CIR20- 100

REV: 02

Yard Activities
CIR20-100

Clean (Irl.)Refuse & Recycling Co. Ltd

Ballinagun West

Cree

Kilrush

Co. Clare

Tel: (065) 9059092

Email: info@cleanirl.com

Web: www.cleanirl.com

Originator …….

Signed of by …….

Date Released……

Purpose

To ensure that the movement of people, vehicles, and material follow a designated path

Scope

All documentation processed by Clean (Irl.) Refuse and Recycling Co Ltd.

Reason For Issue

Third release

Responsibility

Operations Manager – P. Hedigan

Reference

Health and Safety Manual. Clean (Irl.) Refuse & Recycling Co. Ltd. Cree, Kilrush, Co. Clare.

Weigh Bridge Activities CIR20-101

Template Procedure CIR50-100

Clean (Irl.) Refuse and Recycling Co Ltd.

Clean (Irl) Refuse and Recycling Co Ltd. provides a full range of waste management services to both domestic and commercial customers.

Clean Ireland Recycling are active members of the Waste Management Association of Ireland.

Compliance with legislation is the primary aim of Clean Ireland Recycling.

Certification/Licensing

Clean Ireland Recycling holds the following permits and affiliations:

- Clare County Council Waste Permit
  (Permit No. 002/07/WPT/CL)
- Clare/Limerick/Kerry region Waste Collection Permit
  (WCP No. WCP/LK/073/07(d))
- Mayo/Sligo/Galway City/Galway County/Roscommon/Leitrim Region Waste Collection Permits
- Cork County Council Collection Permit
- Offaly County Council
- Irish Waste Management Association
- Repak Approved

Visitor Yard Procedure

Clean (Irl) Refuse and Recycling Co Ltd. has a responsibility to ensure, as far as is reasonably possible, the safety of visitors while on the premises.

To that end, the following policies shall apply:

- All visitors including members of the public are required to check-in with staff at the company's gate office prior to entering the site.
- Visitors must be informed of and follow the site safety rules and emergency procedures at all times while on site.
- An appropriate member of Clean (Irl) Refuse and Recycling Co Ltd. will accompany visitors at all times while on Clean (Irl) Refuse and Recycling Co Ltd. property.
- Only those vehicles required for delivery of equipment and materials or used directly in the performance of an operation will be admitted on to the site.
- Your Clean (Irl.) Refuse and Recycling Co Ltd. contact will advise you on the correct parking procedures, zones and access to designated areas.
- Reference. Health and Safety Manual. Clean (Irl) Refuse & Recycling Co. Ltd. Cree, Kilrush, Co. Clare.

Contractor Yard Procedure

Contractors working for Clean (Irl) Refuse and Recycling Co Ltd. must adhere to the following.

The following policies shall apply:

- Contractors must sign the Contractors Yard Procedure available from the gate office and complete the form as indicted.
- Contractors are required to check-in with staff at the company's Gate Office prior to entering the site.
- Contractors are required to check in/out with the appropriate member of Clean (Irl.) Refuse and Recycling Co Ltd, every time that a contractor leaves or enters the site.
- Contractors must not work on the premises unless appropriately covered by adequate employers and public liability insurance. Contractor's insurance policies must be submitted for examination prior to work commencing.
- Contractors must be familiar with the Clean (Irl.) Refuse & Recycling Co. Ltd. Health and Safety Manual.
- Contractors must adhere to and follow the safety procedures as outlined in the Clean (Irl) Refuse and Recycling Co Ltd. Health and Safety Manual.
- Reference. Health and Safety Manual. Clean (Irl) Refuse & Recycling Co. Ltd. Cree, Kilrush, Co. Clare.

Machinery Modus Operandi

Machinery and vehicle equipment used in Material Collection operations can pose significant hazards to operations.

- Check all guards and protective devices are in position before working.
- Ensure that you know how to operate the equipment before operating a vehicle.
- Report any defective parts/equipment not working properly.
- Do not use or carry out maintenance on any equipment, vehicle body or compactor unless authorised and trained to do so.
- Never attempt to free jammed material.
- Never clean any vehicle while in motion.
- Appropriate clothing and safety attire must be adhered to.
- Never distract people who are operating equipment on site.
- Never walk under a raised skip, or go between a reversing vehicle and fixed structure.
- Reference. Health and Safety Manual. Clean (Irl) Refuse & Recycling Co. Ltd. Cree, Kilrush, Co. Clare.

1. Tipping Procedure For Refuse Lorry

- Once the refuse lorry has been weighed the lorry shall then be directed to the shed by the Yard Marshall/Tipping Marshall.
- No refuse lorry should ever reverse into the yard or shed area unless a tipping marshal/Yard marshal is available to safely direct the refuse lorry in.
- If no tipping marshal is available, the refuse lorry driver must wait until a tipping marshal is available.
- Once a tipping marshal is available the refuse lorry may reverse into the yard and shed.
- It is the responsibility of the tipping marshal to ensure that;
  - Both the yard safety chain and shed safety chains are not causing an obstruction and are correctly stored to one side.
  - Make certain there is adequate space available for the contents of the tipping lorry.
  - No other persons are present on the ground floor of the shed
  - If other persons must be on the ground floor, they must be made aware of the refuse lorry presence.
  - No other machines should be active in the vicinity of the shed/ yard while a refuse lorry is present within those areas.
  - Ensure that the correct personnel protective equipment is worn

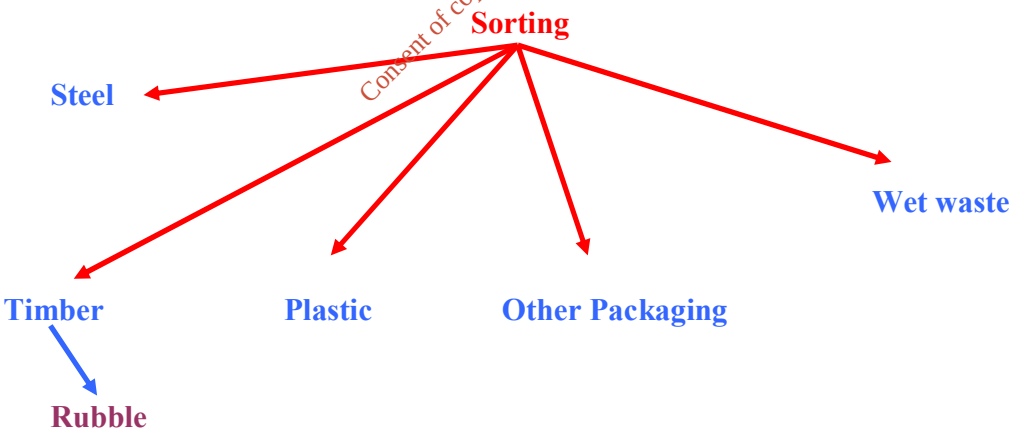
- Safety hat
- Goggles
- Mask
- Reflective jacket
- Safety boots

❖ Once the lorry has successfully entered the designated shed and has got the all-clear from the Tipping Marshal they may begin to tip the lorry load.
❖ The lorry shall then be tipped carefully within the wet shed as directed by the tipping/yard Marshall.
❖ The lorry driver is responsible for the opening/closing of the refuse mechanism lorry doors.
❖ No persons except the person in charge of the lorry door should be within the swinging space of a lorry door.
❖ The refuse lorry driver may begin tipping once the driver has received the go-ahead from the tipping/yard marshal.
❖ The tipping marshal and driver must be vigilant for material which may shatter/spray while being tipped from the refuse lorry.
❖ Once the material has been emptied, it must be inspected by the Yard Marshall.
❖ The refuse lorry door must be secured and closed safely once the tipping has ceased and the refuse lorry is in appropriate position.
❖ Once the material has passed the inspection it is then separated and goes through the Clean Ireland separation process
❖ The lorry shall then proceed to the weigh bridge as per Weigh Bridge Activities CIR20-101.
❖ Reference: Weigh Bridge Activities CIR20-101.
❖ While vehicles i.e. bob-cats etc. are moving material around the yard and shed the safety chains must be in use.
❖ If for any reason at all that a person has to enter the shed while a bob-cat is in operation, they must first
  - Press the buzzer on the outer wall to attract the attention of the driver
  - The driver shall then completely turn off the engine of the bob-cat until the situation has been dealt with
  - Once the driver is sure that all persons have exited the shed/yard, movement of material may commence.

1.2 Tipping Procedure for Drop Down Lorry

- The driver of the drop down lorry proceeds through the Clean (Irl.) Refuse and Recycling Co Ltd. road barrier once dockets have been handed in to the Clean (Irl) Refuse and Recycling Co Ltd. staff member at the Gate office.
- Staff member shall then follow the agreed procedure as indicated in Weigh Bridge Activities CIR20-101
- Once the drop down lorry has been weighed the drop down lorry shall then be directed to the shed by the Yard Marshall.
- A tipping marshal must be appointed to direct the drop down lorry safely through the yard to the shed.
- A drop down lorry should never reverse into the yard or shed area unless a tipping marshal/Yard marshal is available to safely direct the drop down lorry.
- If no tipping marshal is available, the lorry driver must wait until a tipping marshal is available.
- Once a tipping marshal is available the drop down lorry may reverse into the yard and appropriate shed.
- It is the responsibility of the tipping marshal to ensure that;
  - Both the yard safety chain and shed safety chains are not causing an obstruction and are correctly stored to one side.
  - The shed door is completely open.
  - Make certain there is adequate space available for contents of the tipping lorry.
  - No other persons are present on the ground floor of the shed
  - If other persons must be on the ground floor, they must be made aware of the refuse lorry presence.
  - Ensure that the correct personnel protective equipment is worn
    - Safety hat
    - Goggles
    - Mask
    - Reflective jacket
    - Safety boots
  - No other machines should be active in the vicinity of the shed/ yard while a refuse lorry is present within those areas.
- Once the lorry has successfully entered the designated shed and has got the all-clear from the Tipping Marshal the drop down lorry driver drops the skip onto the shed floor so as to facilitate netting removal.

- The driver shall remove the netting, all drivers must be wearing the appropriate personnel protective equipment, this includes;
  - safety hat
  - reflective jacket
  - safety boots
  - safety mask/goggles when necessary
- The lorry driver should store the netting in its designated area once the netting has been carefully removed.
- The tipping marshal will ensure that no other persons are within the door swinging space as the drop down skip door is opened or closed.
- The drop down back-door is then carefully opened and secured properly to ensure that the door will not swing forward during tipping.
- The drop down lorry driver then proceeds to pick up the skip once the all-clear has been received from the tipping marshal.
- The tipping/yard marshal shall then direct the lorry to an appropriate area for tipping
- The refuse lorry driver may begin tipping once the driver has received the go-ahead from the tipping/yard marshal.
- The tipping marshal/driver must be vigilant for material which may shatter/spray while being tipped from the drop down skip lorry.
- Once tipping is completed and the skip is in its original flat position the skip doors must be closed securely before moving out of the shed.
- The material that has been emptied is inspected by the tipping marshal/yard marshal
- Once the material has passed the inspection it is then separated and goes through the following procedure



- The lorry shall then proceed to the weigh bridge as per Weigh Bridge Activities CIR20-101.
- Reference: Weigh Bridge Activities CIR20-101

- While vehicles i.e. bob-cats etc. are moving material around the yard and sheds, safety chains must be in use.
- If for any reason at all that a person has to enter the shed/yard while a vehicle is in operation, they must first
  - Press the buzzer on the outer wall to attract the attention of the driver
  - The driver shall then turn off the engine of the bob-cat until the situation has been dealt with
  - Once the driver is sure that all persons have exited the shed, movement of material may commence

1.3 Tipping Procedure Open Container Lorry

- No driver shall ever attempt to reverse and tip a lorry without a Tipping Marshall to direct the lorry carefully into the shed.
- If there is no Tipping Marshall available, the lorry driver must wait until a suitable member of the Clean (Irl.) Refusing and Recycling Co Ltd. team is available.
- The Tipping Marshall is accountable for the following:
  - Safe direction of the lorry into the shed/yard for tipping
  - Ensure there are no other persons in the shed at time of tipping
  - If other persons must be in the shed, they have to be notified and made aware of the lorry entering the shed
  - Ensure that the shed door if fully open to facilitate tipping
  - Ensure that the safety chain is not blocking access to the shed/yard and that the chain is stored safely to one side.
  - Make certain there is adequate space available for contents of the tipping lorry.
  - Ensure that the correct personnel Protective equipment is worn
    - Safety hat
    - Goggles
    - Mask
    - Reflective jacket
    - Safety boots

- Directing the lorry to an appropriate area for tipping.
- The tipping marshal will open the container back-door once the lorry is in the correct position
  - Tipping marshal must be cautious of material falling suddenly from behind the open container door as it opens.
  - Tipping marshal must ensure that no other persons are within the swinging scope of the container door.
  - Tipping marshal must secure the open lorry back door safely, ensuring that the holding chain is correctly positioned, to avoid the door suddenly swinging during tipping.
- The open-container lorry driver may begin tipping once the driver has received the go-ahead from the tipping/yard marshal.
- The tipping marshal must be vigilant for material which may shatter/spray while being tipped from the drop down skip lorry.
- Once tipping is completed and the skip is in its original position the doors must be closed securely (holding chain and ratchet mechanism) before moving out of the yard/shed.
- The material that has been emptied is inspected by the tipping marshal/yard marshal.
- Once the material has passed the inspection it is then separated and goes through the Clean Ireland sorting process.
- The lorry shall then proceed to the weigh bridge as per Weigh Bridge Activities CIR20-101. as directed by the tipping marshal out of the shed area.
- Reference: Weigh Bridge Activities CIR20-101

* Note: Tipping Marshall – Clean (Irl.) Refuse and Recycling Co Ltd. staff individual with sufficient experience to direct a lorry safely into an appropriate shed

1.4 Tipping Procedure – Glass

Glass must be handled cautiously and only those employees whom are trained to do so.

- The driver of the glass lorry proceeds through the Clean (Irl.) Refuse and Recycling Co Ltd. road barrier once dockets have been handed in to the Clean (Irl) Refuse and Recycling Co Ltd. staff member at the Gate office.
- Staff member shall then follow the agreed procedure as indicated in Weigh Bridge Activities CIR20-101
- Once the driver has been weighed the glass lorry shall then be directed to the glass shed by the Yard Marshall.
- It is the responsibility of the driver to ensure that;
  - The area is clear for tipping
  - That no persons are in the vicinity
  - Once emptied that no glass has fallen out of the bunkers
- The driver shall than return to the weigh bridge if the PT weight is not known

Equipment Maintenance

- Employees shall immediately report any defective equipment.
- This includes all vehicles, machines and all container types.
- Defective equipment will be repaired on site without delay when possible.
- Any equipment which can not be repaired immediately shall be clearly labelled and locked down until repairs have been completed.

2. Public Vehicle Instruction –Yard Procedure

Clean (Irl) Refuse and Recycling Co Ltd. has a responsibility to ensure, as far as is reasonably possible, the safety of visitors while on the premises.
To that end, the following policies shall apply:

- Customer/driver must check in at Gate Reception and be informed of the procedure, before entering the site through the yard barrier.
- An appropriate member of staff shall be assigned to deal with the client.
- Staff member shall then follow the agreed procedure as indicated in Weigh Bridge Activities CIR20-101 and the Clean (Irl.) Refuse and Recycling Co Ltd. Health and Safety Manual
- All vehicle drivers must remain in their vehicles at all times unless otherwise indicated by an appropriate member of staff.
- Reference: Weigh Bridge Activities CIR20-101.
- Reference: Health and Safety Manual. Clean (Irl) Refuse & Recycling Co Ltd.

4. Personnel Protective Equipment (PPE)

- Personnel Protective Equipment (PPE) must be used to protect against hazards which are unavoidable.
- PPE include the list below were appropriate
  - Safety hat
  - Safety jacket
  - Safety boots
  - Safety goggles
  - Safety mask
- Where it is appropriate members of the Clean (Irl.) Refuse and Recycling Co Ltd. must at all times wear the provided Personnel Protective Equipment (PPE) where necessary.
  - While in the yard
  - While crossing the yard
  - While operating all machines
  - While driving all vehicles

5. Movement Between Clean Ireland Buildings/Offices/Sheds

- Staff must at all times be vigilant while moving about the Clean Ireland site.
- Office staff and those moving between the front gate and main office (not wearing PPE) must use the designated walk away.
- Only those employees wearing PPE may cross the yard and enter Clean Ireland sheds/buildings.
- All employees moving between Clean Ireland sheds must use the designated passageways
- Staff will never:
  - Cross over stationary or moving conveyor belts.
  - Cross through yards where safety chains are visibly in use.
- Employees must be aware of vehicle movement while on site.

6. Material Handling

- Manual handling is not restricted to the lifting of loads. It also includes lowering, pushing, pulling, carrying or moving loads whether by hand or other bodily force.
- Employees must consider;
  - The way the job is carried out
  - The size, shape and bulk of load
  - The working environment and how it might affect the task

7. Management Of The Activities

- Waste shall only be accepted at this site between the hours of operation Monday to Saturday inclusive (excluding Sundays, Bank and National Holidays).

- Clean (Irl.) Refuse and Recycling Co Ltd. site shall at times of operation be adequately manned and supervised.

- An awareness and training programme established to ensure that all employees of Clean (Irl.) Refuse and Recycling Co Ltd. are fully aware of the requirements of the waste permit and that employees are fully aware of the permit's provisions in relation to their individual and joint areas of responsibility.

- The establishment and maintenance of a communications programme.

- Clean (Irl.) Refuse and Recycling Co Ltd. shall maintain a register of the following on site;
  - Quantities and composition of waste received on site
    - Computer in gate office
    - Go to, shortcut to MATERIAL DATA
    - Yard Tonnage year (Excel)
  - Quantities and composition of waste not accepted at the site, and details to where such waste were diverted
    - Computer in gate office
    - Go to, shortcut to MATERIAL DATA
    - Diverted Waste (Excel)
  - Dates and times of all waste deliveries to the site
    - **Date** – go to, Computer in gate office
    - Go to, shortcut to MATERIAL DATA
    - Yard Tonnage year (Excel)
    - **Time** – Yard Tonnage Folder stored in gate office
  - The name of the carriers and the vehicle registrations numbers

- Go to, shortcut to MATERIAL DATA
- Yard Tonnage year (Excel)

- Origin of each delivery of waste
  - Computer in gate office
  - Go to, shortcut to MATERIAL DATA
  - Yard Tonnage year (Excel)

- Destination of all waste moving of site
  - Computer in gate office
  - Go to, shortcut to MATERIAL DATA
  - Outbound Tonnage year (Excel)
- A register must be kept on site recording Environmental Incident.
  - Folder 'Report & Investigation Forms'
  - Stored in gate office
- A register must be kept on site detailing all complaints received relating to the operation of the activity
  - Folder 'Report & Investigation Forms'
  - Stored in gate office

❖ Notify the Director of Services, Environmental Section, Clare County Council by fax/telephone of any Environmental Incident (full details shall be forwarded on the next working day);
- Potential for environmental contamination of surface water or ground water
- Cause an threat to air or land
- Requires and emergency response by the council

8. Waste Acceptance and Handling

❖ End of every working day, the hopper and compactor shall be cleared of all waste.

❖ All waste arriving on site is subject to visual inspection, any waste deemed unsuitable for processing and/or in contradiction to the permit shall be immediately separated, stored in a designated quarantined area and removed from the site as soon as possible.

❖ Waste must not be stored on site except for temporary storage pending transport, no t withstanding the requirements of temporary storage, mixed municipal waste and all wastes with a putrescible component shall not be stored on site for more than 48 hours. Dry recyclable wastes shall not be stored continuously for more than 3 months.

9. Nuisance, Emissions and Environmental Impacts

- No overspill of waste outside the site perimeter shall occur.
  - Go to, gate office computer
  - Shortcut Michelle
  - Site Check List 2004
- No material of any sort can fall or be blown from vehicles delivering waste to site
  - Go to, gate office computer
  - Shortcut Michelle
  - Site Check List 2004
- Vehicles exiting from the site should never deposit any type of site material onto the roadway or adjoining land.
  - Go to, gate office computer
  - Shortcut Michelle
  - Site Check List 2004
- All litter from the site and its surrounding environment shall be removed, this includes any waste on the approach roads for a distance of 250 meters either side of the main access road. This shall be completed on a daily basis.
  - Go to, gate office computer
  - Shortcut Michelle
  - Site Check List 2004
- A visual examination of the surface water discharge will be carried out weekly. A log shall be maintained.
  - Go to, gate office computer
  - Shortcut Michelle
  - Site Check List 2004
- If the quality of the surface water should indicate contamination, the following shall take place;
  - An immediate investigation, to identify and isolate the source
  - Put in place measures to prevent further contamination
  - Notify Clare County Council

10. Site Infrastructure

- Clean (Irl.) Refusing and Recycling Co Ltd. shall maintain and stockproof fencing on site.
    - Go to, gate office computer
    - Shortcut Michelle
    - Checks
- Gates shall at all times be locked and shut when the facility is unsupervised.

- Clean (Irl.) Refusing and Recycling Co Ltd. shall provide and maintain an inspection bay/quarantine area on site.

11. Contingency Arrangements

- An adequate supply of suitable absorbent material to contain and absorb any spillage at the facility, for example sand.

12. Corrective Action Procedure

Clean (Ire) has established a written procedure to ensure that Corrective Action is taken. Ref: Corrective Action Procedure CIR20-102

13. Awareness and Training Programme

All personnel who work at the facility are fully cognisant of the requirements of the waste permit and are aware of the permits provisions in relation to their individual and joint areas of responsibility. Please see Awareness and Training Programme CIR20-103.

14. Communications Programme

Clean Ireland Has a dedicated switch board to deal with any queries/requests

15. Holiday Leave Request

- If holidays are required complete Holiday Leave Request form available in canteen

- Minimum four week notice of holiday leave required.

- Get the approval of your supervisor and copy to Reception.

16. Equipment Removal from Site

- Complete form that is available in canteen

- Get the approval of Yard manager and copy to Reception `

17. Lock up procedure

For diesel shed

1) Switch off pump

2) Switch off valves

3) Turn off lights

4) Leave key

N.B. Diesel is not available when yard is not in operation.

Remove all keys from yard machines (bobcats JCB and rubber ducks) and ensure all are properly isolated

The following is the location for the various yard machines in the yard.

Bobcat with bale grab to be left outside near baler

Bobcat with grab to be left in skip shed

Bobcat to be left in wet waste shed

JCB to be left outside dry recyclable shed

Make certain all light in the shed are off the light for the wet waste shed and the skip shed are located in the wet waste shed near the hopper. The lights for dry recyclable shed are on the main panel at the front of shed.
Ensure all door are closed (e.g. skip shed, two doors in the dry recyclable shed, wet waste shed and also that both the barrier in the dry recyclable shed and the skip shed is closed behind the door)

Ensure that the generator is switched off

Check that the spares container is locked.

Switch off lights in reception making sure that weight bridge is switched off and that all three door are locked

Before leaving the site lock the main gate with the key been placed in the container in the canteen

CIR20 - 128

REV: 01

Biostabilisation Plant Operation CIR20-128

Clean (Irl.)Refuse & Recycling Co. Ltd

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Cree

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Tel: (065) 9059092

Email: cleanirl@iol.ie

Web: www.cleanirl.com

Originator …….

Signed of by …….

Date Released……

Purpose

To outline the process for operation of the Biostabilisation Plant

Scope

Biostabilisation Process

Reason For Issue

First Release

Responsibility

Operational Director

1. Waste handling procedure (and #26 Standard operating procedure)

The waste handling and operational procedures for the proposed CIRL bio-stabilisation and pasteurisation treatment process consist of the following steps:

Step 1: Waste Acceptance
Step 2: Material Reception
Step 3: Material Inspection and Decontamination
Step 4: Bulking Material Shredding
Step 5: Feedstock Storage
Step 6: Feedstock Preparation
Step 7: Loading In-Vessel Tunnels
Step 8: In-Vessel Composting
Step 9: Unloading In-Vessel Tunnels
Step 10: Aerated Static Pile Curing
Step 11: Screening
Step 12: Product Testing
Step 13: Blending and Storage
Step 14: Product Distribution
Step 15: Contaminant Disposal

All of these steps are detailed below with pictures and descriptive text.

Step 1: Waste Acceptance

Materials will only be accepted at the proposed bio-stabilisation and pasteurisation facility from CIRL's own collection vehicles, known customers, or new customers subject to initial profiling and characterisations of the materials they would like to bring to the proposed site for treatment. This includes laboratory testing of biosolids and sludges for heavy metal content and potentially toxic chemicals. Written records of this off-site investigation will be retained by CIRL for all active customers and for a two year period following termination of customer agreements or feedstoock supply contracts.

Each load arriving at the site will be inspected at the point of entry to the facility, and subject to this inspection, weighed, documented and directed to the tipping and receiving area for the bio-stabilisation and pasteurisation treatment facility. The following records of incoming materials will be kept for each load brought to the site:

- Date
- Name of haulier or customer
- Source of material
- Type of material
- Weight of material

These records will be organised by date, filed, saved and be available for reporting purposes or for inspection by regulatory authorities as required.

Example of vehicle being weighed in at similar treatment facility

Step 2: Material Reception

After weighing and recording each load, the vehicle will be directed to a specified bay outside the tipping and receiving building. To avoid confusion, these bays will be labelled by number above the bay doors as shown in the picture below so that materials can be tipped in the designated receiving bunker for that particular material, for example, biosolids in bay 1, brown bin materials in bay 2, garden materials in bay 3, etc.

Tipping biowaste materials into a reception building through a bay at a similar biological treatment facility.

When the vehicle is in position, the bay door is opened and the truck backs up to the curb so that the load can be tipped inside the building as shown above. As soon as the load is discharged, the truck pulls forward and the rolling door is immediately closed. The advantage of this sort of system is that traffic is minimised inside of the building which improves waste handing efficiencies inside, decreases the potential for accidents and injuries, and keeps the outside road areas clean of debris which in turns reduces the need to clean up surface water runoff from the overall site.

Since the facility will serve mostly CIRL's collection vehicles, drivers will have the opportunity to inspect materials before they are collected to assure that the load meets the facility's acceptance standards. For other facility users, materials are inspected after they are tipped within the bunkers inside the tipping building to make sure that they comply with facility acceptance standards for type of material, physical contamination, moisture level and foul odours. If the type of source-separated material is not a permitted material, contamination is over 5% by weight, the moisture level is above 90% or the material emits an intensely strong foul putrid odour, the load would be deemed unsuitable for processing. In this case, it would be immediately reloaded into the customer's vehicle and directed to the nearest licensed landfill or disposal facility. In all cases, a record of all inspections of incoming materials will be maintained, including those that are rejected for processing.

Step 3: Material Inspection and Decontamination

Manual removal of gross contaminants from residential brown bin collection scheme in Ballinasloe, County Galway.

After unloaded materials pass the initial inspection and are accepted for processing, they are assessed for the needed to remove gross contaminants, such as sacks full of rubbish, large metal items, rocks or bulky non-degradable items (appliances, furniture, toys, tools, etc.). Some materials, by nature, will not required decontamination, such as biosolids from waste water treatment plants or sludges from industrial food processing facilities. Likewise, since mixed waste fines have already been pre-processed by mechanical means to remove large contaminants, they would be ready for composting. However, materials

such as biowaste from brown bin collections or garden and landscape material from drop-off civic amenity sites may contain some large contaminants that could damage equipment or affect the quality of the final compost product. At this stage, loads of biowaste and drop-off garden materials would be spread out on the floor of the tipping building where gross contaminants would be removed manually as shown in the photo above at County's Galway's pilot brown bin processing site in Ballinasloe.

All contaminants removed would be collected in wheelie bins as shown in the photo above and when full, placed into a skip in the tipping building or wheeled to the adjacent mixed waste processing and transfer station on the CIRL site for eventual disposal.

Step 4: Bulking Material Shredding

Top: Typical high speed shredder converting clean timber into wood chips. Above: Clean wood shredding area at CIRL site showing stockpile of processed wood chips. (Please note that a part of this overall planning and licensing application involves placing this whole shredding operation under roof.)

The CIRL site already contains a material recovery sorting line for select commercial and construction & demolition waste where sand/soil, rocks, metals, cardboard, clean wood and other materials are separated for reuse and recycling. Once the clean timber (painted, coated, laminated or treated wood are *not* considered clean) has been manually segregated from the mixed waste stream, it is taken to the shredding area on the CIRL site for processing by a high-speed shredder. Shown in the pictures above is front-end loader placing clean timber into a high-speed shredder at a material recovery facility in western Ireland. Below that is a picture of the wood shredding area at the CIRL's site showing a stockpile of the clean wood chips. Currently these are sold to a fibre board manufacturer in Ireland, a high specification buyer who demands consistent particle size and cleanliness from its suppliers.

The proposed bio-stabilization and pasteurisation plant will require this type of bulking material for inclusion in feedstock mixes. The wood chips provide some moisture absorbing qualities, but more importantly, they are needed for their structural properties, providing adequate porosity or air space within the blended feedstock mixes in order to facilitate subsequent air flow through the composting mass. A portion of the wood chips produced by CIRL would be diverted to the bio-stabilisation and pasteurisation facility. A front end loader would be used to transfer wood chips from the stockpile by the shredding equipment and take it into the tipping and receiving area of the bio-stabilisation and pasteurisation facility as needed, making sure that the storage bunker in the tipping building is adequately full of chips and readily available for blending purposes on a daily basis.

This same wood processing equipment can be used to shred brushy drop-off garden and landscape materials as well. These, of course, would be processed separately from the clean wood so the wood chips that are sent to the fibre board manufacturer are not contaminated with shredded landscape materials. Once processed, a front-end loader would immediately transfer the shredded landscape materials to the tipping and receiving building and placed into a storage bunker inside.

Step 5: Feedstock Storage

The tipping and receiving building would contain six feedstock storage bunkers for the following materials:

- Biosolids from waste water treatment plants and sludges from food processing facilities.
- Structural bulking materials: shredded wood and brushy landscape materials
- Moisture absorbing bulking materials, such as: leaves, sawdust, wheat chafe, shredded paper
- Biowaste from brown bin kerbside collection routes
- Biowaste from brown bin collection or other source separated feedstock materials, such as drop-off garden and landscape materials
- Two feedstock storage bunkers for mixed waste

Clean Ireland's existing mixed waste processing equipment will be moved into the tipping building of the biostabilisation facility to extract organic rich fines from commercial and residential mixed waste. The fines will be blended with bulking materials and placed into the proposed facility's tunnels for biostabilisation and pasteurisation. The oversized materials will be directed to one of two roll-off compactors for eventual transport to a licensed waste disposal facility, as currently operated on site now.

It is important to store various feedstock materials separately from one another for several reasons. First, it allows operators full control over proportioning the different materials together so they can be assured of creating an optimal recipe for composting (this is covered in the next step- feedstock preparation). Second, it is important to keep animal by-product (ABP) material separate from non-ABP material for regulatory purposes. Third, is that different feedstocks will be used to create different compost products. As indicated above, mixed waste fines will be used to create a low-quality compost, whereas source-separated materials will be used to create high-quality products. If all feedstocks are blended together, then CIRL loses the opportunity to produce high-quality products and the revenue that comes with selling them in the marketplace. Lastly, it is important to separate highly putrescible materials (high moisture, high nitrogen) from drier high carbon feedstocks because putrescible feedstocks need to be processed as soon as possible while high carbon feedstock can be safely stored for longer periods of time. This last issue is a matter of not overwhelming the daily processing capacity of the plant if everything is mixed in one storage bunker as well as an effort to manage and control odours.

Separate feedstock storage bunkers at an on-farm in-vessel composting facility in County Carlow showing wood chips in one bunker to the left and commercial food in the bunker to the right.

This discussion leads to the issue of how long different materials should be stored in the tipping and receiving building before being processed for composting. As a guideline, all putrescible materials, including mixed waste fines, biosolids, sludges, biowaste or food, should be processed within 24 hours of being tipped inside the receiving building. In practice, most putrescibles would be processed the same day they are received on site. If this is not possible due to late afternoon deliveries to the facility, the material would be covered with a 15-20cm layer of screening overs or wood chips overnight and be

processed the next morning. This practice provides a barrier to pests and helps to control odours within the tipping and receiving building.

For brushy drop-off landscape materials, these can be stored undercover in the shredding area or in the tipping building for one to two weeks prior to shredding without creating an odour problem. Once shredded, they should be incorporated into composting mixes within one week's time. And finally, for dry, high-carbon bulking materials such as wood chips, sawdust, leaves, wheat chafe or shredded paper, they can be stored until they are needed without any affect on the composting process or on the generation of odours by the facility. As a standard operational procedure, CIRL will make sure that the two bulking material bunkers will always be partially or completely full so that the facility will always have adequate and readily available bulking materials on hand to blend with the wetter and high nitrogen feedstocks when they arrive on site. This allows the operator to create the proper recipes for composting on a daily basis, balancing ingredients to obtain the right blend of nutrients, moisture and porosity for the bio-stabilisation and pasteurisation treatment process.

Step 6: Feedstock Preparation

Feedstock preparation is the most important step in the composting process. It's like baking a cake. If the ingredients are not proportioned or mixed properly in the beginning, then the cake will not rise or be that tasty. Composting is similar in that it relies on biological organisms, aerobic microbes, which digest or decompose biodegradable materials (anything that comes from plants or animals) and turns them into a stable, humus like material called compost. When managing a biological process, one needs to pay attention to the requirements of the microorganisms. It's like making beer, yogurt, cheese, bread or wine. If an ingredient is omitted or the ingredients are not properly balanced, the biological process can go astray, creating a foul mess. In it most simple form, compost is the farming of microorganisms. In order to raise chickens or cattle, the farmer needs to understand what the animal needs to thrive; all animals need a balanced diet, water and air to survive, grow and reproduce. It's the same for the composting microbes. In their case, they need a balanced diet of Carbon and Nitrogen rich materials, water and air in an environment that is near pH neutral. Therefore, in order to create a compost recipe, the operator needs to understand the critical parameters essential to start and maintain the composting process. These are listed below:

Composting Parameter	Preferred Range
Carbon to Nitrogen Ratio	25-35:1
Moisture Content	55-65%
Porosity	45-60% air space
pH	6.0-8.0

Getting the mix right, involves paying attention to the nutritional properties of feedstock materials (C:N ratio), their physical properties (moisture content, particle size and pH) aswell as their biological properties or the ability to supply and support the right biological organisms. The physical properties in turn have a significant

impact on porosity or the amount of air space within a pile and therefore how easily air will flow through the composting mass. Feedstock materials must not only be porous, but also contain sufficient moisture to support microbial growth. It's all a balancing act.

Once a recipe is created, the steps, in descending order, associated with compost feedstock preparation include setting:

- Particle size
- Carbon to Nitrogen ratio (C:N ratio)
- Porosity
- Moisture
- pH

The first step in feedstock preparation is to set particle size. The general rule of thumb is: the smaller the particle, the faster it will decay. Most materials come in the right size for composting, such as food, brown bin materials, biosolids, sludges, animal manures, grass clippings, leaves, weeds, hay, straw, paper and saw dust. The only materials that need size reduction are woody materials like tree branches, bush trimmings, clean timber and cardboard. Generally shredding to a 10-20mm minus material provides both structural properties as well as moisture absorbing and readily available Carbon qualities. As discussed above in Step 2: Bulking Material Shredding, CIRL has the existing capability to shred woody feedstock materials so they can be added to feedstock blends.

Once the particle size is set, balancing the C:N ratio is next. Some materials are higher in Nitrogen than the ideal ratio of 30:1, such as biosolids, food, animal manures, or grass clippings. Other materials are higher in Carbon than the ideal ratio of 30:1, such as sawdust, paper, dried leaves, hay or straw. Few materials are well balanced, such as shredded drop-off garden materials which could be composted on their own without being blended with other materials. Therefore, given the variety of materials to be composted at the proposed facility, the challenge is to create the right proportion of different feedstock materials to get within the ideal range of 30:1 Carbon to Nitrogen for composting.

So how is this done? Given some basic information about Carbon and Nitrogen content of potential feedstocks from published tables or exact figures from actual laboratory testing of individual materials, there are two ways of coming up with a composting recipe. The first involves using mathematical formulas and a lot of time and effort. The second uses a computerised spreadsheet model readily available on the internet from Cornell University. This interactive tool allows operators to plug in Carbon, Nitrogen and moisture levels into the spreadsheet to help them determine the proper recipe for blending various feedstocks together by weight. Recently, both the managing director and proposed facility manager for CIRL successfully completed the IT Sligo HETAC course "Certificate in Compost Facility Operations" where they learned how to create composting recipes for 2, 3 and 4 ingredients using the Cornell University spreadsheet. In reality, due to the variety of feedstocks to be processed by the proposed facility and the different qualities of compost to be produced, a number of recipes will be developed for

composting: 1) mixed waste fines; 2) biosolids and sludges; and 3) biowaste from kerbside collection routes. In addition, biowaste recipes will be fine-tuned during the year to accommodate changes in material composition during various seasons (e.g., mostly food in winter requiring more bulking materials, and food and garden materials in summer requiring less bulking materials).

Loading stationary electrically powered batch auger mixer with biowaste for feedstock blending purposes.

After recipes have been developed for the three qualities of compost to be produced by the proposed facility, they will be converted from weight to volume measures using published bulk density characteristics for each feedstock so facility operators can be given a mix ratio based on X number of front end loader buckets of this material versus Y buckets of that material. When it comes time to blend materials for composting, operators will fill a stationary, electrically powered batch auger mixer in the tipping and mixing building with materials according to the recipe developed. This balances nutrients and gets the moisture level near its ideal range. After this, wood chips or overs from the screening process are added to the batch in the mixer to provide the blend with the porosity it needs to facilitate air flow during composting. After this, the moisture level is checked using a simple squeeze test. If the mix is too wet, then more moisture absorbing bulking material is added along with a moisture neutral nitrogen source (dry moisture absorbing bulking materials are high in carbon, so if they are added, then the C:N ratio needs to be readjusted downward so it is not too high). If the mixture is too dry, moisture can be added in the form of leachate collected from the tipping building, compost tunnels or aerated static pile curing area; surface water; or well water.

Water being added to a batch of feedstocks in an auger mixer at the end of the feedstock blending process.

Once the proper balance of nutrients, structural bulking materials and moisture are added to the mixer, it is allowed to mix the materials thoroughly together until the materials reach a homogeneous blend (3-5 minutes).

Most materials from the residential and commercial waste stream will be close to pH neutral, so pH will not need to be adjusted. However, some sludges from industrial plants or commercial wastes, such as pizza dough, will be either too acidic or too alkaline. This can be a problem because materials that are too high or too low in pH can inhibit microbial activity, growth and reproduction. In this case, the materials would need to be tested to see if pH adjustment in the feedstock preparation process is necessary. If a pH adjustment needs to be made, this can be accomplished with the use of chemicals or other feedstock materials. If the ingredient it too acidic, it can be neutralised with lime or wood ash. If it is too alkaline, it can be adjusted with shredded pine branches, pine needles or peat moss. Given the types of feedstocks to be processed by the facility, the need for pH adjustment will be minimal.

Once everything is just right (balanced nutrients, the proper moisture level, the right porosity, and a pH neutral environment) and the mix is thoroughly blended, it is then discharged from the mixer into a holding area within the tipping and receiving building where it is ready to be placed into the in-vessel composting tunnels.

Step 7: Loading In-Vessel Tunnels

After thorough blending, the feedstock mix is discharged from the mixer in a bunker within the tipping building. At this point, the blended feedstock materials are ready to be picked up by a front-end loader and taken into tunnels and stacked to a height of 2-3m. For high-quality compost made from biowaste and drop-off garden materials, the height will depend on the season of the year with higher piles in the peak summer months and lower piles in the lower volume winter months. For biosolids and mixed waste fines, the height will depend on the volume of material to be processed in a weekly batch. The important thing during this process is that the piles are built evenly within the tunnel, i.e., the same height from back to front. This promotes even air flow through the material and avoids short circuiting of air through higher or denser sections of the pile.

Loading a fully enclosed composting tunnel with a front-end loader

In most cases, CIRL will not be able to fill a tunnel with one day's supply of materials and the tunnel will need to be filled over a series of days. In this case, the tunnel is loaded from the back to the front until the tunnel is filled. After each day's worth of blended materials is placed into the tunnel, the doors are closed and the aeration system is turned on to begin composting. For whichever tunnel technology is chosen, CIRL will require that aeration within the tunnels are sectioned off into 3-4 zones and controlled by valves so that aeration does not short circuit the piles when a tunnel is partially filled.

Step 8: In-Vessel Composting

CIRL has chosen to install a batch tunnel in-vessel composting technology to initially process materials because it is the best available technology for minimising potential environmental impacts such as odour while being the most efficient and cost effective system on the market. It is also the simplest to operate and easiest to maintain. Plus, an in-vessel or enclosed technology is required by the EU Animal By-Products Regulations (ABPR) to process catering waste, or food containing meat, fish, bones, skins, shells

coming from residential sources and commercial kitchens (i.e., in hotels, restaurants, schools, hospitals, and supermarkets but not from butcher counters). The Department of Agriculture and Food (DAF) has been given responsibility to oversee the implementation of EU's ABPR in Ireland. The ABPR specify that the composting of food waste containing meat must be conducted in a "closed composting reactor that cannot be by-passed." The in-vessel tunnel system ensures these requirements are met by enclosing the material in a sealed concrete tunnel over a 10-14 day cycle. To meet the latest requirements of DAF's ABPR, materials would be placed into a tunnel for 5-7 days of composting, making sure that the appropriate time and temperature regime is met. Then materials would be taken out of the tunnel, and placed into a second tunnel for another 5-7 days, again meeting the appropriate time and temperature requirement for the material being processed. This dual barrier or double in-vessel processing approach ensures that all materials within the tunnel have been exposed to pathogen killing temperatures in the first and/or second stage of in-vessel processing.

New concrete in-vessel composting system installed in County Devon, UK as seen from inside the tipping building

The batch in-vessel tunnel systems have the following environmental features:

- Completely enclosed to allow complete heating of the composting material
- Close control of the composting process
- Full capture of all exhaust air
- Biofiltration of exhaust air
- Exclusion of vermin
- Full·capture·of·all·leachate·generated

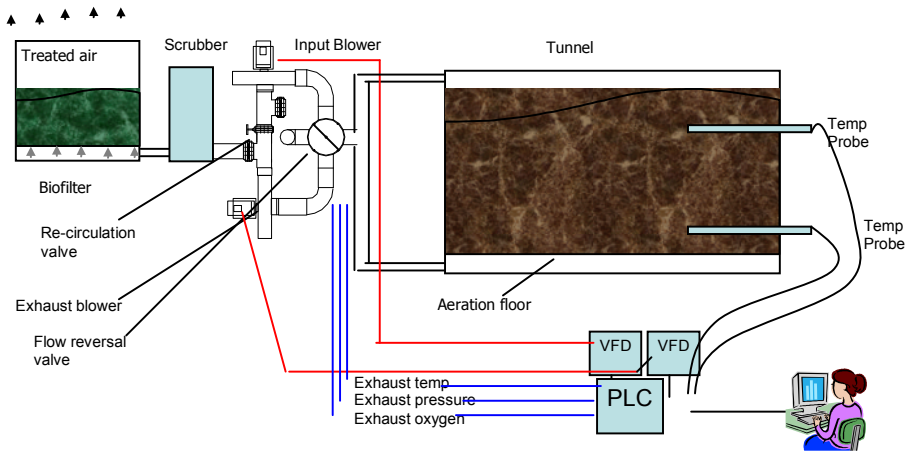
- Weatherproof
- Full computer control
- Continuous temperature record
- Neat and tidy appearance

The in-vessel tunnel system to be constructed at the CIRL facility will comprise of initially four concrete tunnels with the possibility of adding two additional ones. The tunnels will have a sliding door at each end through which they are loaded and unloaded. Loading occurs through the doors in the compost tipping and receiving building side and unloaded from the doors within the aerated static pile curing building. The material is typically stacked to a height of between two and three metres within the tunnels. Air is delivered to the composting mass via a series of buried pipes underneath the tunnel floor rising up through grates, slats, channels or spouts. The aeration system in the tunnel floor delivers air to the composting mass. Large high speed, high pressure aeration blowers push and pull air through the composting mass in order to keep it 'aerobic'. Each tunnel utilises two stainless steel blowers; one blows air into the top or bottom of the tunnel and the other draws air out of the tunnel and pushes it through the odour treatment system. A grate, slat or channel system has the advantage of also being capable of collecting leachate which can be reused at the front end of the process and added during the feedstock preparation stage.

The delivery of air are dictated by temperature and or oxygen measurements of the composting mass or exhaust air and are continuously recorded by a computer. Temperatures are measured by a number of temperature probes that are directly inserted into the top and bottom of the composting mass. In the beginning of the process, when the composting mass is heating up, the computer system is in "oxygenation" mode. Here the process control system is programmed to blow air into the vessels on a periodic basis to maintain adequate oxygen levels and stimulate the growth of aerobic bacteria with the off cycle being no longer than 30 minutes. These systems can also be configured for air recirculation to conserve heat and moisture and for air reversal to assure pathogen killing heat is spread evenly throughout the composting mass.

Once the composting mass reaches its temperature set point, the computer system switches into "cool down" mode. This "temperature feedback mechanism" maintains the composting process within its optimum range of 60-65 degrees C. If the mixing is done properly, the challenge is to keep the composting mass from overheating and killing off the beneficial bacteria. If the temperature differential between upper and lower temperature probes is greater than 3-5 degrees C, the air flow reverses. Experience has shown that this cool down cycle provides more than enough oxygen to keep the mass aerobic. The 10-14-day cycle within the tunnels allows enough time to pasteurise the material while removing its food value. This avoids any subsequent insect or vermin problems during the second phase of composting in the enclosed curing building.

The tunnel aeration system is illustrated in the diagram below.



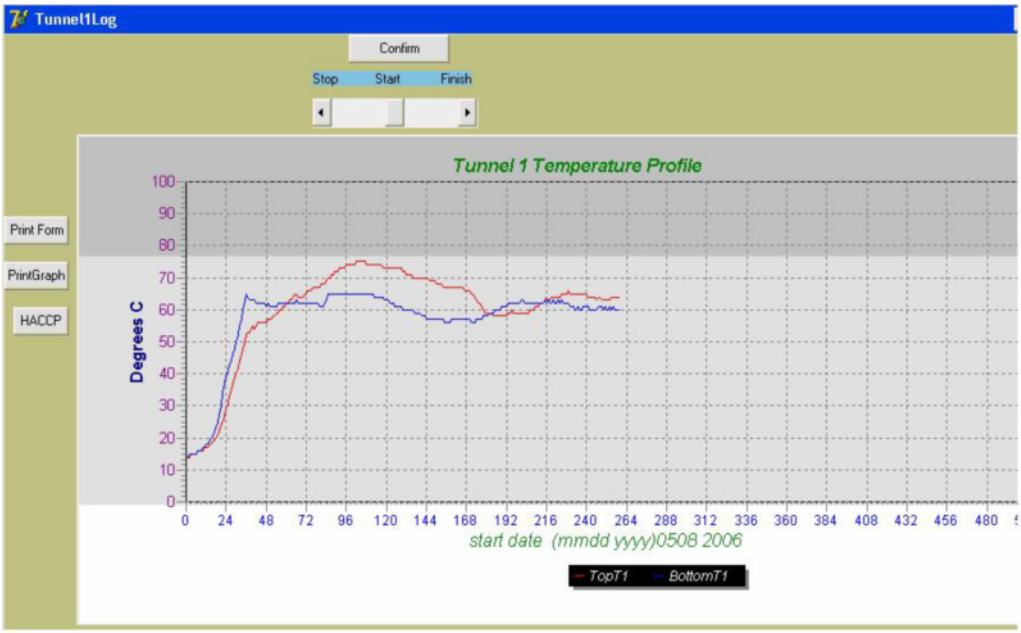
The process control system consists of the following components:

- Industrial Programmable Logic Controller (PLC)
- Variable frequency drives for the blowers
- Temperature, pressure, air flow and/or oxygen sensors
- Personal computer with printer, UPS and modem
- Windows operating system software
- Process control software
- Pile logistics software

The Programmable Logic Controller (PLC), the brains of the system, coupled with a windows based PC computer allows the operator to configure a temperature profile for the 10-14 days of in-vessel composting. The PC computer is loaded with proprietary software so that the operator can configure or change operating parameters to meet regulatory time and temperature requirements. The computer also is loaded with database and spreadsheet software so that temperature data can be logged and reports can be generated, printed and filed for each batch of compost.

The computer will also be connected to a printer so that reports on each batch of compost can be printed and filed for record keeping purposes. The process control panel, variable frequency drives, computer, modem and printer will be housed in the office adjacent to the composting mixing building.

From an ABPR standpoint, the process control software will comply with Irish ABPR requirements. In this regard, specific time/temperature graphs and data sheets are generated as seen below in addition to HACCP enabled colour coding for each temperature probe: top and bottom.



Typical time temperature graph from a tunnel composting facility in County Carlow illustrating the tracking of the temperatures in the top and bottom of the compost pile.

Step 9: Unloading In-Vessel Tunnels

After 10-14 days of composting within the tunnels, the door within the curing building is opened and a front-end loader is used to remove material from the tunnel as shown below.

Front-end loader removing material from concrete tunnel

Step 10: Aerated Static Pile Curing

The front-end loader then places the material from the tunnel and places it into an aerated bunker for 3-8 weeks of curing depending on the product to be made and its application or use. Again, the operator forms piles evenly, at the same height, over the aeration system to promote even air flow through the composting mass and avoid any short circuiting of air through shorter sections of the pile.

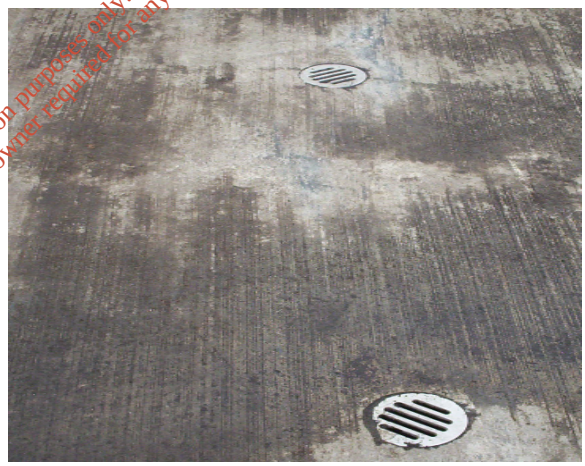
The material is initially placed into an aerated curing bunker for 2 weeks of continued composting and stabilisation. The material is then turned into a new bunker with the use of a front end loader and is then allowed to further stabilise for another 1-2 weeks. Depending on the type of material to be processed and its desired end use, the material could be turned once more and allowed to mature further for 2-4 weeks in an aerated aging bunker as shown on the facility plan. Below are the turning regimes for the low, medium and high quality products to be processed by the facility:

- *Mixed waste fines producing a low quality product*: placed in an aerated bunker for two weeks and turned once for another two weeks of processing into another aerated curing bunker. After 4 weeks of processing, two bunkers of mixed waste fines materials will be consolidated into one aerated aging bunker for 2-4 weeks of maturation. Total curing time will depend on the pending EPA standard for stability of biostabilised waste (6-8 weeks of total curing time).

- *Biosolids and sludges producing a medium quality product*: placed in an aerated bunker for two weeks. If the compost is used as an agricultural fertiliser, the material is turned once into another aerated bunker and allowed to compost for an additional one to two weeks (3-4 weeks of total curing time). If the compost is to be used for topsoil production, the material is placed into an aerated curing bunker for two weeks and turned into another aerated curing bunker for two weeks. After four weeks of processing, two bunkers of biosolids/sludges will be consolidated into one aerated aging bunker for another 2-4 weeks of maturation. (6-8 weeks of total curing time).

- *Biowaste from brown bins and other source separated biodegradable materials producing a high quality product*: placed in a curing bunker for two weeks and turned into another curing bunker for two weeks. After four weeks of processing, two bunkers of biowaste will be consolidated into one aerated aging bunker for another 4 weeks of maturation. (8 weeks of total curing time).

The maturation building consists of a large concrete slab with a similar air delivery system as the tunnels i.e. a buried network of pipes connected to a series of aeration blowers. Grate and channel aeration floors are showed in the photographs below:



Top: Aerated bunker system enclosed within a building
Above: Channel aeration system to left and grate aeration system to the right

The aerated maturation pavement is an engineered biological treatment system designed to optimise and accelerate the maturation process. In brief, the pasteurised biomass is removed from the tunnels at the end of a 10-14 day cycle and transferred to one the aerated curing bunkers. The aerated pavement works by drawing air under vacuum through the

Initially with six tunnels operating, the curing building would contain 12 aerated bunkers and six aerated aging bunkers as shown in the facility plan. The aerated maturation pavement is an engineered biological treatment system designed to optimise and accelerate the maturation process. In brief, the pasteurised biomass is removed from the tunnels at the end of a 10-14 day cycle and transferred to one the aerated bunkers. The aerated pavement works by drawing air under vacuum through the maturing biomass to maintain aerobic activity. This air is re-pressurised and forced through a scrubber and biofilter to remove any residual odours. Consequently, all exhaust or process air at the site will be collected and treated. The aeration pipes in the in-floor system double as a drainage system for leachate and condensate so these can be captured and directed to a storage tank for reuse when piles are turned between bunkers to maintain adequate moisture levels or added to new batches of feedstock blends in the beginning of the composting process.

Critically, the maturing material is turned and moved 2-3 times over a three to eight week period while it is in the curing building, again the cycle time is dependent on what is being processed and its ultimate end use. Turning is achieved by using front end loaders or telescopic front end loaders as shown below.

Turning aerated static piles in Waterford City

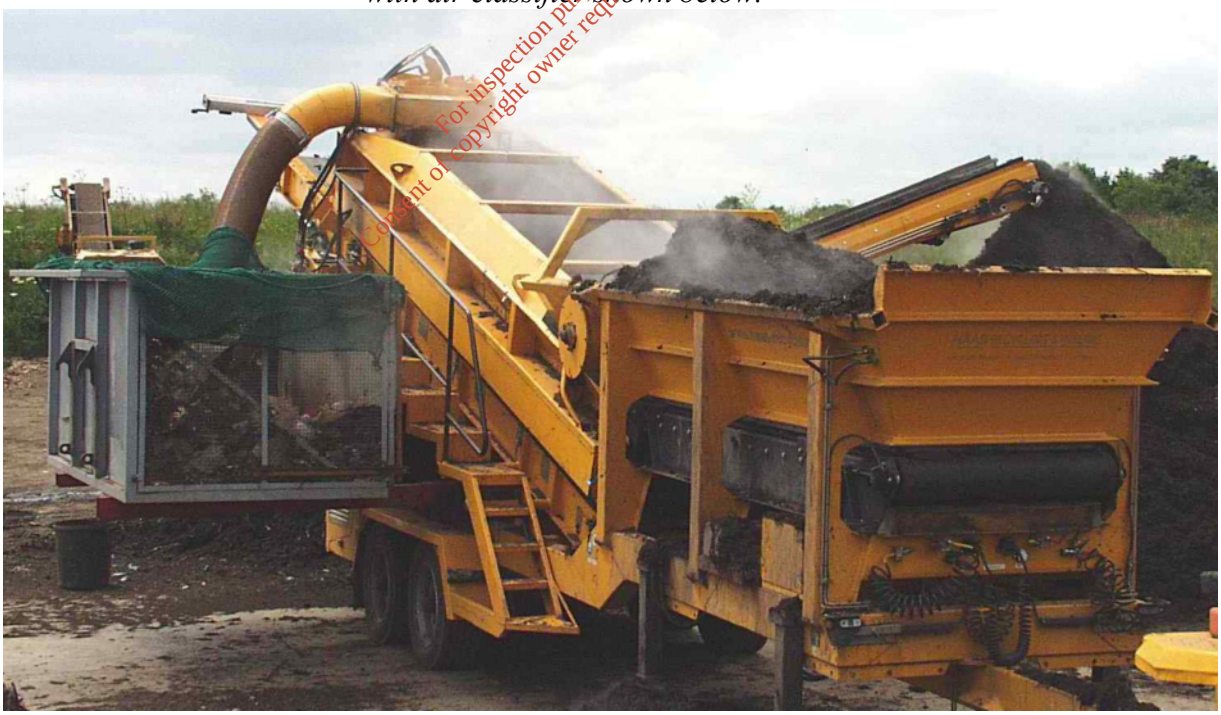
Temperatures are recorded in the curing phase using wireless temperature probes. These probes use radio transmitters to relay temperature readings back to the process controller so blower speed, blower on-off cycling and valves to each zone can be automatically adjusted. This also allows the operator to monitor temperatures in each of the composting bunkers. A picture of the wireless probes is shown below.

Wireless temperature probe in aerated static pile in Waterford with receiver located between the signs for zone numbers 4 and 5 in the back.

Step 11: Screening

After curing, the material is ready to be screened. Depending on the grade of product to be produced (coarse, medium or fine), a screening size is selected and the material is screened. A front end loader is used to place cured material into the screen hopper for screening. Screening will take place within the curing building as a way to capture and control odours, bioaerosols and dust. All screened product will be stored within the three bunkers outside the curing building while it is being tested and prior to blending.

Stationary electrically powered trommel screen above from Galway City and star screen with air classifier shown below.



The screening system will include an air classifier to remove plastic film from the overs so they can be reused in the process as a structural bulking material and as an inoculant in new batches. The overs can also be cleaned up further with the use of a 40-50mm screen

or by manual sorting to produce a clean mulch product for sale. All contaminants would be collected for landfill disposal.

Step 12: Product Testing

Testing would be conducted to assure the product's safety, compliance with EPA and ABPR requirements and to understand the product's characteristics for marketing and sales purposes. Due to the fact that the facility would produce between 5,000 and 8,000 tonnes of product per year, the EPA guideline on frequency of testing would require testing to occur every 1,000 tonnes of production. As shown below, sterilised stainless steel instruments would be used for gathering composite samples for shipment to an independent laboratory for testing following the sampling guidelines detailed in the I.S. EN 12579: 2000.

These samples would then be sent to an independent laboratory for testing. To comply with EPA and ABPR requirements, the following laboratory tests would be conducted to assess compost quality:

- Stability
- Physical Impurities
- Pathogens
- Heavy Metals
-

The chart below lists the limits being proposed by the EPA and Cré Composting Association of Ireland for compost quality.

Heavy Metals (mg/kg- dry matter)	
Mercury	0.5
Cadmium	1.2
Nickel	59
Chromium	97
Copper	159
Zinc	399
Lead	150
Pathogens	
Salmonella (in 25g)	0
E. coli (cfu/g fresh mass)	1,000
Impurities	
Total glass, metal & plastic > 2mm diameter by weight	0.5%
Stability	
Oxygen Uptake Rate (mmol / O_2kg Organic solid/h)	10

To assist with marketing and sales, other parameters will periodically be tested, including one or more of the following laboratory tests:

Physical Properties:

- Organic matter content

- Moisture content
- Bulk density
- Particle size distribution
-

Chemical Properties:

- pH
- Electrical conductivity (salts)
- Phytotoxins (organic acids)
- Total Carbon
- Total Nitrogen (N)
- Phosphorous (P) and Potassium (K)
- Available nutrients (N, P & K)
- Ammonium to Nitrate ratio

Step 13: Blending and Storage

Depending on the quality of the compost and its intended use, the compost product could be immediately moved off site to end users or it could be blended with other materials to make topsoil, potting mixes or organic fertiliser. Depending on what is being produced, a mixer, trommel screen or front-end loader could be used to blend ingredients together to create value-added compost-based products. These blended products could be stored outside in bunkers, as shown below.

Outdoor product storage bunkers

Step 14: Product Distribution

Compost based products will be distributed in the following ways:

- Picked up by the customer from CIRL's site
- Bagged and distributed for sale from retail outlets and civic amenity sites

- Delivered using 1-2 cubic meter bags
- Bulk delivery using CIRL roll-off or transfer vehicles

All material leaving the site will be weighed for tracking purposes. Records will include the date, type of product, quantity/weight, customer name and price (typical sales invoice).

Loading delivery vehicle with compost

Any and all products could be packaged in small paper or plastic bags for retail distribution or sale from public or privately operated civic amenity sites. Other composting facilities in Ireland have had great success with loading compost-based products into 1-2 cubic meter plastic mesh bags that then can be delivered to landscaping jobs or construction sites (these are the same bags that CIRL uses to collect various waste materials from contractors, landscapers or anyone needing disposal services for quantities that are more than what wheelie bins would hold and less than the capacity of a skip).

Under cover storage in Waterford City where customers can pick up or bag their own compost

Step 15: Contaminant Disposal

All contaminants removed from the tipping area and from the cleaning up the screening overs would then be accumulated with other residual waste from the entire CIRL site and loaded into a transfer trailer for transport to a licensed landfill disposal facility.