qualified on the basis of appropriate education, training and experience as required and aware of the requirements of the permit/licence. In addition, the facility manager and his/her deputy successfully complete a recognised specific training course relevant to the management of the facility.
	– Training systems, covering the following items, should be in place for all relevant staff which cover:
	  – awareness of the regulatory implications of the permit/licence and how this impacts their work responsibilities and activities;
	  – awareness of all potential environmental effects from operation under normal and abnormal or extreme circumstances (e.g. extreme weather, plant failure, emergency)
		All staff on site are both qualified and competent to complete their assigned jobs.
		Designated staff on site are also trained in fire prevention, fighting and evacuation.
		A review of training needs is carried out as part of the EMS.

	– awareness of the need to report deviation from the permit/license – prevention of accidental emissions and action to be taken when accidental emissions occur – reporting and accountability procedures within the management structure of the facility.	
Accidents / incidents procedures	An accident plan is in place which: – identifies the likelihood and consequence of accidents and emergency – identifies actions to prevent accidents and mitigate any consequences The accident management plan considers and has procedures for dealing with events which effect the day to day operation of the facility e.g. risks and impact of flooding and fires.	An accident plan is in place at the facility that meets the BAT criteria
Environmental Management Systems	A written management system is in place which provides the framework for the plant to deal with immediate and long-term environmental impact of its products, services and processes. A management system needs consider the location, waste types treated, size of your site, and complexity of your process. The operation of formal environmental management systems (EMSs) is equally accepted as non-certified systems. The level of information and control should be proportional to the risk each activity may have to the environment or on process control.	An EMS for the facility is already in place and covers the range of points mentioned

In order to ensure stable process operation and optimisation and to minimise operational difficulties, BAT is to have a suitable monitoring system, both manual and instrumental. Parameters monitored may include, but are not limited to, the following:

1.1.1.4	Indoor composting process monitoring		
Parameter	**Unit**	**Measurement frequency**	**Critical limits**
Temperature and temperature distribution	°C	Continuous or periodic monitoring. Frequency as specified in operators' management system.	As specified in operators' management system.
Moisture		Periodic monitoring. Frequency as specified in operators' management system.	As specified in operators' management system.
CO_2 / O_2	%	Continuous or periodic monitoring. Frequency as specified in operators' management system.	As specified in operators' management system.

In order to reduce or prevent emissions to water, BAT is to use the following operational and management techniques.

1.1.1.5	Emissions to Water	
Section	**BAT**	**How the BAT requirements will be met at the composting facility**
Procedures to manage discharge of leachate and/or contaminated storm water to surface water	Unless otherwise agreed by the Regulator or relevant Competent Authority, no leachate and/or contaminated storm water is discharged to surface water drains and courses.	Wastewater from the facilities operations is collected in a holding tank on site and either re-used in the composting process or tankered off site to the Local Authority Wastewater Treatment Plant. The latter only occurs in exceptional circumstances.
Procedures to manage direct or indirect emissions to groundwater	Unless otherwise agreed by the Regulator or relevant Competent Authority, no leachate and/or contaminated storm water is discharged directly or indirectly to groundwater.	Wastewater from the facilities operations is collected in a holding tank on site and either re-used in the composting process or tankered off site to the Local Authority Wastewater Treatment Plant. The latter only occurs in exceptional circumstances.
Procedures to manage discharge of leachate and/or contaminated storm water to sewers or for treatment at sewage treatment work off-site	Where effluent is treated off-site at a sewage treatment works: - action plans are appropriate to prevent direct discharge of the waste-waters in the event of sewer bypass, (via storm/emergency overflows or at intermediate sewage pumping stations) for example, knowing when bypass is occurring, rescheduling activities such as cleaning or even shutting down when bypass is occurring.	There is a procedure in place to meet the attached criteria.

	- a suitable monitoring programme is in place for emissions to sewer. - the operator conducts visual checks on the effluent management system and maintain a log. - the operator has in place procedures to ensure that the effluent specification is suitable for the on-site effluent treatment system or discharge criteria - measures are in place to isolate effluent where samples indicate a breach of specification. Incidents of this nature are recorded in the effluent log.	
Closed loop cooling systems	Wherever possible, closed loop cooling systems are used and procedures in place to ensure blow down from abatement systems is minimised	This is in place at the facility.
Leachate management	Leachate is managed via a sealed drainage system that collects and separately contains it from non-contaminated surface water at the facility. All systems are fitted with high level alarms and a record of inspection of levels kept on site. Prevention of excessive leachate as a priority through design is needed, diverting rainfall from stored feedstock, active composting and product maturation areas where possible. The amounts collected can be minimised by providing separate drainage for clean roof water and clean yard water. Clean and dirty drainage are clearly identified.	Wastewater from the facilities operations is collected in a holding tank on site and either re-used in the composting process or tankered off site to the Local Authority Wastewater Treatment Plant. This is kept separate from clean water runoff
Re-use of leachate or process water	Where possible reuse of leachate or other water helps maintaining moisture content in the active composting phase. Leachate from unsanitised waste is not applied to sanitised wastes.	Waste water/Leachate is reused during the composting process whenever possible

In order to prevent, or where it is not practicable, to reduce emissions to water from indoor composting, when wastewaters/liquor are not discharged directly to sewers or tinkered to WWTWs, BAT is to use one or a combination of the following abatement systems.

Section	Description	How the BAT requirements will be met at the composting facility
Activated sludge process		N/A
Chemical treatment		N/A

Upflow anaerobic sludge blanket (UASB) reactor		N/A
Sequencing Batch Reactors (SVR)		N/A
[other]		N/A

In order to operate low-emission composting installations, BAT is to have the following operational and management techniques.

1.1.1.6	**Emissions to air – odours, bioaerosols, dust, point source emissions (e.g. ammonia from biofilter)**	
Process step	**Operational Techniques**	**How the BAT requirements will be met at the composting facility**
Intensive or main decomposition (enclosed)	- Control active aeration system to ensure sufficient air is supplied to the composting material	This is in place at the facility. This is system controlled.
Batch formation	- Produce the feedstock blend while ensuring adequate levels of structurally stable substances (wood chips, screenings etc.), favourable water levels, favourable C:N ratio, adequate air pore volume. - Form batches while respecting the underlying design and ballast loads to guarantee adequate air pore volume.	This is carried out at the facility.
Intensive or main decomposition (enclosed)	- Control active aeration system to ensure sufficient air is supplied to the composting material - Irrigate composting material in the case of insufficient moisture content (but do not waterlog).	This is carried out at the facility. Aeration is carried out by computer control.
Post-treatment	- If drum screens are used: - wet material (> 35% water) => Reduced screening capability, low screening yield, high screen overflow. - dry material (< 35% water) => Good screening capability, good screening yield; significant dust emissions possibly associated with microbe emissions as water levels decrease (< 20%).	This is carried out at the facility.
Final product storage	- Do not overly agitate product with very compact layers.	This is carried out at the facility.

In order to reduce or prevent odour, dust and bioaerosol emissions, BAT is to use the following techniques.

Section	Description	How the BAT requirements will be met at the composting facility
Odour management plan/system	An odour management system is in place including measures aimed at minimising, or where possible preventing, odour emissions. Features include (but are not limited to: - Composting process is optimised by controlling parameters listed in 1.1.1.5	The composting facility is subject to an engineered odour management system which includes air extraction and filtration through a bio-filter. An odour impact assessment and dispersion modelling assessment has been completed to simulate the emissions from the proposed developments at the facility. Data has been entered into the odour management system to help minimise and prevent odour emissions. Addition control measures proposed are an extension to the biofilter and an airlock door system for waste intake.
Dust management plan	In dry weather, site roads and any other areas used by vehicles are sprayed with water as and when required to minimise airborne dust nuisance. Other measures include: - Covering of skips to and from site and in storage - Where dust creation is unavoidable, use of sprays, binders, stockpile management techniques, windbreaks etc. are employed based on risk assessment - Wheel and road cleaning (avoiding transfer of pollution to water and wind blown particulate) - Closed conveyors, pneumatic or screw conveying (noting the higher energy needs). Filters on the conveyors to clean the transport air prior to release - Regular housekeeping	All of these measures have been implemented in order to control dust emissions
Identification of activities that could potentially generate bioaerosols	A full and complete identification of activities that could potentially generate bioaerosols is carried out.	This has been carried out and monitoring for bio-aerosols is ongoing.
Scrubber and biofilter and design and optimisation	Scrubbers and biofilters are designed, commissioned and monitored to ensure optimum performance, i.e. operating at correct pH, ensuring adequate chemical wash replenishment and replacement and pressure drop monitoring.	This is in place at the facility. An upgrade of the biofilter is proposed in the near future.
Recording of weather data	Weather data are recorded or obtained from national weather agency	This is carried out at the facility. A windsock is present on site and daily wind direction readings are noted.

Use of misting devices	Misting and atomising units at the boundary or operationally placed. If used will be fully operational and maintained.	This is in place at the facility.

In order to prevent, or where it is not practicable, to reduce emissions to air from indoor composting, BAT is to use one or a combination of the following abatement systems.

Section	BAT	How the BAT requirements will be met at the composting facility
Biofilter		In place
Wet scrubber		
Activated carbon		
Bioscrubber		
Ozone treatment		
Acidic scrubber		
[other]		

In order to prevent, or where it is not practicable, to reduce emissions to air from indoor composting, BAT is to use one or a combination of the following types of containment.

Section	BAT	How the BAT requirements will be met at the composting facility
Tunnels		In place
Rotating Drums		

Enclosed halls		
Silos		
Agitated bays		

In order to reduce or prevent litter, BAT is to use the following techniques.

Section	BAT	How the BAT requirements will be met at the composting facility
Management procedures for litter control	All loose litter or other waste, placed on or in the vicinity of the facility, other than in accordance with the requirements of the permit/licence, is removed in a timely manner, subject to the agreement of the landowners.	This is in place as part of the EMS.

In order to reduce or prevent the presence of pests/ vermin, BAT is to follow any or a combination of the following techniques:

Section	BAT	How the BAT requirements will be met at the composting facility
Management procedures for pests/vermin control	The operator has documented procedures in place to ensure pests/vermin are controlled. These include inspections at the facility and its immediate surrounds for nuisances caused by vermin, birds, and flies. The operator maintains a record of all nuisance inspections.	This is in place as part of the EMS.

In order to reduce or prevent noise and vibration, BAT is to follow any or a combination of the following techniques:

1.1.1.7	Noise and vibrations	
Sections	**BAT**	**How the BAT requirements will be met at the composting facility**
Noise survey and management plan	The plant carries out a noise survey of the site operations. The survey programme identifies: the main sources of noise and including infrequent sources); the nearest noise sensitive locations and relevant environmental surveys which have been undertaken; and the proposed techniques and measures for the control of noise.	Noise monitoring is a requirement of the current Waste Facility Permit (WFP-CW-10-0003-01 as reviewed by WFP-CW-14-5) for the site and control measures will be maintained to regulate noise emissions in compliance with any new EPA Licence for the facility which will take account of the proposed new development.

Measures for the control of noise, including maintenance	The operator employs basic good practice measures for the control of noise, including adequate maintenance of any parts of plant or equipment whose deterioration may give rise to increases in noise (for example, bearings, air handling plant, the building fabric, and specific noise attenuation kit associated with plant or machinery).	This is in place as part of the EMS.

In order to use energy efficiently and to reduce raw materials and chemicals consumption, BAT is to follow any or a combination of the following techniques:

1.1.1.8	**Resource and energy efficiency (waste and materials use, water consumption etc.)**	
Section	**BAT**	**How the BAT requirements will be met at the composting facility**
Energy efficiency audit	The plant carries out an audit of the energy efficiency of the site within one year of the date of commencement of the plant activity. The energy efficiency audit is repeated at intervals as required by the Regulator. The audit identifies all practicable opportunities for energy use reduction and efficiency and the recommendations of the audit will be incorporated into the plant management system targets.	An energy audit has been completed in order to find area of high energy consumption. Findings from the audit help to minimise energy consumption as well as making the facility more energy efficient.
Water recycling and reuse	The plant identifies opportunities for reduction in the quantity of water used on site including recycling and reuse initiatives, wherever possible. Reductions in water usage shall be incorporated into the plant management system targets. Optimise the water reuse, taking into account the legal requirements (odour minimsation), technical requirements (need of water for optimised aerobic degradation) and sanitisation requirements (non recontamination of compost).	Water recycling takes place wherever possible in order to keep fresh water usage to a minimum Rainwater harvesting is in place for use in the process and for fire water use.
Assessment of efficiency of use of raw materials	The plant undertakes an assessment of the efficiency of use of raw materials in all processes, having particular regard to the reduction in waste generated. The assessment takes account of best international practice for this type of activity. Where improvements are identified, these are incorporated into the plant management system targets.	This will be carried out on an ongoing basis.