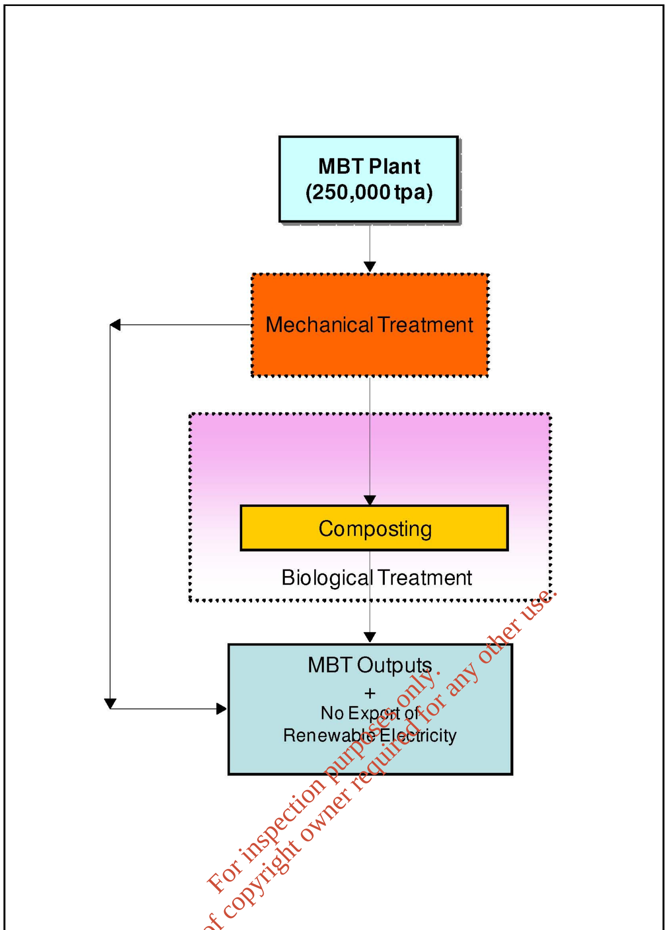
2.3.1 Configuration A (MBT with Composting)



Flow Diagram No. 1: Configuration A (MBT with Composting)

2.3.1.1 Waste Acceptance

The design and construction of the waste reception area will be such that waste delivery vehicles are not required to enter the Mechanical Treatment Building. Waste delivery vehicles will reverse to waste receiving doors and discharge waste down into the waste reception bunker. The finished floor level of the waste reception bunker will be approximately 4m below the finished level of the external area where waste delivery vehicles reverse to waste receiving doors. It is envisaged that eight waste receiving doors will be provided at the Mechanical Treatment Building. Each waste receiving door will be 4m wide. Concrete kerbing or wheel guides, with a minimum height of 200mm, will be provided at each side of the waste receiving doors to guide trucks to the centre of the doorway. Doors at the waste reception area will be rapid closing doors, with an opening or closing time of approximately 20 seconds. Doors for the acceptance of waste will be fitted with air curtains to minimise the escape of odorous emissions when a door is opened.

The waste reception bunker is designed to accommodate the storage of approximately three days of incoming waste, thereby providing contingency in the event of unavailability of the mechanical processing equipment.

Typical Waste Receiving Doors

2.3.1.2 Waste Pre-sorting

Following the discharge of waste into the waste reception bunker within the Mechanical Treatment Building, the waste (following an initial inspection) will be moved towards the hoppers (that feed the mechanical process) by means of a loading shovel and/or mechanical grab machines. The waste reception bunker will be provided with suitably sized concrete push walls in order to facilitate the handling, moving and storage of waste.

Prior to loading the waste into the hoppers, pre-sorting will be undertaken by the mechanical grab machines. Pre-sorting will involve the removal, where visible and possible, of non-processible waste items into quarantine bays for either disposal or onwards movement to an appropriate EPA waste licensed facility. Non-processible waste items include:

- Large and/or heavy items that have the potential to cause difficulties in the MBT process and/or to damage equipment (e.g. metal items, mattresses, carpet rolls, etc.);
- Dangerous items (e.g. fire extinguishers, gas cylinders, etc.); and
- Hazardous waste (e.g. fluorescent lamps, fridges/freezers, etc.).

Typical Mechanical Grab Machine in Operation
Typical Waste Presorting

2.3.1.3 Mechanical Processing of Waste

The primary objectives of the mechanical process include the following:

- Extraction of the organic and putresible fraction for biological treatment;
- Extraction of marketable recyclables (e.g. metals, plastics, paper/cardboard etc.);
- Refinement of remaining high calorific materials for use as a Solid Recovered Fuel (SRF).

The mechanical processing of the waste will involve a series of treatment steps each with a specific purpose and with the common objective of reducing the volume of waste which will require treatment by disposal in landfill or incineration. In order to achieve this objective, the mechanical process will maximise recovery and recycling. The envisaged treatment steps are outlined in the following sections.

Bag Opening and Primary Screening

<u>Bag Opening</u>

The first stage of the mechanical process will be bag opening. Waste will be fed evenly into the hoppers of the bag openers by means of the mechanical grab machines. The fundamental objectives of bag opening are as follows:

- Size reduction (in the region of 300/400mm downwards); and
- Freeing of contents within plastic bags.

Bag Opener

A bag opener is essentially a slow speed coarse shredder. The slow rotating speed of the bag opener shafts 'rips' bags and liberates their contents. Importantly, the bag openers perform a 'ripping' function as opposed to a fine 'shredding' function. As a result, large items are reduced in size without the fine shredding of smaller items. Hence, the bag opening process causes minimum contamination and damage to potential recyclables thereby optimising the extraction of such materials in a down stream process.

Typical Bag Opener Installation

Typical Bag Opener Cutting Shaft Arrangement

Primary Screening

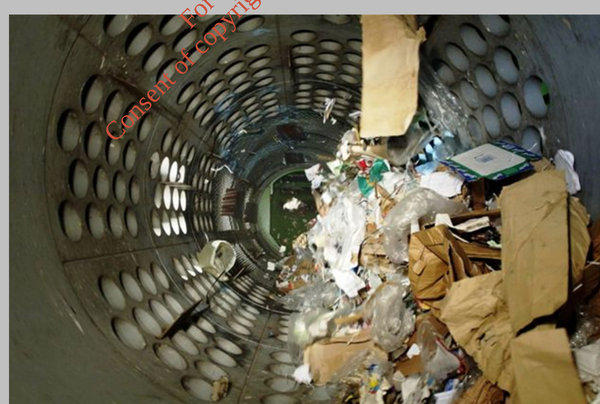
Waste from the bag openers will be transferred, by means of conveyors, to the primary screens. It is envisaged that the primary screens will be trommel screens.

Trommel Screen

A trommel screen can be simply described as a rotating cylindrical sieve. The rotating action of the trommel screen generates a lifting and tumbling action and is therefore regarded as an extremely aggressive and effective screen. Trommel screens used for the primary screening of waste are typically fitted with heavy gauge punch plate screens to cope with the unpredictable nature of municipal waste.

As the tumbling waste falls onto the screens within the trommel, material that is less than or equal to the screen openings falls through the screens. Larger material continues to be tumbled along the length of cylindrical sieve and will ultimately be discharged out the end of the trommel drum as an oversize fraction.

Typical Trommel Screen Installation



Typical Tumbling Action generated by a Trommel Screen

The cylindrical sieve in each of the trommel screens will be fitted with two screen sizes – approximately 80mm and approximately 230mm. The screens with the smaller openings (approximately 80mm) will be fitted closest to the inlet end of each trommel screen and the screens with the larger openings (approximately 230mm) will be fitted closest to the outlet end of each trommel screen.

The output from each of the trommel screens will be in the form of three fractions:

- Organic fines (< 80mm);
- Intermediate (between 80mm and 230mm); and
- Oversize (> 230mm).

The mechanical treatment process will be configured such that the extraction of the organic fines fraction (the bag opening and primary screening of the waste) can be undertaken in situations where downstream equipment is out of service (e.g. the recyclables extraction and/or the SRF production equipment). In this situation, the intermediate and oversize fractions would be conveyed back into the waste reception bunker for re-processing (when the downstream equipment is back in service). Thus, an outage (for a period of approximately two days) in the mechanical treatment process will not adversely affect the treatment of the organic fines fraction in the biological treatment process.

Treatment of the Organic Fines Fraction

The organic fines fraction will contain the majority of the organic items (food waste and garden waste). Firstly, ferrous and non-ferrous metals will be separated from this fraction by means of an overband magnet and an eddy current separator. This fraction (following the extraction of metals) will subsequently be conveyed to the biological treatment buildings.

Overband Magnet

An overband magnet comprises of a permanent magnet located within a belt conveyor. In essence, a moving belt surrounds the magnet. The length of the moving belt is sufficiently long such that the belt travels in and out of the permanent magnet's magnetic field.

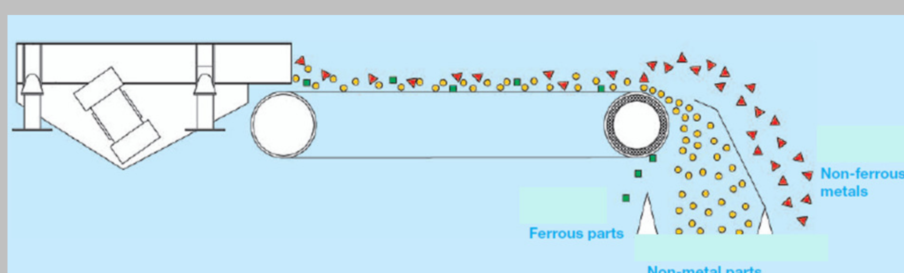
The overband magnet arrangement is positioned such that its permanent magnet is located over the flow of materials (containing ferrous metals) on another conveyor. Ferrous items are attracted upwards to the moving belt that surrounds the permanent magnet. Once the moving belt (with the attracted ferrous metals) travels outside of the permanent magnet's magnetic field, the ferrous items fall due to gravity into a bin or onto another transfer conveyor.

Typical Overband Magnet Installation

Eddy Current Separator

An eddy current separator consists of a belt conveyor with two pulleys. The driving drum on the feeding side is typically driven by a geared motor. The belt speed can be electronically adjusted by continuous control. An extremely strong and fast rotating permanent magnetic system is located in the head pulley. The specific geometry of the magnetic system generates a pulse like magnetic field. The number of revolutions of the magnetic field is also continuously adjustable and can thus be adapted to specific applications.

When the non ferrous items are exposed to the pulse like magnetic field, eddy currents are generated which in turn generate magnetic fields whose flux are opposed to the magnetic fields generating them, thus causing repulsive forces which discharge non ferrous metals out of the material flow.



Eddy Current Separator Principle

Treatment of the Intermediate Fraction

It is considered that the intermediate fraction will be rich in recyclables. Indeed, a substantial portion of the recyclable metals (e.g. beverage cans and food tins) and plastics (e.g. bottles and containers) will be contained in this fraction.

Firstly, ferrous metals and non-ferrous metals will be separated from this fraction by means of an overband magnet and an eddy current separator.

The intermediate fraction will subsequently be conveyed to a ballistic separator where a two dimensional fraction and a three dimensional fraction will be generated. A fines fraction, which will also be generated by the ballistic separator, will be conveyed such that it combines with the organic fines fraction from the trommel screens.

Ballistic Separator

The principle of operation of a ballistic separator is described as follows. Typically, a ballistic separator comprises of a series of paddles which are positioned on an incline. A rotating eccentric shaft arrangement connected to the paddles causes the paddles to have an upwards and forwards cyclical motion. The upwards and forwards movement of the paddles is not synchronised (i.e. one paddle could be up while another paddle is down). The throwing action, generated by the paddles, is such that flat items (two dimensional items) continue to move up the incline of the paddles while three dimensional items eventually move down the incline of the paddles (due to the tendency for three dimensional items to roll). Fine materials liberated by the throwing action fall through holes in the paddles.

Typical Ballistic Separator Paddles

The two dimensional fraction (mainly including paper and light plastics) will be subjected to Near Infra Red (NIR) separation in order to extract a mixed paper fraction as a recyclable. The remaining two dimensional materials will then pass through an air knife (air classification) to extract a plastic film fraction as a recyclable. The extracted recyclables will pass through a manual picking station where a quality pick will be performed in order to further improve the quality of the extracted recyclables before being discharged into a holding bunker beneath the picking station.

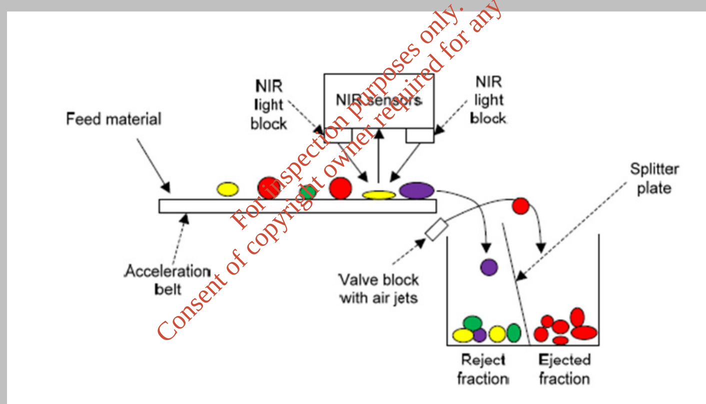
From the holding bunker, the recyclables will be conveyed for alternative baling. The bales of recyclables will be stored indoors in the bale storage area.

The three dimensional fraction will be transferred to a series of NIR optical sorters to recover recyclable dense plastics (e.g. HDPE and PET).

Following the extraction of recyclables, the remaining two dimensional and three dimensional items will be conveyed to the SRF production equipment.

NIR Optical Sorters

NIR sorting machines utilise the near infrared part of the electromagnetic spectrum. The NIR spectrum is a small part of the electromagnetic spectrum and lies between the visible and the medium infrared spectrums. The frequency range of NIR light is 700 to 2000 nanometres. NIR sorters operate by measuring the spectrum of NIR wavelengths reflected and absorbed by a material. Individual polymer types absorb and reflect different spectra under infrared light. The intensity of infrared light reflected off the surface of the material at a range of frequencies is measured and the results compared against known polymer signals to determine the resin type for each piece of material.



NIR Optical Sorter Principle

The typical NIR separation process is as follows:

- Before running, the NIR sorter is pre-programmed with specific sort criteria. For example the machine could be set up to positively sort PET (identify and eject an output stream of PET);
- Feed material is fed evenly onto a fast moving conveyor belt, known as the acceleration belt;
- A scanner/detection unit, normally positioned above the belt, scans the full width of the acceleration belt. Bright lights are positioned to reflect light back up from the belt and into the NIR detectors;
- As feed material passes under the scanner, the light is reflected off the surface of the material and a signal is detected by the scanner unit;

- The scanner unit identifies the polymer type for each item;
- The sorter determines the location of each item on the acceleration belt;
- When an item has been identified for removal the detector sends a signal for a specific air valve on the valve block to open. The valve block is positioned at the discharge end of the acceleration belt. The distance between the detectors and valve block is determined by a number of factors including belt speed and processing time;
- As the material is discharged off the end of the acceleration belt the specified valve opens and a jet of compressed air is fired at the detected item;
- The material that is fired at (positively sorted) is lifted by the air jet over a deflector/splitter plate and into the eject/selected fraction;
- Non-sorted material is discharged off the end of the belt and falls under the deflector plate into the reject fraction; and
- Conveyor belts are usually positioned underneath the eject and reject fractions in order to carry the fractions away from the NIR sorter, either to product collection bays or for further processing.

Picking Station

A picking station is essentially a slow moving belt conveyor which travels through an enclosed cabin. Within the cabin, operators manually pick items from the moving waste stream and deposit the said items in provided chutes which lead to bins or transfer conveyors. The environment within the cabin of the picking station is generally controlled in respect of noise, dust and temperature. Fresh air is typically ducted into the cabin from the outside environment thereby enhancing the working environment within the picking station cabin.

In modern MBT facilities, the extraction of the recyclables is undertaken by fully automated equipment (e.g. NIR optical sorters). Manual picking in modern MBT facilities is generally an ‘end of line’ process with the sole purpose of improving the quality of extracted recyclables. This ‘end of line’ picking involves the manual picking of contaminants out of the extracted recyclables.

Typical Picking Station Installation

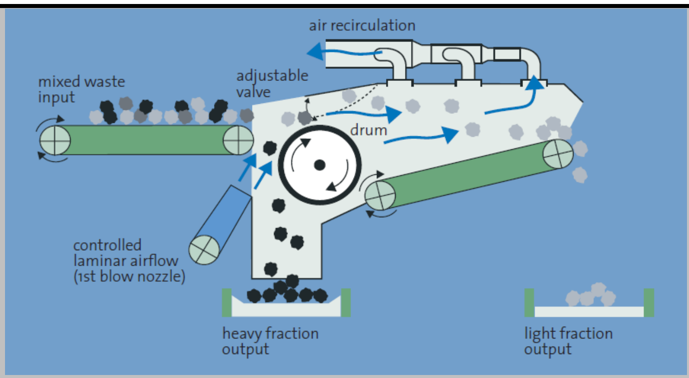
Treatment of the Oversize Fraction

Firstly, ferrous metals will be separated from the oversize fraction (> 230mm) by means of an overband magnet. The oversized fraction will be subsequently processed though a single drum separator (air classification) such that a heavy fraction and a light fraction is generated. The light fraction will typically contain materials such as plastic film, paper and cardboard, while the heavy fraction will contain materials such as timber, stone, hard plastics and wet plastic film, wet paper/cardboard. The split between the heavy and light fraction will be dependent on the settings of the single drum separator (e.g. air flow and pressure).

Single Drum Separator

The single drum separator is a combination of a recirculation fan, a separation section with a rotating drum and a connecting expansion chamber. The single drum separator uses air as the separation medium and is thereby regarded as air classification. It is a separating solution based on density of materials.

In essence, the lower density items are carried forward and over the rotating drum by the air stream generated by the recirculation fan. The higher density items fall out of the air stream (before the rotating drum) and on to a transfer conveyor. In the expansion chamber, the lower density items fall out of the air stream (principally due to a reduction in air speed) and are transferred out of the single drum separator by means of a conveyor.



Single Drum Separator Principle

The light fraction will pass through a series of NIR optical sorters where plastic film and paper/cardboard will be extracted as recyclables. The recyclables will pass through a manual picking station where a quality pick will be performed in order to further improve the quality of the extracted recyclables before being discharged into a holding bunker beneath the picking station. From the holding bunker, the recyclables will be conveyed for alternative baling. The bales of recyclables will be stored indoors in the bale storage area.

The remaining materials within the light fraction along with the heavy fraction from the single drum separator will be conveyed to the SRF production equipment.

Baler

A baler is a mechanical device that compresses/presses recyclables or SRF into a rectangular bale. The compressing/pressing action is achieved by a hydraulic system. The hydraulic system can be adjusted thereby facilitating the adjustment of the press force generated and therefore the bale density. In broad terms, a baler comprises of a charging hopper, a hydraulic system, a bale chamber and a tying system. The charging hopper feeds the material into the bale chamber which forms the bale. The baler automatically ties the bale with wire (plastic wiring in the case of SRF) so as to ensure that the bale holds its shape and integrity during transport.

Typical Baler

Typical Baler Installation

SRF production

The intermediate fraction and the oversize fraction, following the extraction of the recyclables, will pass through a NIR optical sorter where items unsuitable for SRF production (e.g. PVCs) will be removed for disposal. The remaining material will then be fine shredded to a size (between 20mm and 50mm) that satisfies market conditions. The shredded SRF will then be discharged to a storage bay prior to SRF drying.

The SRF product will be loaded by means of a loading shovel into a hopper and conveyed into the SRF Building for thermal drying.

The heat to the thermal dryer will be waste heat from the CHP (Combined Heat and Power) plants at the nearby Drehid Waste Management Facility. The hot process air to the thermal dryer will be at an envisaged temperature of 150°C.

The dried SRF will be conveyed into holding bunkers thereby providing buffer storage. From the buffer storage bunkers, the dried SRF will be conveyed to compactors or to a baling and wrapping station. The compactors will load the loose SRF into bulk trailers for distribution to end users in Ireland. The baling and wrapping station will facilitate the storage of SRF bales outdoors for longer term storage and/or transport overseas.

Thermal Dryer

The SRF thermal dryer is a drum dryer. Drum drying uses a specially designed rotating drum with injection of heated air. This process is very similar to a domestic vented tumble drier in concept. As the material is passing through the rotating drum, hot process air is passed directly into the drum. The system is a continuous process, with a typical feedstock residence time in the dryer of approximately twenty minutes.

The damp SRF product is conveyed into the drum of the thermal dryer by a dosing screw. The rotating drum is equipped with multiple drying sections for high performance drying. At the first contact between the drying air and the damp SRF product a spontaneous evaporation occurs, resulting in a fast temperature drop of the drying air. Following this stage, de-hydration takes place in the next sections of the drum, resulting in a drying air temperature of approximately 50°C at the drum outlet. During the process the dry solids content of the product will slowly rise to approximately 85%, depending on the various process parameters. As a result of this drying principle, the temperature of the product will not exceed 55-65ºC – thereby minimising the occurrence of fires. At the rotary drum outlet the dried product is separated from the drying air in a drop out box and a multi cyclone.

Typical Thermal Drier Installation

Wrapping Machine

The wrapping machine automatically wraps rectangular bales of SRF with numerous layers of plastic film.

Typical Wrapper Installation

2.3.1.4 Biological Processing of Waste

The biological treatment process will involve a composting phase and a maturation phase.

<u>The Composting Process</u>

Within the Biological Treatment Buildings, the organic fines fraction (<80mm) generated in the mechanical process will be conveyed to an automatic filling system that will fill the composting tunnels.

The conveyor system from the Mechanical Treatment Building will be configured such that organic fines can be conveyed to an intermediate storage area (adjacent to the composting tunnels) in the event that the tunnel composting process is unavailable. In such a situation, the organic fines will afterwards be loaded by loading shovel into a hopper that will feed the automatic tunnel filling system.

Typical Automatic Tunnel Filling System Installation

It is envisaged that the fresh organic fines will reside in the composting tunnels for a period of four weeks. During this period, intermediate turnings from one composting tunnel into another composting tunnel will take place in order to further homogenise the material and to optimise the process efficiency.

Each composting tunnel will comprise of a sealed concrete structure provided with an insulated loading door on the roof and an insulated unloading door on the front. The doors will be equipped with a rubber sealing arrangement. The concrete floor will house a series of parallel PVC pipes (embedded in the concrete) which will be lengthwise incorporated in the floor. Tapered plastic nozzles (spigots), fitted to the top of the pipes will protrude through the concrete floor.

Typical Composting Tunnel with Spigot Floor

Each composting tunnel will have its own centrifugal aeration fan which will blow a mixture of fresh air and process air through an air plenum and into the PVC pipes embedded in the floor of the composting tunnel. The spigots will distribute aeration air uniformly to the composting material within the tunnel. Pressurised air will flow through the composting material thereby ensuring intensive contact between the air and the composting material. In this way, the composting process will be closely controlled and aerobic conditions will be maintained in the complete batch of material being processed. The mixture of fresh air and process air will be set using computer controlled, pneumatically actuated valves.

Typical Aeration Fan and Ductwork Installation

The quantity of air supplied to the composting process will be determined by the phase of the composting process. The control of the tunnel centrifugal fan will be mainly based on the temperature of the composting mass (determined by means of temperature probes). A frequency transformer will control the speed of the centrifugal fan and thereby the displacement of air from this fan. The setting for the fresh air supply valve will be based on the measured oxygen value within the tunnels and the temperature of the composting mass. At high temperatures, the fresh air supply connected to the relevant central air ductwork will open further and a larger quantity of fresh air will be blown into the tunnel. When the oxygen level is too low, the supply of fresh air to the tunnel will also be increased. The re-circulation air supply valve will be electronically linked to the fresh air supply valve and its operation will be exactly opposite to the fresh air supplying valve. If less re-circulation air is supplied, more fresh air will be automatically blown through the material. Each composting tunnel will be connected to two central air ductworks:

- central fresh air supply ductwork; and
- central process air discharge ductwork (for the warm and humid air released during the composting process).

The composting tunnels will also be equipped with a sprinkling system which will re-circulate the waste water contained in the process waste water tanks. The process waste water tanks will be located in the biofilter/odour abatement system plant rooms. The sprinkling system will maintain optimum moisture levels within the composting mass thereby optimising the stabilisation process.

Process air from the composting tunnels will flow through a chemical acid scrubber (in order to control the ammonia level in the emissions) and a biofilter before being vented to atmosphere.

The process air discharge ductwork to the composting tunnels will be equipped with a one-way air valve, which ensures that no process air will enter another composting tunnel.

Each tunnel will also be equipped with a negative pressure protection valve whereas overpressures will be managed by a central safety valve located in the main exhaust ductwork. In the composting tunnels, negative pressure will be maintained throughout the process in order to prevent polluted and odorous air from being released inside the buildings.

Negative pressure will also be created in all of the facility buildings to force odorous air to the odour abatement system thereby preventing uncontrolled emissions from the MBT facility.

The composting tunnels will also feature an automatic unloading system thereby obviating the need for intervention by a loading shovel in the unloading process. The aforementioned automatic unloading system will convey the material to the maturation buildings.

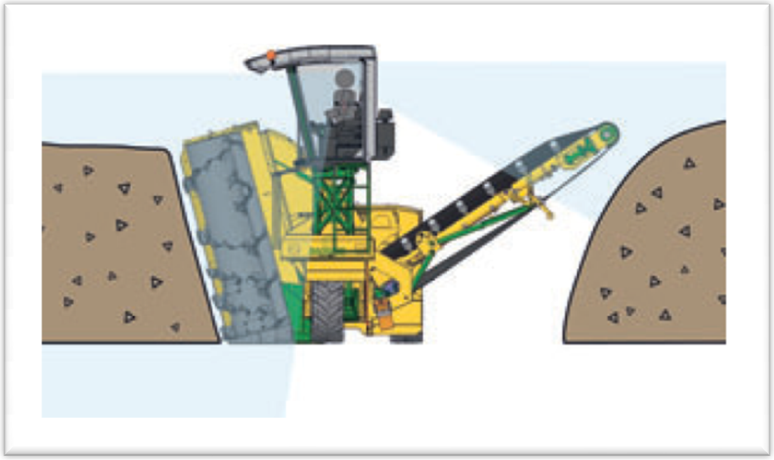
Typical Automatic Tunnel Unloading System Installation

The Maturation Process

The material discharged from the composting tunnel process will be conveyed to an intermediate storage area within the maturation buildings. The compost will then be moved by loading shovel and placed into trapezoidal windrows within dedicated maturation bays. The windrows will be approximately 17.5m wide, 30m long and 2.5m high. The windrows will be frequently turned (to de-compact material and to encourage optimum decomposition) by means of a diesel powered mobile windrow turner.

It is envisaged that the material will reside in the maturation buildings for a period of five weeks.

The floor of the maturation bays will feature aeration pipe work embedded in concrete. Each maturation bay will have a separate under floor aeration system powered by a separate centrifugal fan. It will also be possible to isolate each length of aeration pipe work in a maturation bay such that aeration is only provided beneath the composting mass. Therefore, when the composting mass is turned/moved by the windrow turner from one side of the maturation bay to the other, any aeration pipe work that is not covered by composting mass can be isolated from the aeration system (thereby preventing the short circuiting of air). It is envisaged that the trapezoidal windrows will be turned weekly by means of a diesel powered mobile windrow turner.



Trapezoidal Windrow Turner Principle

The under floor aeration system will be operated as a negative pressure system thereby minimising the generation of odourous compounds within the maturation buildings.

Following the maturation process, the stabilised material will be loaded into a hopper and subsequently conveyed to an intermediate storage area in the Refining Building.

2.3.1.5 Stabilised Output Refining and Treatment

The stabilised material will be retrieved from the intermediate storage area by means of a loading shovel and fed into the refining line buffering and dosing hopper. This hopper will be equipped with a de-compacting device which will loosen the material thereby enhancing the efficiency of the downstream refining equipment.

Firstly, residual ferrous metals will be removed from the stabilised material by way of an overband magnet.

In order to produce a Compost Like Output (CLO), the stabilised material will subsequently be conveyed onto a screen. This screen will produce two fractions (oversize and undersize). The undersize fraction will be used to produce a CLO material. The screen will be configured such that the undersize fraction has a maximum particle size of 12mm. This maximum particle size of 12mm is governed by the Animal By-Product Regulations – when processing material to the EU Standard (70°C for a period of one hour).

The undersize fraction will be discharged from the screen into an intermediate storage bay and subsequently fed by loading shovel into the hygienisation tunnel in order to treat the material to a standard (in compliance with Animal By-Product Regulations) that allows it to be spread on land. The material will be heated to a temperature of 70°C for a period of one hour.

The hygienisation tunnel will consist of an insulated concrete tunnel where air will be blown in a controlled way through the floor in order to ignite the natural self heating ability of the material. Backup heating will be provided by a water-to-air heat exchanger receiving heat from the CHP plants at the nearby Drehid Waste Management Facility. When the material within the hygienisation tunnel reaches a temperature of 70°C for a period of one hour, the material will be removed from the hygienisation tunnel. A number of temperature probes within the material will indicate to the control system that the aforementioned temperature and time parameters have been achieved.

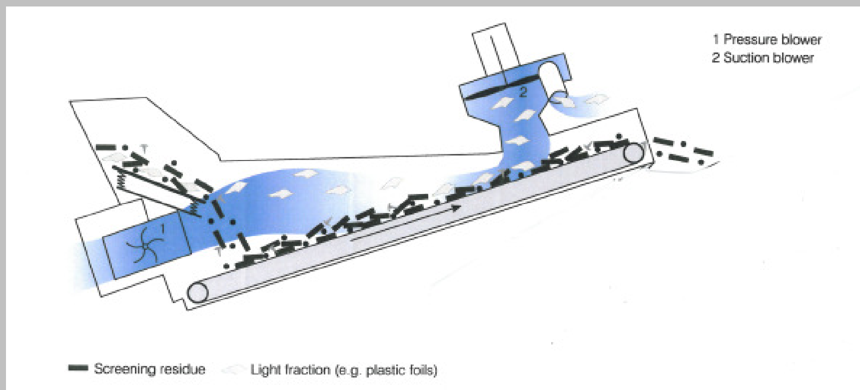
It should be noted that the design of the MBT Facility facilitates the production of CLO as a 'future proofing' measure. The ability to produce CLO will facilitate the future exploitation of more established markets that are likely to develop for the use of CLO (such as brown field restoration).

During the remaining operational life of the nearby Drehid Waste Management Facility, it is not envisaged to produce CLO for export out of the Bord na Móna landholding. Rather, biostabilised waste will be produced for acceptance at the nearby Bord na Móna landfill until its permission to accept waste expires in 2028.

The oversize fraction (12mm to 80mm) will undergo wind sifting (air classification) to recover light and high calorific value plastics which will be diverted to the Mechanical Treatment Building for SRF production. This light combustible fraction will be automatically filled into enclosed containers in the Refining Building. The enclosed containers will be transferred by means of a truck to the SRF processing line (within the Mechanical Treatment Building). Within the Mechanical Treatment Building, the enclosed containers will be discharged into a dedicated hopper which will feed the material to the SRF processing equipment.

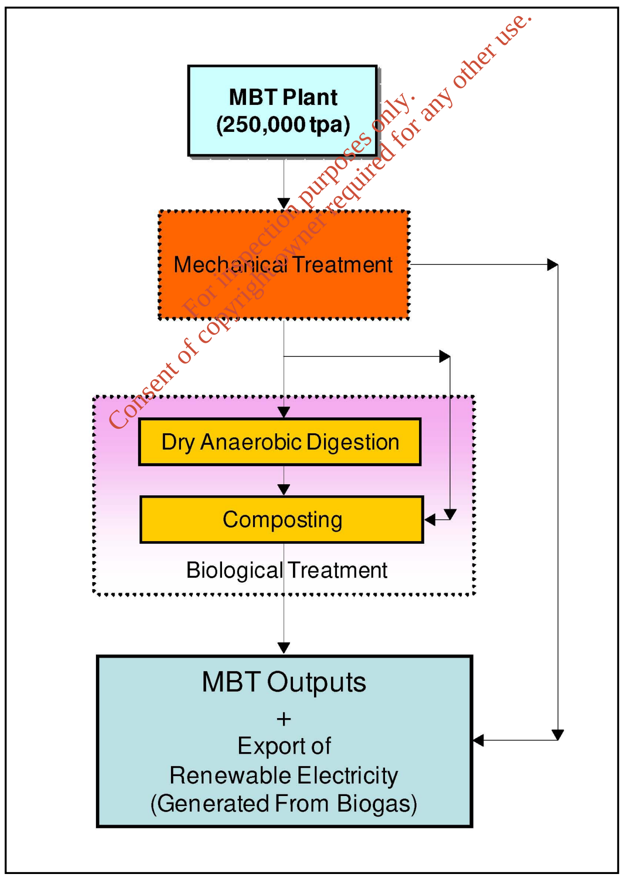
Wind Sifting Process

The wind sifting process typically involves the use of air to separate the light fraction from screening residues. A pressure-suction process enables an effective separation to take place. In the first step, material is subjected to a pressurised air stream. The high pressure air causes the lightweight materials to rise within a chamber and subsequently fall on top of the heavier materials. In the second step, the lightweight material is drawn off by a powerful suction blower.



Wind Sifter Principle

2.3.2 *Configuration B (MBT with Dry Anaerobic Digestion and Composting)*



Flow Diagram No. 2. Configuration B (MBT with Dry Anaerobic Digestion and Composting

As the mechanical process and the refining and ABP hygienisation process for Configuration B is identical to that of Configuration A (MBT with Composting), only "Biological Processing of Waste" is detailed below for Configuration B.

2.3.2.1 Biological Processing of Waste

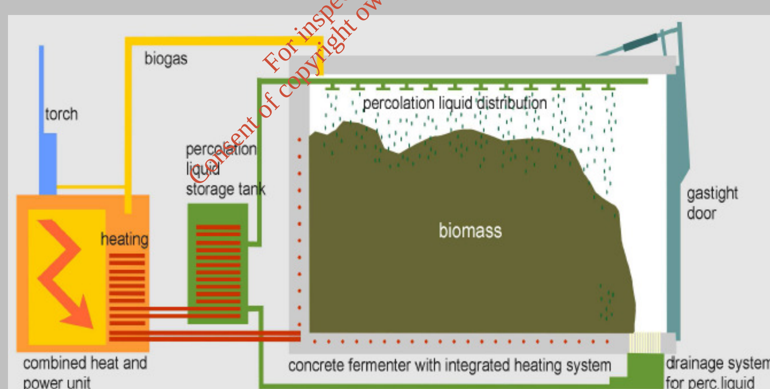
Within the Biological Treatment Buildings, the organic fines fraction (<80mm) generated in the mechanical process will be stored in an intermediate storage area between the Dry AD (anaerobic digestion) tunnels and the composting tunnels.

Part of the organic fines fraction (50,000 TPA) will be processed in the Dry AD tunnels, while the remainder of the organic fines fraction will be processed in the composting tunnels along with the digestate from the dry anaerobic digestion process.

The Dry Anaerobic Digestion Process

Dry Anaerobic Digestion Process

Anaerobic digestion (AD) is a natural process of decomposition and decay that takes place in the absence of oxygen and by which organic matter is broken down to its simpler chemical components. The primary components produced are methane and carbon dioxide.



Typical Schematic of a Dry Anaerobic Digestion Process

The organic fines fraction from the intermediate storage area will be loaded into the dry AD tunnels by means of a loading shovel.

Loading of Dry AD Tunnels

Each dry AD tunnel will comprise of a sealed concrete structure equipped with a loading/unloading insulated door provided with a pressurised rubber seal. The concrete floor will house a series of parallel PVC pipes (embedded in the concrete) which will be lengthwise incorporated in the floor. The aforementioned pipes will be connected to a medium pressure blower. Tapered plastic nozzles (spigots), fitted to the top of the pipes will protrude through the concrete floor. The spigots will transfer air from within the pipes to the material in the tunnels in order to:

- keep the spigots open during the loading of the tunnel with organic material;
- increase rapidly the material temperature in the first phase of the process by a short aerobic stage aimed at consuming the oxygen in the tunnel before starting the anaerobic process;
- flush the biogas from the material at the end of the AD process.

Each tunnel outlet will be equipped with a series of pneumatic valves which will be used to:

- open/close the biogas flow from the tunnels to the biogas storage bladders
- open/close the exhaust air flow heading to the biofilter
- open/close the re-circulation circuit flowing through the spigots in the tunnel floor

The tunnels will also be equipped with a sprinkling system which will re-circulate the percolate contained in the fermentation tanks. The sprinkling system will be used in the beginning of the process in order to activate the anaerobic digestion process by inoculating the fresh organic material with the bacterial activity present in the fermentation tanks. The fermentation tanks will be constructed adjacent to the dry AD tunnels (between the dry AD tunnels and the composting tunnels).

In the dry AD tunnels, a slightly positive pressure will be maintained throughout the process in order to prevent air entering the tunnels during the anaerobic phases. Each tunnel will also be equipped with an over/under pressure protection valve which will activate in case of excessive under/over pressures within the tunnel.

Following the loading of the organic fraction into the dry AD tunnels and the closing of the loading/unloading door, the medium pressure blower will start to re-circulate the tunnel air through the spigot floor. This action will induce a preliminary aerobic process which will rapidly raise the temperature of the feedstock to the mesophilic level (temperatures of 34 – 37°C) required in the AD process. As this aerobic process continues, the oxygen level in the air will drop resulting in the process converting to anaerobic conditions. After this aerobic first stage, the biogas valve will open thereby allowing the biogas to be extracted from the tunnels and into the biogas storage bladders. The biogas storage units will be flexible bladders and will be located on the roof of the dry AD tunnels.

The floors and walls of the dry AD tunnels will be heated in order to sustain mesophile temperatures in the process. Heat produced by the dry AD CHP plants will be used in the heating of the floors and walls. A series of hot water pipes will be embedded in the floors and walls of the tunnels to facilitate the aforementioned heating. Thus, the medium for the transfer of heat from the CHP plants to the floors and walls of the tunnels will be hot water.

The biogas storage units will also collect the biogas generated in the fermentation tanks which will mix with the biogas coming directly from the tunnels thereby providing a uniform mixture for the biogas engines within the CHP plants. The biogas storage units will be sized to facilitate the shutdown and maintenance of the biogas engines and the biogas cleaning equipment in the CHP plants.

Biogas produced in the dry anaerobic digestion process will be processed (gas cleaning, removal of contaminants and moisture) before it is combusted in the CHP plants. It is envisaged that two CHP plants will be provided to process the biogas thereby producing renewable electricity and heat. The envisaged specification of each CHP plant is as follows:

- Electrical Output of 844 Kw
- Thermal Output (Water and Exhaust) of 829 Kw

It is envisaged that during the process the medium pressure blowers will intermittently re-circulate the biogas through the spigot pipes and in to the material in order to optimise biogas production by maintaining the proper porosity in the material and homogenising the process conditions in the entire batch of material.

Typical Biogas Storage Units

At the end of the process, when the biogas production lowers, the fresh air valve will open and the medium pressure blower will start to purge the tunnel of biogas. When the biogas concentration drops below a certain level, the biogas valve will close and the exhaust air valve will open. This exhaust air, still mixed with traces of biogas, will be diluted with air coming from the MBT buildings such that the exhaust air is below the LEL (Lower Explosion Level). The exhaust stream will then be transferred to the acid scrubber and biofilter.

When the analysing system indicates that the methane content in the tunnel atmosphere is below the LEL, the door safety interlock will open and the tunnel door can be opened. The digestate will then be emptied from the AD tunnels with a wheel loader and transferred to the feeding hopper/mixing unit that feeds the composting tunnels.

It is envisaged that the residence time in the dry AD tunnels will be four weeks. It is considered that this retention time will optimise biogas productivity while leaving organic load in the digestate to participate in the downstream composting process.

The Composting Process

The digestate from the dry AD process will be mixed with fresh organic fines in a dedicated feeding hopper/mixing unit prior to being conveyed to an automatic filling system that will fill the composting tunnels. The feeding hopper/mixing unit will:

- de-compact the materials
- mix the digestate and the fresh organic fines
- feed the composting tunnels automatic filling system

Typical Automatic Tunnel Filling System Installation

It is envisaged that the mixture of digestate and fresh organic fines will reside in the composting tunnels for a period of four weeks. During this period, intermediate turnings from one composting tunnel into another composting tunnel will take place in order to further homogenise the material and to optimise the process efficiency.

Each composting tunnel will comprise of a sealed concrete structure provided with an insulated loading door on the roof and an insulated unloading door on the front. The doors will be equipped with a rubber sealing arrangement. The concrete floor will house a series of parallel PVC pipes (embedded in the concrete) which will be lengthwise incorporated in the floor. Tapered plastic nozzles (spigots), fitted to the top of the pipes will protrude through the concrete floor.

Typical Composting Tunnel with Spigot Floor

Each composting tunnel will have its own centrifugal aeration fan which will blow a mixture of fresh air and process air through an air plenum and into the PVC pipes embedded in the floor of the composting tunnel. The spigots will distribute aeration air uniformly to the composting material within the tunnel. Pressurised air will flow through the composting material thereby ensuring intensive contact between the air and the composting material. In this way, the composting process will be closely controlled and aerobic conditions will be maintained in the complete batch of material being processed. The mixture of fresh air and process air will be set using computer controlled, pneumatically actuated valves.

Typical Aeration Fan and Ductwork Installation

The quantity of air supplied to the composting process will be determined by the phase of the composting process. The control of the tunnel centrifugal fan will be mainly based on the temperature of the composting mass (determined by means of temperature probes). A frequency transformer will control the speed of the centrifugal fan and thereby the displacement of air from this fan. The setting for the fresh air supply valve will be based on the measured oxygen value within the tunnels and the temperature of the composting mass. At high temperatures, the fresh air supply connected to the relevant central air ductwork will open further and a larger quantity of fresh air will be blown into the tunnel. When the oxygen level is too low, the supply of fresh air to the tunnel will also be increased. The re-circulation air supply valve will be electronically linked to the fresh air supply valve and its operation will be exactly opposite to the fresh air supplying valve. If less re-circulation air is supplied, more fresh air will be automatically blown through the material. Each composting tunnel will be connected to two central air ductworks:

- central fresh air supply ductwork; and
- central process air discharge ductwork (for the warm and humid air released during the composting process).

The composting tunnels will also be equipped with a sprinkling system which will re-circulate the waste water contained in the process waste water tanks. The process waste water tanks will be located in the biofilter/odour abatement system plant rooms. The sprinkling system will maintain optimum moisture levels within the composting mass thereby optimising the stabilisation process.

Process air from the composting tunnels will flow through a chemical acid scrubber (in order to control the ammonia level in the emissions) and a biofilter before being vented to atmosphere.

The process air discharge ductwork to the composting tunnels will be equipped with a one-way air valve, which ensures that no process air will enter another composting tunnel.

Each tunnel will also be equipped with a negative pressure protection valve whereas overpressures will be managed by a central safety valve located in the main exhaust ductwork. In the composting tunnels, negative pressure will be maintained throughout the process in order to prevent polluted and odorous air from being released inside the buildings.

Negative pressure will also be created in all of the facility buildings to force odorous air to the odour abatement system thereby preventing uncontrolled emissions from the MBT facility.

The composting tunnels will also feature an automatic unloading system thereby obviating the need for intervention by a loading shovel in the unloading process. The aforementioned automatic unloading system will convey the material to the maturation buildings.

Typical Automatic Tunnel Unloading System Installation

The Maturation Process

The material discharged from the composting tunnel process will be conveyed to an intermediate storage area within the maturation buildings. The compost will then be moved by loading shovel and placed into trapezoidal windrows within dedicated maturation bays. The windrows will be approximately 17.5m wide, 32m long and 2.5m high. The windrows will be frequently turned (to de-compact material and to encourage optimum decomposition) by means of a diesel powered mobile windrow turner.

It is envisaged that the material will reside in the maturation buildings for a period of four weeks.

The floor of the maturation bays will feature aeration pipe work embedded in concrete. Each maturation bay will have a separate under floor aeration system powered by a separate centrifugal fan. It will also be possible to isolate each length of aeration pipe work in a maturation bay such that aeration is only provided beneath the composting mass. Therefore, when the composting mass is turned/moved by the windrow turner from one side of the maturation bay to the other, any aeration pipe work that is not covered by composting mass can be isolated from the aeration system (thereby preventing the short circuiting of air). It is envisaged that the trapezoidal windrows will be turned weekly by means of a diesel powered mobile windrow turner.

Trapezoidal Windrow Turner Principle

The under floor aeration system will be operated as a negative pressure system thereby minimising the generation of odourous compounds within the maturation buildings.

Following the maturation process, the stabilised material will be loaded into a hopper and subsequently conveyed to an intermediate storage area in the Refining Building

3 SOCIO ECONOMIC

3.1 INTRODUCTION

Human Beings are a vital element to be considered as part of the EIA process. This Chapter assesses the existing environment in addition to the potential impacts on human beings arising from the proposed development.

This Chapter will focus on land use, population, employment, tourism and amenities, infrastructure, community gain and health and safety. Mitigation measures will be proposed to mitigate any potential impacts arising from this proposed Drehid MBT Facility development.

3.1.1 Methodology

A desktop study was carried out in order to examine relevant information pertaining to socio economic activity in the area. The following information sources and references were used to compile this Chapter:

- EPA Guidelines – 'Information to be contained in Environmental Impact Statements', 2002;
- OSI mapping and Aerial Photography to identify land use and possible amenity sites;
- Kildare County Development Plan (2011-2017);
- Central Statistics Office (CSO) information;
- Fáilte Ireland Information in relation to tourism amenity in conjunction with websites of relevant tourism sites and amenities for the area; and
- Environmental Impact Statements for previous developments (within the Bord na Móna landholding) (2004 and 2008).

3.2 EXISTING ENVIRONMENT

Bord Na Móna proposes to develop a Mechanical Biological Treatment (MBT) facility within its landholding located within the townlands of Coolcarrigan and Drummond, Carbury, Co. Kildare. The extent of the Bord na Móna landholding, which comprises 2,544 hectares (ha), is outlined in blue on enclosed Figure 1.1. No modifications to already permitted facilities, including the entrance from the R403 regional road, are envisaged.

The proposed Drehid MBT Facility will primarily accept and process municipal solid waste and will provide for an overall capacity of 250,000 tonnes per annum (TPA).

The site of the proposed MBT Facility is located within the same Bord na Móna landholding as the existing permitted Drehid Waste Management Facility. Access has been provided into the Drehid Waste Management Facility from the R403 via a dedicated entrance and a 4.8km access road. This road will also provide access from the R403 to the proposed MBT Facility.

The Drehid MBT Facility site is located approximately 3.5km north of Allenwood and 10km south of Enfield. Derrinturn is located approximately 3km north west of the closest edge of the site activity boundary and Timahoe crossroads is located approximately 2.5km north east of the closest edge of the site activity boundary.

3.2.1 Land Use

As previously stated the site of the proposed MBT Facility is located within the same Bord na Móna landownership boundary as the existing permitted Drehid Waste Management Facility. This property is located between the Regional Routes R403 (Lucan/Carbury) and R402 (Enfield/Tullamore) that lie to the south and west of the site, and County Roads L5025 and L1019 located to the north and east of the site.

The site consists of cutover bog with a mosaic of bare peat and revegetated areas with scrub, woodland, heath and grassland communities present. It is located within a mixed rural/urban setting at the northwestern extent of County Kildare. Within the extended area, farming enterprises intermingle with a multiplicity of industrial and commercial establishments as well as a number of settlements that have developed primarily along a section of the existing national road system.

3.2.2 Population

This section will look at the population change over the period 2002-2011 to gain an understanding of the socio economic activity in the area. The Bord na Móna landholding is located within the County Kildare townlands of Drehid, Ballynamullagh, Kilmurry, Mulgeeth, Mucklon, Timahoe East, Timahoe West, Coolcarrigan, Corduff, Coolearagh West, Allenwood North, Killinagh Upper, Killinagh Lower, Ballynakill Upper, Ballynakill Lower, Drummond, Kilkeaskin, Loughnacush, and Parsonstown. The Bord na Móna landholding is located in the Electoral Divisions (EDs) of Timahoe North, Timahoe South, Drehid, Dunfierth, Kilpatrick, Windmill Cross and Kilmeage North. The proposed MBT Facility site is located within the ED of Timahoe South. These EDs are located within the overall districts of Naas No.1 Rural Area and Edenderry No. 2 Rural Area.

The objectives for settlements immediately adjacent to the subject site are outlined in Section 3.3 of the Kildare County Development Plan 2011-2016, in accordance with the Regional Planning Guidelines for the Greater Dublin Area 2004-2017. Allenwood and Coill Dubh/Coolearagh are described as *Key Villages,* Prosperous and Derrinturn are *Small Towns*, while Carbury and Timahoe are categorised as *Rural Nodes*.

The function of a Small Town is to develop as a key local centre for services for a population of roughly 1500 to 5000, to cater for local need and support local enterprise. The role of a Key Village is to develop as a local centre for services and to cater for local need and enterprise at an appropriate scale, with limited scope for expansion.

As the MBT facility site remains outside the development boundary of Derrinturn and Allenwood, specific planning objectives relating to these settlements do not apply.

All of the existing settlements in the vicinity are at a considerable distance from the subject site, the nearest being Timahoe, at approximately 2.5km from the proposed MBT Facility activity boundary. Derrinturn is approximately 3km from the proposed MBT Facility activity boundary, while both Allenwood and Coill Dubh are in excess of 3km.

Table 3.1 below illustrates the population change between 2002-2011 in the State, Leinster, County Kildare, the districts of Naas No.1 Rural Area and Edenderry No.2 Rural Area and the ED of Timahoe South. The population statistics for 2006 for these respective areas are also included.

Table 3-1 Population Change 2002-2011

	2002	2006	2011	% Change
State	3,917,203	4,239,848	4,588,252	17%
Leinster	2,105,579	2,295,123	2,504,814	19%
County Kildare	163,944	186,335	210,312	28%
Naas No.1 Rural Area	62,640	74,142	84,049	34%
Edenderry No.2 Rural Area	9,038	10,059	11,756	30%
Timahoe South	533	722	772	45%

Source: Central Statistics Office (CSO) 2012

Table 3.1 above shows that the population has increased in the state as a whole and in Leinster over the period (2002-2011) by 17% and 19% respectively. Population during this period has undergone a significant increase in Co. Kildare (28%) and also within the districts of Naas No.1 Rural Area (34%) and Edenderry No. 2 Rural Area (30%). There has also been an increase in the population within the ED of Timahoe South (45%).

The Kildare County Development Plan 2011-2017 states the key emerging trends for the 2002-2006 and includes;

'Population has more than doubled in the rural hinterlands of urban centres such as Athy, Naas, Newbridge, Clane and Kilcock and the village of Caragh. A considerable amount of this development pressure has arisen from the demand for high numbers of single rural dwellings and the demand for housing within rural settlements….

A high rate of development of rural housing at annual levels of c. 500 dwellings per year between 2000 – 2009 has significantly increased the level of housing in most rural areas. This has resulted in a wide dispersal of development creating a dispersed rural living environment' (Ref Section 3.2).

Other sections of this EIS consider noise, air quality, water quality and traffic impacts and propose mitigation measures where appropriate to ameliorate the impact of the proposed development on nearby receptors. The nearest occupied residential dwelling is located approximately 1km to the west and 1.4km to the east of the proposed MBT Facility activity boundary.

3.2.3 Employment

Employment is an important indicator of the economic standing of an area. This section examines unemployment levels, employment status and industrial groups in County Kildare. The Quarterly National Household Survey (QNHS) provides details of unemployment on a regional level. County Kildare is located in the Mid East Region, therefore this region will be used to illustrate rates of unemployment in the area of the proposed development.

Table 3-2 Quarterly National Household Survey (Q4 2011)

	Unemployment Rate	Participation Rate
State	14.3%	60.2%
Mid-East Region	12.3%	65.5%

Source: CSO, 2012

Table 3.2 illustrates the findings from the most recent QNHS, October to December 2011. The unemployment rate is the number of unemployed persons expressed as a percentage of the total labour force. The unemployment rate for the State was 14.3%, while the unemployment rate for the Mid East Region was somewhat lower at 12.3%. These figures illustrate that unemployment rates remain high throughout the state and the Mid-East Region.

The participation rate is the number of persons in the labour force expressed as a percentage of the total population (over the age of 15 years). From October to December 2011, the participation rate in the State was 60.2% while the Mid East Region's participation rate was 65.5%, which is higher than that of the State.

The CSO publishes figures relating to the live register. These figures are not strictly a measure of unemployment as they include persons who are legitimately working part time and signing on part time. However they can be used to provide an overall trend within an area.

Table 3-3 Live Register 2010-2011

	December 2010	December 2011	% Change
State	437,079	434,784	-0.5%
Mid East Region	42,489	41,889	-1.4%
County Kildare	18,015	17,683	-1.8%

Source: CSO 2012

The figures in Table 3.3 show that over the period December 2010 – December 2011 the number of persons on the live register slightly decreased in all regions. The high number of people on the live register indicates a need for significant employment opportunities in the area.

Socio-Economic Profile

Statistics in relation to the occupational group are provided in the 2006 Census (results from the 2011 Census data are not yet available) for the ED of Timahoe South in which the proposed development is located. Therefore the occupational groups for Timahoe South can be used as an indicator only in the absence of more current data. These occupational groups are outlined in Table 3.4 below.

Table 3-4 Occupational Groups in Timahoe South

Occupational Group	No. Males	No. Females
Farming, fishing and forestry workers	7	0
Other agricultural workers	1	3
Manufacturing workers	46	3
Building and Construction workers	41	1
Clerical and office workers	3	36
Administrative and Government workers	24	22
Transport workers	14	1
Sales workers	23	27
Professional workers	29	26
Service workers	3	21

Occupational Group	No. Males	No. Females
Other	19	19
Total	210	159

Source: CSO, 2006.

Manufacturing workers are the largest occupational group for males in Timahoe South ED (46), while clerical and office workers are the highest for females (36).

The aim of economic development as set out in the Kildare County Development Plan 2011-2017 is to *'provide for the future well being of the residents of the county and the region by facilitating economic development; to promote the growth of employment opportunities in all sectors in accordance with the principles of sustainable development; to achieve a reduction in the unsustainable levels of commuting from the county; to provide a greater focus on community building and improving quality of life'* (Ref Section 5).

It also states that '*County Kildare is strategically positioned to benefit from local, national and international markets owing to its location proximate to the national gateway, a number of ports and airports and also due to its excellent road and rail network through the county linking Kildare to other centres of importance throughout the State. Currently, the county contains a number of significant employers including, Intel, HP and NUI Maynooth in north Kildare, Pfizer in Newbridge, Bord na Móna activities (in both Newbridge and rural County Kildare), the equine industry and the defence forces'* (Ref Section 5.3).

3.2.4 Tourism and Amenities

The current Kildare County Development Plan 2011-2017 states the following in relation to tourism;

'Tourism is an important sector of Kildare's economy and it has grown substantially over the last number of years…. In the context of tourism, the natural environment, landscape, built heritage and attractive towns and villages play a key role' (Ref Section 5.8).

County Kildare is located in the East and Midlands tourist region. The latest available statistics from Fáilte Ireland are the preliminary tourist facts for the year ending December 2010. According to these statistics approximately 5.9 million overseas visitors arrived in Ireland in 2010 generating total revenue of €3.41billion. Domestic tourism expenditure amounted to €1.25 billion making tourism in total a €4.66 billion industry in 2010.

Table 3-5 Overseas Tourism 2010

	Britain (000s)	Europe (000s)	N. America (000s)	Other (000s)	Total (000s)	Revenue (€million)
No. of Visitors-Ireland	2,706	1,985	853	322	5,865	3,412
East & Midlands	402	247	93	31	772	299

Table 3.5 illustrates that there were approximately 772,000 overseas visitors to the East and Midlands region in 2010 and this generated revenue of €299 million.

The top visitor attractions identified by Fáilte Ireland for County Kildare are:

- Irish National Stud & Japanese Gardens
- Castletown House
- Athy Heritage Centre
- Maynooth Castle
- Kildare Town Heritage Centre
- Larchill Arcadian Gardens
- Ballitore Library & Quaker Museum
- Bog of Allen Nature Centre (Lullymore)
- The Irish Pewtermill & Moone High Cross Centre
- Harristown House

The nearest of these top visitor attractions to the proposed development is the Bog of Allen Nature Centre (Lullymore) which is located southwest of Allenwood. This centre focuses on Irish Peatland Heritage and all aspects of its history, folklore, nature & wildlife:

With respect to boglands, Kildare County Council recognises that cutaway and cut-over boglands represent degraded landscapes and/or brownfield sites and thus are potentially robust to absorb a variety of appropriate developments (Ref Section 14.8.2).

The site is located within an area contained within the Western Boglands landscape classification as described in Appendix III of the Kildare County Development Plan 2011-2017. Section 9.2 of this appendix states the following in relation to the Western Boglands landscape '*Badly drained bogs and alluvial lands characterise the unit, which has remained unattractive to agricultural settlement. As a result, the area is thinly populated. However, small settlements such as Allenwood or Robertstown, combined with existing clusters of scattered rural houses (e.g. Lullymore, Blackwood) can be found. Although there is a low population density, the recreation and tourism potential of the area is recognised*'.

Coolcarrigan House has extensive gardens and a 19th century church which are open to visitors. This dwelling is located approximately 1.6km from the proposed MBT Facility and is screened from the proposed MBT facility by an extensive coniferous forestry plantation to the west of the house. In addition, traffic generated by the proposed development will enter the Bord na Móna landholding directly from the R403 by way of the existing entrance, and will therefore not adversely impact on visitors travelling to Coolcarrigan House via the L5025 and L1019 County Roads.

3.2.5 Activities

Walking and Cycling Routes

The Kildare County Development Plan 2011-2017 states the following in relation to walking routes:

Two long distance walking routes are located along the Grand and Royal Canals. Other shorter routes are located mainly in urban settings comprising of heritage trails and Slí na Slainte routes….The eastern uplands, the boglands, the water corridors and disused railway lines coupled with a rich natural, architectural and built heritage provide excellent opportunities to develop further long distance routes (cycling/walking)' (Ref Section 14.11.3).

Sections of the Grand Canal Way and the Barrow Way pedestrian walks coincide adjacent to the 19th Lock to the southeast of Allenwood, though both are approximately 5.5 kilometres from the footprint of the proposed development.

There is also a walk at Donadea Demense, which has a lake that is home to a variety of wildfowl which is located approximately 8.3 kilometres from the footprint of the proposed development.

Forest Parks/Woodlands & Boglands

The Kildare County Development Plan 2011-2017 states the following in relation to Forest Parks/Woodlands & Boglands:

'Approximately 9,200 hectares of land in Kildare is under forest cover. Forests and woodlands provide benefits over and above the revenue yielded from timber and other wood based products. These include recreational and tourism amenities for local communities…24,300 hectares of peatland cover 14.4% of the county. Of the total bog cover, 10% remains intact, 39% is under industrial peat extraction, 25% consists of cutover and cutaway bog and 24% is modified fen area. Some of these boglands are used for recreation/education purposes such as the Bog of Allen Nature Centre in Lullymore operated by the Irish Peatland Conservation Council and Lullymore Heritage Park' (Ref Section 14.11.3).

As stated previously the Bog of Allen Nature Centre (Lullymore) is located southwest of Allenwood. Ardkill Bog/Ardkill Farm offers visitors a chance to see a raised bog in a controlled setting. These are located approximately 7km and 5.5km respectively from the site of the proposed development.

In terms of statutory protection, Carbury and Hodgestown Bogs are designated Natural Heritage Areas (NHAs) and are located approximately 6km to the northwest and 4.0km to the east of the MBT Facility site respectively. Ballynafagh Lake and Bog are designated Special Areas of Conservation (SACs) and cited as proposed NHAs. These are located approximately 5.8km and 6.4km to the southeast of the site boundary. The Long Derries, Edenderry is also an SAC and proposed NHA site and is over 7.2km to the west.

Other Activities

Allenwood Celtic AFC's football pitch is located to the south of the existing entrance on the R403 at Killinagh Upper. A wide belt of mixed deciduous and evergreen trees and shrubs has been planted by the developer along the entire boundary of the Bord na Móna landholding with the grounds of Allenwood Celtic AFC in the interest of visual amenity.

Coarse fishing can be undertaken at both Ballynafagh Lake, near Prosperous and the Grand Canal.

3.3 POTENTIAL IMPACTS

3.3.1 Potential Impacts of Configuration A (MBT with Composting)

Land Use

The development of the proposed MBT Facility will result in an alteration to that part of the current land use of the Bord na Móna landholding. The proposed MBT Facility site currently consists of cutover bog with a mosaic of bare peat and revegetated areas with scrub, woodland, heath and grassland communities present. It will be replaced by an MBT Facility with associated infrastructure. As the proposed MBT Facility will be located in close proximity to an existing waste management activity, it is considered that this development will not result in a significant change of use to the overall Bord na Móna landholding.

Population

The proposed development site is located within a large Bord na Móna landholding and is not in close proximity to dwellings. The MBT Facility will utilise existing internal road infrastructure and access so impacts on the local population will be minimised.

The development is unlikely to have any significant negative effects on the local or broader population. There is likely to be a positive impact on the local population as some of those employed at the proposed MBT Facility may in fact move into or continue to reside in the locality.

Air emissions from the MBT Facility will not cause a nuisance at sensitive receptors. There will be no disruption to the social travel patterns of those residing adjacent to the MBT Facility.

The proposed development will ensure that waste is adequately pre-treated prior to being deposited in landfill. Biostabilised waste from the proposed MBT Facility will be accepted at the Drehid Waste Management Facility during its remaining lifetime, thereby reducing the potential for odour generation at this landfill. In addition, Configuration B (MBT with Dry Anaerobic Digestion and Composting) will produce renewable energy, assisting Ireland to meet its target of 40% of energy consumption being generated from renewable sources by 2020.

Any impacts in relation to noise, air, water quality, traffic and visual impacts are dealt with in those relevant chapters of this EIS.

Employment

The proposed MBT Facility has the potential to create a significant number of jobs in the area with the resultant off shoot benefits. During construction, it is envisaged that the MBT Facility will employ approximately 175 people. When operational, it is envisaged that the MBT facility will provide full time employment for approximately 74 people. This will include management and administrative staff, laboratory technicians, weighbridge operator, maintenance staff, electricians, shift supervisors, technicians, drivers, operatives and cleaning staff.

Tourism and Amenities

Tourist amenities and activities are located at such a distance from the proposed development that they will not be impacted by the proposed development. In addition, traffic generated by the proposed development will not adversely impact on visitors travelling to any of these attractions. Any potential visual impacts are dealt with in Chapter 10 of this EIS.

Within the general area of the MBT Facility site, there are golf courses at Knockanally (near Donadea) approximately 8km to the northeast and Ballygibbon East and Kilshawanny Lower (near Carbury) approximately 10km west of the site. Allenwood Celtic AFC's pitch is located to the south of the existing site entrance on the R403 at Killinagh Upper.

Ballynafagh Lake (approx. 5.8km to the east), near Prosperous, is available for coarse fishing as is the Grand Canal, while Ardkill Bog/Ardkill Farm offers visitors a chance to see a raised bog in a controlled setting. Heather Lodge 'B&B', one of the few in this general area, is close to Allenwood AFC's pitch. There is also a walk at Donadea Demense (approx. 8km to the northeast), which has a lake that is home to a variety of wildfowl. Again, all are a considerable distance from the proposed MBT Facility.

The Kildare County Development Plan 2011-2017 aims to protect the '*architectural heritage and to encourage sensitive sustainable development so as to ensure its survival and maintenance for futur*e generations' (Section 12.1). This includes Carbury Castle, Newbury Hall and Demense that has Trinity Well located therein, and Ardkill House. Coolcarrigan House, which is also listed, has extensive gardens and a 19th century Hiberno-Romanesque church that is also formally preserved, both of which are open to visitors.

These tourist attractions are located a significant distance from the proposed MBT Facility and will not be impacted by the proposed development. In addition, traffic generated by the proposed development will not adversely impact on visitors travelling to any of these attractions.

The only buildings located within the Bord na Móna landownership boundary are the constructed buildings associated with the development of the previously permitted Drehid Waste Management Facility. There are no listed or other buildings of significant architectural or cultural heritage within the vicinity of the MBT Facility site. The nearest such building is Coolcarrigan House, which is located approximately 1.6km from the proposed MBT Facility and is screened from the facility by an extensive coniferous forestry plantation to the west of the house.

There will be no visual impact on any of the surrounding items or facilities of tourist potential. The amenity and tourist potential thereafter, especially of the waterways, will only be compromised if those seeking to travel to such might consider the impact of the additional traffic movements along the surrounding regional routes, as an intrusion. The Grand Canal is at such a distance from the proposed development, that along with the existing and proposed vegetation cover, views from the Grand Canal of the proposed development will be non-existent.

Allenwood Celtic AFC's football pitch is located to the south of the existing entrance on the R403 at Killinagh Upper. As the access road does not require any additional works, the potential impacts on this amenity are not considered significant. A wide belt of mixed deciduous and evergreen trees and shrubs has been planted by the developer along the entire boundary of the Bord na Móna landholding with the grounds of Allenwood Celtic AFC in the interest of visual amenity.

Infrastructure

The Drehid MBT Facility is located within the confines of the Bord na Móna landholding in the townlands of Coolcarrigan and Drummond, County Kildare. The MBT Facility site is accessible via a network of regional routes which in turn link with the National Motorway network. The R403 lies south, and southwest and west of the site. The R403 joins the R402 at Carbury to the northwest of the site. The R402 connects to the M4 while the R403 connects to central and south County Kildare. The M4 (Dublin to Sligo/Galway) motorway is located approximately 9km to the north of the proposed MBT Facility location, while the M7 (Dublin to Limerick/Cork) motorway is located approximately 17km to the south of the proposed MBT Facility location.

Access has been provided into the previously permitted Drehid Waste Management Facility from the R403 via a dedicated entrance and a 4.8km access road. This road will also provide access from the R403 to the proposed MBT Facility.

Contractors hauling waste to the MBT Facility will be required to enter into a contract with Bord na Móna which will strictly control the access routes which the relevant vehicles will be permitted to travel. Proposed haul routes are illustrated on Figure 11.1.

Community Gain

The proposed MBT Facility has been designed and will be constructed and operated to Best Available Techniques (BAT). All information will be available to interested parties and a complaints register will be maintained at the MBT Facility site. The EPA will also undertake regular environmental audits, which will demonstrate how the MBT Facility is performing.

<u>Community Liaison Committee</u>

Consistent with previous proposals and permissions, a community liaison committee has previously been established under the auspices of Kildare County Council in respect of the existing Drehid Waste Management Facility.

The already established committee comprises eight members, as follows:

- two local community representatives;
- two Clane Local Area Committee elected representatives;
- two personnel from Bord na Móna; and
- two personnel from the Planning Authority (Kildare County Council).

In regard to the proposed MBT Facility, it is proposed that this or a similar committee (for agreement with Kildare County Council) will identify environmental works and community facilities to be funded by the MBT Facility Community Development Fund, outlined below.

<u>MBT Facility Community Development Fund</u>

Consistent with previous proposals and permissions, Bord na Móna will agree the establishment of a community development fund with Kildare County Council in respect of the proposed MBT Facility. This fund will contribute to the provision of environmental improvement and recreational or community amenities in the locality. The identification of such projects will be decided by the planning authority in consultation with the Community Liaison Committee. This type of community fund has previously been established for the existing Drehid Waste Management Facility.

<u>Public Education</u>

The educational room in the Administration and Welfare Building of the MBT Facility will be used for the provision of a public education area for environmental education needs. Poster presentations and literature on waste management and on the workings of the Drehid MBT Facility will be available in this meeting room. Provision will also be made for the inspection of the EPA waste licence and Annual Environmental Reports (AERs) in this room.

Health and Safety

Chapter 2 of this EIS outlines Health & Safety measures for the construction and operation of the proposed Drehid MBT Facility.

Impacts regarding health and safety at the development will relate primarily to concerns about individuals either straying or trespassing into the facility, alongside the health and safety of each worker or visitor to the MBT Facility.

In the case of workers and visitors to the site, the day to day operation of this development, including any activities associated with site machinery and on-site vehicles, and additionally how visitors are to present and conduct themselves when engaging with this enterprise, will be undertaken in compliance with all health and safety laws and regulations pertaining to such.

Security fencing will be erected as detailed in Section 2.2.1.2 to prevent accidental or intentional trespass onto the MBT Facility site. Warning signs will be placed along the fencing at regular intervals, informing people of the potential hazards associated with unauthorised trespass.

Access to the MBT Facility will be via the private access road constructed to the south of the facility to join the R403 at Killinagh Upper. The overall Bord na Móna landholding and entrance will continue to be secured against unauthorised access and trespass and the MBT Facility will also have a dedicated secure entrance. All machinery will be locked away during non-working hours and parked within the confines of the site. The limited number of houses in the general vicinity of the site, and the fact that the surrounding roads are not designated walking routes, will undoubtedly reduce opportunistic trespass.

3.3.2 Potential Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)

The potential impacts outlined above for Configuration A (MBT with Composting) will also apply to Configuration B (MBT with Dry Anaerobic Digestion and Composting).

3.4 MITIGATION MEASURES

3.4.1 Mitigation Measures for Configuration A (MBT with Composting)

The proposed development will be developed in a manner such that the impact on human beings is minimised. The proposed development will generate significant employment during the construction and operational phase. This impact is positive, therefore no mitigation measures are proposed in relation to employment. Employment at the proposed MBT Facility may also lead to persons moving into the locality or indeed allowing them to continue to reside in the locality rather than emigrating. Again this is a positive impact for which no mitigation measures are proposed. There are no potential negative impacts on tourism and amenities in the area and therefore no further mitigation measures are required.

The following measures will ensure that the proposed MBT Facility's impact on the receiving environment is minimised.

- Dust, air, odour, noise and surface/ground water will be monitored on site in compliance with an EPA waste licence;
- Mitigation measures in relation to the visual impact are discussed in Chapter 10 of this EIS and in Drawing 6301-2321 of Volume 3 of this EIS (Landscape Plan); and
- The Community Development fund will provide benefits for the local community through the provision of environmental improvement and recreational or community amenities in the locality.

Mitigation measures for Landscape & Visual Impact (Chapter 10) Noise & Vibration (Chapter 9), Water Quality (Chapter 6), Traffic (Chapter 11) and Air/Dust/Odour (Chapter 8) are dealt with in the respective chapters in this EIS.

3.4.2 Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)

The mitigation measures outlined above for Configuration A (MBT with Composting) will also apply to Configuration B (MBT with Dry Anaerobic Digestion and Composting).