Drehid Waste Management Facility

IED Licence Application

Operational Report

December 2018

Revision A

TOBIN CONSULTING ENGINEERS

Operational Report

PROJECT: **Drehid Waste Management Facility IED Licence Application**

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TABLE OF CONTENTS

TABLES & APPENDICES

TABLES

INSERTS

APPENDICES

1 INTRODUCTION

Bord na Móna Plc. (Bord na Móna) owns and operates an integrated waste management facility (WMF) located at Drehid in County Kildare. The existing facility is currently licensed by the Environmental Protection Agency (EPA) (Reg. Ref. W0201-03) to accept municipal solid waste (MSW) for landfilling and suitable organic waste for composting.

Bord na Móna is applying to the EPA (herein referred to as the Agency) for a new Industrial Emissions Directive (IED) Licence for the proposed further development of the WMF. The activities proposed at the site are outlined herein. This Operational Report has been prepared for submission with the IED Licence application and in accordance with the guidance outlined in the *Licence Application Form Guidance* published by the Agency in 2018[1].

1.1 SITE DESCRIPTION

The Drehid WMF has been in operation at the site since February 2008. Planning permission was granted for the facility by Kildare County Council (KCC) in April 2005 (Ref No. 04/371) for the construction of an engineered landfill and composting facility. In November 2005, An Bord Pleanála (ABP) upheld that planning decision following an appeal and an Oral Hearing. A Waste Licence was issued for the facility in August 2005 by the EPA (Reg. Ref. W0201-01). This Waste Licence was replaced by an IED Licence (W0201-03) in December 2013.

Subsequent approvals have been granted for the intensification of waste acceptance at the facility from October 2008 until December 2017 as well as the development of additional infrastructure at the site. A detailed planning and licencing history of the facility is provided in Chapter 2 of the Environmental Impact Assessment Report (EIAR)[2].

Currently, the WMF is permitted to accept 120,000 tonnes per annum (TPA) of pre-treated MSW for disposal to landfill and 25,000 TPA of suitable organic material for composting.

The IED Licence application is confined to an area of 272 hectares (ha), outlined in red on the Regional Site Location Map (Drawing No. 8108-2000). The proposed facility is situated in the townlands of Timahoe West, Coolcarrigan, Killinagh Upper, Killinagh Lower, Drummond, Kilkeaskin, Loughnacush, and Parsonstown. The site is located within the applicant's overall landholding (outlined in blue on the Regional Site Location Map) which has a total area of 2,544 ha.

1.2 CURRENT AND PROPOSED FACILITIES

The existing operational facility comprises the following main facilities and infrastructure:

- MSW Landfill

[1] EPA, *Licence Application Form Guidance – Industrial Emissions (IE), Integrated Pollution Control and Waste Version 2* (March, 2018)
[2] TOBIN Consulting Engineers, *Proposed Development at Drehid Waste Management Facility – Environmental Impact Assessment Report (EIAR)* (December 2017)

- Composting Facility
- Administration Area
- Car Park
- Access Roads
- Weighbridge
- Settlement Lagoons
- Ancillary Infrastructure

Bord na Móna propose to further develop the integrated WMF to provide the following facilities and infrastructure:

- Development of additional non-hazardous and hazardous landfill capacity to provide for the sustainable landfill of these waste streams for a period of twenty five years;
- Pre-treatment or processing of certain waste streams prior to landfill;
- Increasing the capacity of the existing composting facility;
- On-site treatment of leachate; and
- Development of associated buildings, plant, infrastructure and landscaping.

2 UNIT OPERATIONS

The following is a list of the unit operations for the Drehid WMF:

- Non-Hazardous MSW Landfill – continuation of acceptance of waste to the existing MSW landfill facility until 2028 at a maximum acceptance rate of 120,000 TPA;
- Composting Facility – increase the waste intake at the existing composting facility by 20,000 TPA to 45,000 TPA and build an extension to the existing facility to allow for an additional intake of 45,000 TPA of suitable organic waste;
- Non-Hazardous Landfill – construction of a new non-hazardous landfill providing capacity for 250,000 TPA of suitable waste material;
- Hazardous Landfill – construction of a new hazardous landfill providing capacity for 85,000 TPA of suitable waste material;
- Incinerator Bottom Ash (IBA) Maturation Facility – it is proposed that IBA will be accepted to the new non-hazardous landfill facility. Prior to landfilling, the IBA will be stockpiled in maturation bays for approximately eight weeks to reduce the moisture content and pH levels of the material;
- IBA Metal Recovery Facility – following maturation, the IBA will be processed in a metals recovery facility to remove ferrous and non-ferrous metals for off-site recycling;
- Ash Solidification Facility – it is proposed that incinerator flue gas treatment residues (FGTR) and fly ash will be accepted to the new hazardous landfill facility. Prior to landfilling, solidification is typically required to ensure that hazardous waste leaching criteria are met and to enhance the structural durability of residues.

The above unit operations are illustrated in the flow diagram in Figure 2.1 below.

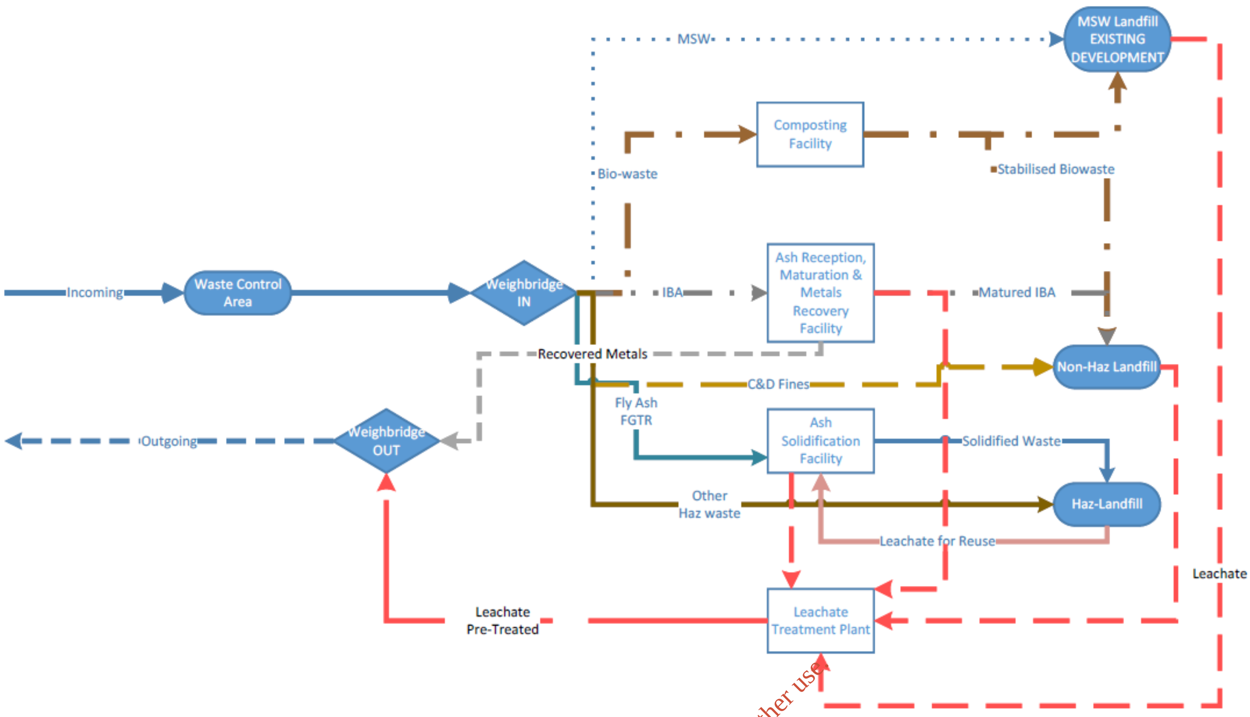


Figure 2.1: Unit Operations Flow Diagram

A detailed description of the plant, methods, processes, ancillary processes, abatement, recovery and treatment systems is provided below. Facility operating procedures are also outlined.

The Facility Master Plan is shown in Drawing No. 10369-2010 in Appendix A.

3 DESCRIPTION OF UNIT OPERATIONS

3.1 MSW LANDFILL

The MSW Landfill is currently an operational landfill permitted under EPA IED Licence W0201-03. The landfill was originally permitted in 2005 to accept up to 120,000 TPA of MSW for a period of 20 years. This permission was amended in 2008 to allow intensification of waste acceptance up to a maximum of 360,000 TPA and the operational life of the landfill was extended to 2028. As of December 2017, the waste acceptance rate has reverted to 120,000 TPA for the remainder of the operational life of the facility (i.e. 2028).

The waste types accepted at the facility in 2017 (which are typical of the waste types accepted at the MSW Landfill) are outlined in Table 3.1.

Table 3.1: MSW Landfill Inputs 2017 (taken from 2017 AER)

Waste Inputs	Description	Tonnes
Municipal	Mixed commercial and domestic	213,444.90
	Street cleansing and Local Authority clean-ups	52,957.19
	Biostabilised waste*	49,357.97
Industrial	Non-hazardous industrial solid waste	614.16
Sludges and filter cake	Non-hazardous municipal and industrial	2,971.08
C&D	Mixed construction and demolition waste	379.62
	Non-hazardous soils and stones (incl. Japanese Knotweed)	18.00
	Fines for disposal	2,336.27
	Non-hazardous dredging spoil	5,807.01
Total Disposed to Landfill Facility		**327,886.20**
Industrial	Ash	5,490.23
Sludges and filter cake	Waste from desanding	414.84
C&D	Soil and stones	23,022.81
	Shredded timber	2,591.80
	Bituminous mixtures	13.52
Total Non-Inert Recovered at Landfill Facility		**31,533.20**
C&D	C&D rubble	52,801.54
	Soil and stones	56,620.57
	C&D fines	111,383.18
	Dredging spoil	604.54
Municipal	Glass	5,881.68
Total Non-Inert Recovered at Landfill Facility		**227,291.51**

* The future intake of biostabilised waste may include output from the (Mechanical Biological Treatment) MBT facility which has been previously granted planning permission and a Waste Licence but is not yet constructed. The MBT facility is not included in this IED Licence Application.

The MSW Landfill covers an area of approximately 39 ha and has been designed to be constructed in 15 Phases. As of November 2018, Phases 1 – 13 have been constructed and placement of waste is ongoing in Phase 12. Placement of waste has been completed in Phases 1 – 4 and these phases are fully capped. The majority of waste placement has been completed in Phases 5 – 11. All vegetation stripping has been completed for the remaining unconstructed areas of the landfill and the majority of topsoil stripping has been completed. The floor level of the MSW landfill completed to date has been prepared in accordance with the Specified Engineering Works (SEWs) reports submitted in compliance with the current IED Licence (W0201-03). Phase 14 and 15 will be prepared in accordance with SEW Report No. 13 submitted to the Agency in September 2017.

The remaining phases of the engineered landfill will be constructed using a basal liner which will comprise (from top to bottom):

- 500 mm deep leachate drainage layer;
- Geotextile protection layer;
- 2.0 mm thick HDPE geomembrane liner;
- Low permeability bentonite enhanced soil (BES) layer of minimum 500 mm compacted depth;
- Undercell drainage layer; and
- Natural mineral subsoils.

After deposition of waste, the final capping will be installed, and full restoration will take place. Following reprofiling, the final capping system consisting of a gas collection layer, a low permeability barrier layer, a linear low-density polyethylene liner and woven geotextile, a drainage layer, subsoil and topsoil, is placed. The maximum height of the fully completed capped MSW Landfill will be approximately 103.25 mOD. Following final capping, each phase will be allowed to recolonise with natural species.

Incoming waste for deposit in the landfill, will be directed to the active fill area of the landfill (active face) where the load will be deposited under the direction of a banksman. The empty vehicles will exit the landfill and the site via the wheel wash and the weighbridge.

The size of the working area on the MSW Landfill will be confined to 25 m X 25 m, no more than 2.5 m in height after compaction and have a slope no greater than 1 in 3 as per Condition 6.26.2 of the current IED Licence (W0201-03).

Waste will be deposited close to and above the advancing tipping face. Site operatives will inspect the deposited waste for items that are not acceptable. Any unsuitable items will be removed and transferred to the Waste Inspection Area for further investigation.

The deposited waste is then spread in shallow layers on the inclined surface and compacted. Steel-wheeled compactors operate on the gradient of the shallower face, pushing and compacting thin layers of waste. Each day's waste input forms a 'block', which is compacted and covered. The following day a new 'block' of waste is deposited adjacent to this block. This allows areas that have been filled and are to be left for a period, to be progressively restored over the site life, minimising the areas of active waste deposition.

Based on current operations at the MSW landfill, it is envisaged that there will be one tracked excavator, one bulldozer and one steel wheel compactor in operation at the active landfill face to place waste and there will be two dump trucks utilised to transfer biostabilised waste from the composting facility to the active face (also depositing biostabilised waste into the non-hazardous landfill depending on operational requirements). Separately, waste hauliers will drive trucks directly to the working face for deposition.

Process Controls

Waste acceptance procedures (as discussed in Section 5.5) are currently in place at the operational WMF to ensure that only permitted waste types are accepted at the facility. Waste contractors using the site will be required to have a contract with Bord na Móna and the site waste acceptance procedure will apply to all waste deliveries to the site. This will ensure that all contractors will be assessed in advance and that the general composition of the waste will be known. Any contractors who arrive on-site without such a contracted agreement will be refused entry and turned away.

Following satisfactory documentation check and initial on-site verification of authorised vehicles at the Waste Control Area, vehicles will be directed to the appropriate access to the landfill. While unloading, the waste is subject to further visual inspection by site staff. Should any unacceptable wastes be discovered, the load or any relevant part thereof will be removed to the Waste Inspection Area for further investigation.

The design of the landfill, which is carried out in compliance with the EPA's *Landfill Manuals – Landfill Site Design*[3], includes leachate collection with preliminary treatment onsite and landfill gas collection infrastructure to ensure that all emissions from the landfill are controlled and managed appropriately for the life of the facility. Leachate from the MSW Landfill will be pumped to leachate storage tanks prior to preliminary treatment onsite and landfill gas will be transferred to the existing landfill gas management system, which includes a landfill gas utilisation plant and landfill gas flaring system.

A Landfill Odour Management Plan (LOMP) has been prepared for the existing operational facility to minimise the odour emissions from the facility. The LOMP includes details on the use of daily inert cover to reduce the release of odours from the waste body, the use of contact neutraliser sprays as well as identifying loads that may consist of malodourous wastes prior to disposal at the active face.

Capacity, Throughput and Output

The acceptance capacity of the existing permitted MSW Landfill is 120,000 TPA until 2028. The total disposal capacity of the MSW landfill is approx. 5,040,000 m^3 and approx. 4,129,923 m^3 of void space (prior to settlement) has been used up to the end of 2017. The current constructed unused void space at the end of 2017 is approximately equivalent to 236,031 tonnes of waste disposal.

Construction of Phase 13 has been completed in June 2018 and approval from the Agency to commence acceptance of waste was received in September 2018. The remaining two phases (Phase 14 and Phase 15) will be constructed in accordance with operational needs. Each phase will cater for up to three years of waste acceptance depending on the operational demands and subject to the permitted annual maximum quantities.

[3] EPA, *Landfill Manuals – Landfill Site Design* (2000)

Leachate will be generated from active phases of the landfill. This leachate will be collected and pumped to the proposed onsite Leachate Treatment Facility for preliminary treatment (see Section 4.1 below) prior to being transported offsite to an approved Irish Water WWTP for final treatment and disposal. It is currently proposed that Osberstown WWTP will be used for treated leachate disposal with Leixlip and Ringsend WWTPs available as backup. Based on 2017 leachate generation rates, it is anticipated that c. 41,000 m^3 of leachate will be generated in the existing permitted MSW Landfill in 2020 and reducing to c. 10,000 m^3 by 2028.

3.2 COMPOSTING FACILITY

The design and operation of the proposed composting process will be similar to the existing composting process currently in operation at the Drehid WMF. The layout of the proposed new compost facility infrastructure is shown in Drawing No.'s 8108-2082, 8108-2083 and 8108-2084 included with the EIAR for the Proposed Development. This design will provide for the biological treatment of the following feedstocks:

- Organic Fines; and
- Source Separated Bio-waste.

Organic Fines is the undersize fraction generated by the screening of residual municipal solid waste following an initial course shredding process. As the name suggests, Organic Fines primarily comprise organic material in the form of food and garden waste. The biological treatment of Organic Fines generates the following biostabilised waste outputs:

- Compost Like Output (CLO); and
- Oversize Material.

The screening of biostabilised waste, arising from the biological treatment of Organic Fines, produces an undersize fraction and an oversize fraction. Compost Like Output is the undersize fraction. As the name suggests, Compost Like Output resembles compost. However, the quality of this material, due to the presence of contaminants such as glass and heavy metals, is not currently envisaged to be at a standard that would allow it to be spread on land. Rather, this material will be either recovered (as an engineering material at the Non-Hazardous Landfill) or disposed of at the Non-Hazardous Landfill. The oversize material will also be disposed of at the Non-Hazardous Landfill.

Source Separated Bio-waste arises from the separate collection of food waste and garden waste at domestic and commercial premises. In Ireland, the collection of Source Separated Bio-waste is typically facilitated by the provision of brown bins to domestic and commercial premises.

Both Organic Fines and Source Separated Bio-waste is regarded as an Animal By-Product pursuant to the EU Animal By-Products legislation. As is the case at the existing composting facility at Drehid, the extended composting facility will be designed, constructed and operated in accordance with EU Animal

By-Products legislation as implemented in Ireland by the Department of Agriculture. This will require the approval of the facility by the Department of Agriculture for the acceptance and treatment of Animal By-Products.

Waste Acceptance

The design and construction of the waste reception area will be such that waste delivery vehicles are not required to enter the Composting Building. Waste delivery vehicles will reverse to the waste receiving doors and discharge waste down into the waste reception bunker. The finished floor level of the waste reception bunker will be approximately 2.5 m below the finished level of the external area. It is envisaged that four additional waste receiving doors will be provided at the extended Composting Building. Each waste receiving door will be 4.5 m wide. Concrete kerbing or wheel guides, with a minimum height of 200 mm, 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.

Waste received on the tipping floor will be either moved to dedicated storage areas by the dedicated wheel loader operating in the reception area or it will be fed directly to the shredder/mixer hopper. Concrete walls in the reception area will facilitate material handling while a drainage system will collect run-off and direct it to the plant leachate holding tanks. Regular washdown procedures will be implemented within the waste reception area. The waste reception bunker is designed to accommodate the storage of approximately three days of incoming waste, thereby providing contingency in the event of the mechanical processing equipment being unavailable for a time.

Figure 3.1: Typical Waste Receiving Doors

Waste Pre-treatment and Tunnel Feeding

Pre-treatment will be in the form of a low speed shredder mixer, located within the waste reception area, which provides the following actions:

- Bag opening (in the case of Source Separated Bio-waste) to allow for all content to be available to the composting process;
- Shredding of green waste trimmings and other large size bio-waste to provide suitable structure to the input mix; and
- Good mixing of the input waste streams.

The output material from the shredder is conveyed to an intermediate storage concrete bunker. The wheel loader travels from the lower level waste reception area to empty this storage bunker and load the composting tunnels as per the operating schedule of the process. It is important that the input material is loaded in an even manner within the tunnels.

Figure 3.2: Typical Shredder

Tunnel Composting

The tunnel composting process is divided into the following phases:

- Phase I composting;
- Phase II composting;
- Maturation (only relevant to the processing of Source Separated Bio-waste feedstock);
- Refining; and
- Pasteurisation (only relevant to the processing of Source Separated Bio-waste feedstock).

Phases 1 & 2 and the maturation phase occur within the concrete composting tunnels in the main processing area of the plant. Material will initially be loaded into a tunnel for an approximate 2-week period (Phase 1) after which it is moved to another tunnel for a further 2 week period (Phase 2). Phases 1 & 2 apply to both the treatment of Organic Fines feedstock and Source Separated Bio-waste feedstock.

Following Phase 2, in the case of Source Separated Bio-waste feedstock, the composted material is moved for a third time to another tunnel for an approximate maturation period of 1 week. The maturation stage is not relevant to the treatment of Organic Fines.

Figure 3.3: Loading of Dry AD Tunnels

Each composting tunnel consists of a sealed concrete structure provided with a unique door equipped with a rubber sealing. The concrete floor of the tunnel houses a series of parallel PVC pipes which are incorporated within the floor along the length of the tunnel. These pipes are provided with tapered plastic nozzles (spigots).

Figure 3.4: Typical Composting Tunnel with Spigot Floor

Each tunnel has a dedicated centrifugal fan which blows a mixture of fresh air and process air through the air plenum via the spigot pipes to the composting material. Pressurised air flows through the material mixture from the spigots ensuring intensive contact between the air and the input material. This provides complete control of the composting process ensuring that aerobic conditions can be maintained in the material.

Both re-circulated process air and fresh air will be fed into the material using the computer controlled, electrically actuated, valves. The quantity of air supplied is determined by the phase of the composting process. The control of the tunnel fan is mainly based on the compost temperature. A frequency transformer controls the fan's capacity. The setting for the fresh air supply valve is based on the measured oxygen value and the compost temperature. At high temperatures, the fresh air supply connected to the relevant central air ductwork is further opened and a large quantity of fresh air flows into the tunnel. When the oxygen level is too low, the supply of fresh air to the tunnel is also increased. The re-circulation air supply valve is electronically linked to the fresh air supply valve and its operation is exactly opposite to the fresh air supplying valve. If less re-circulation air is supplied, more fresh air is automatically blown through the material. Each composting tunnel will have its own aeration system and is connected to two central air ductworks: the central fresh air supply ductwork and the central process air discharge ductwork for the warm and humid air released during the composting process.

Figure 3.5: Typical Aeration Fan and Ductwork Installation

Exhaust air as well as the unused fresh air collected from the other areas of the Composting Facility, will flow through a humidifier and a biofilter before leaving the system. The biofilter units are proposed to be located in a single storey structure external to the composting building. The discharge air connection to the tunnels is equipped with a one-way air valve, which ensures that no air enters another tunnel, through failures or overpressures in the central suction system.

Tunnels will also be equipped with a sprinkling system which is used to balance the material moisture. Each tunnel is also equipped with a negative pressure protection valve while overpressures are managed by a central safety valve located in the main exhaust duct.

In the composting tunnels, negative pressure is maintained throughout the process in order to prevent polluted and odorous air being released inside the buildings. The whole composting plant operates under negative pressure in order to minimise the escape of any potential fugitive odours from the building when the facility doors are open e.g. waste delivery.

Compost Refining

Following the tunnel composting process prior to pasteurisation (only used if final disposal is by land application or other beneficial reuse), the material is fed by the ‘dirty area’ wheel loader to the buffering and dosing hopper feeding the refining line. The hopper feeds the material to a belt conveyor which transfers it to a screener (for example a trommel screen or a star screen). The conveying line is also equipped with a magnetic separator for the removal of ferrous metals.

The screen produces two fractions:

In the case of Organic Fines feedstock

- < 30 mm
- > 30 mm

In the case of Source Separated Bio-waste feedstock

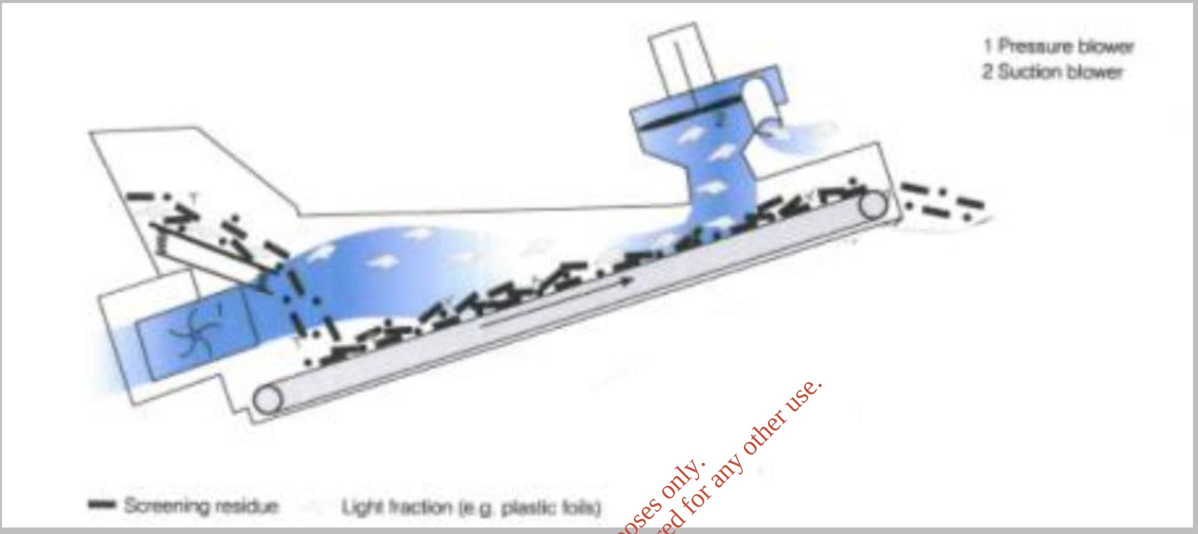
- < 12 mm
- > 12mm

In the case of Source Separated Bio-waste feedstock, the undersize fraction is conveyed to a densimetric separator which separates hard particles such as stones and glass from the compost stream. These fractions are collected within bunkers for discharge and disposal. The treated compost material is collected in another bunker for transfer to the pasteurisation tunnel.

The oversized fraction is collected and re-used as structural material in the composting process. This material is passed through a wind sifter to remove light plastics which are blown out through an enclosed tube to a covered collection skip external to the composting building.

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.



Compost Pasteurisation

In the case of Source Separated Bio-waste feedstock, the undersize 12 mm compost fraction is subjected to a pasteurisation stage to facilitate its application on land in accordance with Animal By-Products legislation. The pasteurisation stage is not relevant to the treatment of Organic Fines.

The pasteurisation tunnel consists of a single insulated tunnel through which all material must pass in order to move to the 'clean' area of the facility. To this end, the tunnel has doors at both ends. Compost that has been refined is loaded into the pasteurisation tunnel from the 'dirty' processing area. The tunnel is aerated in a controlled manner through the floor resulting in the re-activation of the remaining microbial population within the material and the resultant generation of heat. In order to ensure that the required processing standard temperature is achieved, a heating back up system is provided by a dedicated water boiler and water-air heat exchanger.

Once the required time-temperature parameters (70°C for a period of one hour) have been achieved and recorded within the pasteurisation tunnel, the material is ready to be unloaded from the 'clean' area of the plant.

Compost that has been unloaded from the pasteurisation tunnel will be stored in one of two quarantine areas while microbial testing is carried out. The material contained within one full loading of the pasteurisation tunnel is deemed to be a batch. A batch is moved to a quarantine bay within the compost storage area using the dedicated clean area wheel loader and sampling is carried out immediately. Once compliant sampling results are received from the laboratory, the batch is moved to the wider compost storage area for storage until such time at the material is removed from the plant.

Odour Controls

If composting temperatures exceed approximately 65°C, odour emissions increase significantly, due to the changes in process biochemistry. Excessive increases in composting temperatures are especially relevant in the first stage of composting when, due to the fast degradation, a lot of energy will be released. Temperature sensors will be used to measure the temperature in the composting tunnels and subsequently in the maturation area. The SCADA control system will ensure that the composting temperature does not exceed 65°C by adding more fresh process air to the composting mass. This will reduce the odour load in the process air being transported to the odour abatement systems.

Abatement

The Composting Facility will include a building ventilation system and an odour abatement system. The function of the building ventilation system will be to provide a specified number of air changes per hour and to maintain a negative air pressure environment within the building. The maintenance of a negative pressure environment within the building will prevent the emission of untreated air thereby minimising potentially nuisance causing odour emissions. The provision of air changes within each building will also provide appropriate working conditions for plant operators.

The odour abatement system will treat the air extracted by the building ventilation system and the process air exhausted by the composting process. The core components of the odour abatement system include acid scrubbers, humidifiers and biofilters.

The biofilters will be maintained to ensure optimum performance. Biofilters will be compartmentalised to facilitate maintenance and replacement of media. Each biofilter will comprise of two sections such that treatment is provided by one of the sections while the other section is being maintained. Biofilters will be covered and hence isolated from extreme weather conditions (e.g. intensive rainfall or intensive heat) thereby providing optimum control of biofilter efficacy.

It is envisaged that the biofiltration material proposed for the odour abatements systems will either consist of woodchip or other equivalent products such as Monafil or Monashell. Monafil has an odour efficiency of typically between 95 – 98% up to a range of 100,000 OU_E/m^3 whilst Monashell, which is a manufactured shell-based media has an odour efficiency of typically between 95 – 98% for the range of 20,000 - 400,000 OU_E/m^3 falling to a range in efficiency of 90 – 95% for odour concentrations between 5,000 - 20,000 OU_E/m^3.

Capacity, Throughput and Output

It is proposed to increase the quantity of waste to be accepted at the existing composting facility by 20,000 TPA (from the currently permitted 25,000 TPA to 45,000 TPA) and remove the restriction on the operating life of this facility, which is currently aligned with the life of the existing landfill facility (i.e. 2028). In addition, it is proposed to extend the existing facility to provide for the acceptance of an additional 45,000 TPA bringing the total composting process capacity to 90,000 TPA.

Biostabilised waste from the compost plant will be accepted for landfilling at the Drehid facility during its operational life. Thereafter, biostabilised waste will be transported to alternative destinations. Table 3.2 outlines the outputs from the composting process.

Table 3.2: Estimated Annual Outputs for the Composting Facility

Output Type	Estimated Tonnage (TPA)	Envisaged Destination
Compost Facility – Biostabilised Waste including oversize material and rejects	63,000	Drehid Waste Management Facility (or other destinations -beyond the lifespan of Drehid WMF)
Compost Facility – Composting Process Losses	27,000	-

3.3 NON-HAZARDOUS LANDFILL

The Non-Hazardous Landfill will be designed and constructed to accept 250,000 TPA of non-hazardous waste for a period of 25 years. The envisaged average quantities of waste that will be accepted in the Non-Hazardous Landfill are presented in Table 3.3.

Table 3.3: Non-Hazardous Landfill Inputs

Input	2019 – 2028 (TPA)	Post 2028 (TPA)
IBA/C&D Fines and Soil & Stone	204,500	187,000
Stabilised Bio Waste	45,500	63,000

The Non-Hazardous Landfill will cover an area of approximately 20.9 ha and is designed to be constructed in 12 Phases. The proposed layout of the Non-Hazardous Landfill is shown in Drawing No.'s 8108-2011, 8108-2035, 8108-2036 and 8108-2070 included in the EIAR for the Proposed Development. Prior to the construction of the Non-Hazardous Landfill, all vegetation will be cleared and the ground will be stripped of topsoil. The floor of the Non-Hazardous Landfill will be graded in accordance with the formation levels as illustrated on Drawing No. 8108-2011 included in the EIAR for the Proposed Development.

The engineered landfill will be constructed using a basal liner as detailed in Chapter 3 of the EIAR which will comprise (from top to bottom):

- 500 mm deep leachate drainage layer;
- Geotextile protection layer;
- 2.0 mm thick HDPE geomembrane liner;
- Low permeability bentonite enhanced soil (BES) layer of minimum 500 mm compacted depth;
- Undercell drainage layer; and
- Natural mineral subsoils.

After deposition of waste, the final capping will be installed and full restoration will take place. Following reprofiling, the final capping system, consisting of a gas collection layer, a low permeability barrier layer, a linear low-density polyethylene liner and woven geotextile, a drainage layer, subsoil and topsoil, is placed. The maximum height of the fully completed capped Non-Hazardous Landfill will be approximately 115.75 mOD. Following final capping, each phase will be allowed to recolonise with natural species.

Incoming waste for deposit in the landfill, either directly from the weighbridge, from the composting facility output or pre-treated IBA from the maturation and metal recovery facilities, will be directed to the active fill area of the landfill (active face) where the load will be deposited under the direction of a banksman. The empty vehicles will exit the landfill and the site via the wheel wash and the weighbridge.

The size of the working areas will be kept to the minimum required area to minimise generation of leachate. It is envisaged that the minimum area required is 40 m x 40 m, this size of the working area is required in order to allow for the efficient operation of the large waste compactor and/or bulldozer to place and compact the waste in thin layers (approx. 0.5 m in thickness) in a maximum of 3 m lifts.

Waste will be deposited close to and above the advancing tipping face. Site operatives will inspect the deposited waste for items that are not acceptable. Any unsuitable items will be removed and transferred to the Waste Inspection Area for further investigation.

The deposited waste is then spread in shallow layers on the inclined surface and compacted. Steel-wheeled compactors operate on the gradient of the more shallow face, pushing and compacting thin layers of waste. Each day's waste input forms a 'block', which is compacted and covered. The following day a new 'block' of waste is deposited adjacent to this block. This allows areas that have been filled and are to be left for a period, to be progressively restored over the site life, minimising the areas of active waste deposition.

It is envisaged that there will be one tracked excavator and one steel wheeled compactor and/or one bulldozer in operation at the active landfill face to place waste and there will be two dump trucks utilised to transfer waste from the pre-treatment areas to the active face. Separately, waste hauliers will drive trucks directly to the working face where the incoming waste does not require pre-treatment (i.e. C&D fines, soil and stones and stabilised bio-waste).

Process Controls

Waste acceptance procedures (as discussed in Section 5.5) are currently in place at the operational WMF to ensure that only permitted waste types are accepted at the facility and these will be updated accordingly for the proposed development. Waste contractors using the site will be required to have a contract with Bord na Móna and the site waste acceptance procedure will apply to all waste deliveries to the site. This will ensure that all contractors will be assessed in advance and that the general composition of the waste will be known. Any contractors who arrive on-site without such a contracted agreement will be refused entry and turned away.

Following satisfactory documentation check and initial on-site verification of authorised vehicles at the Waste Control Area, vehicles will be directed to the appropriate access to the landfill or pre-treatment facility as appropriate. While unloading, the waste is subject to further visual inspection by site staff. Should any unacceptable wastes be discovered, the load or any relevant part thereof will be removed to the Waste Inspection Area for further investigation.

The design of the landfill, which is carried out in compliance with the EPA's *Landfill Manuals – Landfill Site Design*, includes leachate collection and landfill gas collection infrastructure to ensure that all emissions from the landfill are controlled and managed appropriately for the life of the facility. Leachate from the Non-Hazardous Landfill will be pumped to the onsite leachate treatment plant and landfill gas will be transferred to the existing landfill gas management system, which includes a landfill gas utilisation plant and landfill gas flaring system.

The nature of the waste types proposed for acceptance at the Non-Hazardous Landfill (including biostabilised waste) means that this waste will have a lower odour emission rate than material accepted to the MSW landfill. Odour control systems at the landfill including the use of daily inert cover material will ensure that odorous emissions are minimised.

Capacity, Throughput and Output

The proposed capacity of the Non-Hazardous Landfill is 250,000 TPA for 25 years. On the basis of the density of the material and including cover material it is envisaged that there is a requirement for c.200,000 m^3 of landfill capacity each year for the 25 years. This equates to 5,000,000 m^3 or 6,250,000 tonnes over the 25-year life. The landfill will be divided into 12 Phases of approximate equal volume. Each phase will cater for approximately 2 years of waste.

Leachate will be generated from active phases of the landfill. This leachate will be collected and pumped to an onsite leachate treatment plant for initial treatment (see Section 4.1 below). The leachate will then be transported offsite to an approved Irish Water WWTP for final treatment and disposal. It is currently proposed that Osberstown WWTP will be used for leachate disposal with Leixlip and Ringsend WWTPs available as backup). It is anticipated that c. 18,800 m^3 of leachate will be generated in the Non-Hazardous Landfill on an annual basis.

3.4 HAZARDOUS LANDFILL

The Hazardous Landfill will be designed and constructed to accept 85,000 TPA of hazardous waste for a period of 25 years. The envisaged average quantities of waste that will be accepted in the Hazardous Landfill are presented in Table 3.3.

Table 3.4: Hazardous Landfill Inputs

Input	TPA
Hazardous Waste from Incineration Process	50,620
- Ground Material (Cement or similar) (non-waste – added to the above in the solidification process)	7,593*
- Process Water (Acid & water mix) (non-waste – added to the above in the solidification process)	12,655
Other Hazardous Waste**	34,380

*The ratio is likely to be in the region of 15-20%. A worst case of 20% has been allowed for in calculating the associated traffic movements, however the final ratio will be determined following onsite trial mixes, (It is noted that from a similar plant in Belgium the actual percentage is approximately 15%).

**Other hazardous waste as outlined in the EPA report "Technical and Economic Aspects of developing a National Difficult Waste Facility (NaDWaF)" July 2010.

The Hazardous Landfill, as outlined on Drawing No. 8108-2012, 8108-2035, 8108-2036 and 8108-2070 will cover approximately 10.8 ha and is designed to be constructed in 10 Phases. Prior to the construction of the Hazardous Landfill, all vegetation will be cleared and the ground will be stripped of topsoil. The floor of the Hazardous Landfill will be graded in accordance with the formation levels as illustrated on Drawing No. 8108-2012.

The engineered landfill will be constructed using a basal liner as detailed in Chapter 3 of the EIAR which will comprise (from top to bottom):

- 500 mm deep leachate drainage layer;
- Geotextile protection layer;
- 2.0 mm thick HDPE geomembrane liner;
- Low permeability bentonite enhanced soil (BES) layer of minimum 500 mm compacted depth;
- Undercell drainage layer; and
- Natural mineral subsoils.

After deposition of waste, the final capping will be installed, and full restoration will take place. Following reprofiling, the final capping system, consisting of a low permeability barrier layer, a linear low density polyethylene liner and woven geotextile, a drainage layer, subsoil and topsoil, is placed. The maximum height of the fully completed capped Hazardous Landfill will be approximately 115.75 mOD. The proposed final contours for the facility are shown on Drawing No. 8108-2070. Following final capping, each phase will be allowed to recolonise with natural species.

On arrival, the incoming waste delivery vehicle will be processed, weighed and directed to the hazardous waste reception area. Depending on the hazardous waste type, the delivery vehicle will be off-loaded in either the ash solidification facility, the hazardous waste handling building or the hazardous waste storage and quarantine area. Once unloaded the delivery vehicle will then leave the hazardous waste reception area and the site via the wheel wash and the weighbridge. All waste for final disposal will then be transported internally by Bord na Móna dump trucks only to the hazardous landfill. At no stage will the vehicles delivering waste to the hazardous waste facility enter the hazardous landfill itself.

The size of the working areas will be kept to the minimum required area to minimise generation of leachate. It is envisaged that the minimum area required is 40 m x 40 m, this size of the working area is required in order to allow for the efficient operation of the tracked excavator and/or bulldozer to place and compact the waste in thin layers (approximately 0.5 m in thickness) in a maximum of 3 m lifts. Waste will be deposited close to and above the advancing tipping face.

The deposited waste is then spread in shallow layers on the inclined surface and compacted. A tracked excavator and/or bulldozer will operate on the gradient of the shallower face, spreading and compacting thin layers of waste. Each day's waste input forms a 'block', which is compacted and covered. The following day a new 'block' of waste is deposited adjacent to this block. This allows areas that have been filled and are to be left for a period, to be progressively restored over the site life, minimising the areas of active waste deposition and thereby reducing the quantity of leachate being generated.

It is envisaged that there will be one tracked excavator in operation at the active landfill face to place waste and there will be two dump trucks utilised to transfer waste from the pre-treatment and inspection area to the active face.

Process Controls

Waste acceptance procedures (as discussed in Section 5.6) are currently in place at the operational WMF to ensure that only permitted waste types are accepted at the facility and these will be updated accordingly for the proposed development. Waste contractors using the site will be required to have a contract with Bord na Móna and the site waste acceptance procedure will apply to all waste deliveries to the site. This will ensure that all contractors will be assessed in advance and that the general composition of the waste will be known. Any contractors who arrive on-site without such a contracted agreement will be refused entry and turned away.

Following satisfactory documentation check and initial on-site verification of authorised vehicles at the Waste Control Area, vehicles will be directed to the Hazardous Waste Reception Area. While unloading (with the exception of fly ash and FGTR), the waste is subject to further visual inspection by site staff. Should any unacceptable wastes be discovered, the load or any relevant part thereof will be removed to the Hazardous Waste Quarantine Area for further investigation.

The proposed disposal of solidified fly ash and FGTR in the Hazardous Landfill will require the permitting of a derogation on Waste Acceptance Criteria (WAC) limits in accordance with the requirements of Council Decision 2003/33/EC. Approval for a derogation of three times higher limit values is being sought for the solidified material as set out in the *Waste Sampling and Testing for Disposal to Landfill* document in Appendix B. Further detail on the assessment of the potential impact of disposal of the material in the Hazardous Landfill is provided in Chapter 6 of the Proposed Development EIAR and the hydrogeological risk assessment (HRA) carried out is provided in Appendix 6.8 to the Proposed Development EIAR.

The design of the Hazardous Landfill, which is carried out in accordance with the EPA's *Landfill Manuals – Landfill Site Design*, includes leachate collection infrastructure to ensure that emissions from the landfill are controlled and managed appropriately for the life of the facility. Leachate from the Hazardous Landfill will be pumped to a storage tank in the ash solidification facility for use as process water in the solidification process.

Landfill gas collection is not proposed for the Hazardous Landfill. This approach is in compliance with the approach adopted at existing landfills in Europe that accept inert hazardous waste, similar in nature to the Drehid WMF.

The nature of the waste types proposed for acceptance at the Hazardous Landfill means that this waste will have a significantly lower odour emission rate than MSW or biostabilised waste as outlined in Chapter 11 of the EIAR. Odour control systems at the landfill including the use of daily inert cover material will ensure that potentially odorous emissions are minimised.

Capacity, Throughput and Output

The proposed capacity of the Hazardous Landfill is 85,000 TPA for 25 years. On the basis of the density of the material and including cover material it is envisaged that there is a requirement for 79,000 m^3 of landfill capacity each year for the 25 years. This equates to c.1,980,000 m^3 or 2,125,000 tonnes over the 25-year life. The landfill will be divided into 10 Phases of approximate equal volume. Each phase will cater for approximately 2.5 years of waste.

Leachate will be generated from active phases of the landfill. This leachate will be collected and pumped to an onsite storage area in the hazardous waste reception area for recycling as process water in the ash solidification process. During the operational phase of the hazardous landfill, it is not envisaged that there will be any excess leachate, as the operational areas will be kept to the minimum required area to reduce the quantity of leachate being generated.

In the event that excess leachate is generated at the Hazardous Landfill, above the volume required for the solidification process water, the hazardous leachate can be transferred to the leachate treatment plant which has been designed to cater for all leachate generated during the operational and the post operational phase at the facility. All treated leachate will be disposed of at an offsite municipal WWTP. It is anticipated that c. 7,700 m^3 of leachate will be generated in the Hazardous Landfill on an annual basis.

3.5 INCINERATOR BOTTOM ASH (IBA) MATURATION FACILITY

Incinerator bottom ash (IBA) is the non-combustible material left over from the incineration of MSW waste. This material is collected at the end of the grate in a Waste-to-Energy or incinerator facilities. IBA is a granular material that consists of a mix of inert materials such as sand, stone, glass, porcelain, metals, and ash from burnt materials.

The IBA Maturation & Metals Recovery Facility will separate ferrous and non-ferrous metals from the IBA itself. On the basis of potential volumes of IBA from waste to energy facilities in Ireland, the bottom ash processing facility has been designed for a capacity of up to 120 tonnes per hour.

On the basis of processing up to 200,000 TPA, it is envisaged that 15,000 TPA of metals will be recovered from the IBA at the Drehid Facility, through mechanical screening and extraction processes onsite. Ferrous metals make up approximately 6 to 10% and non-ferrous metals make up 1-2% of the total amount of bottom ash. The metals will then be exported from the site for recycling. Residual ash will then be placed into a vehicle and transported internally within the site to the Non-Hazardous Landfill as discussed above.

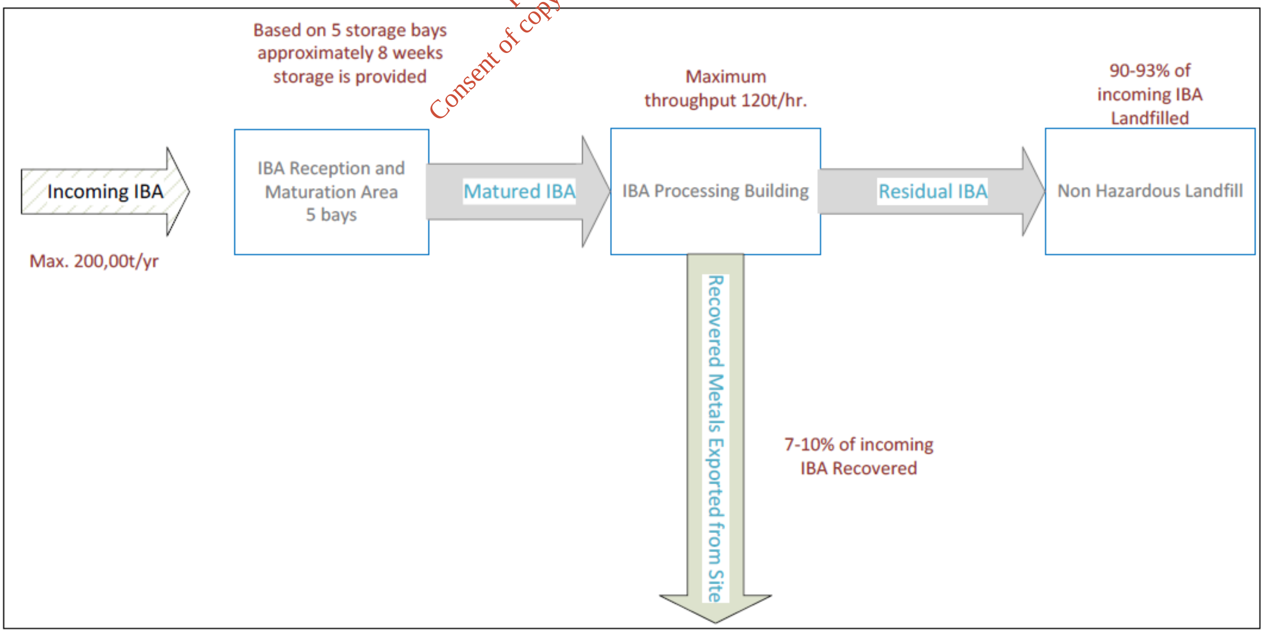


Figure 3.6: IBA Maturation & Metals Recovery Facility

The IBA Maturation & Metals Recovery Facility is divided into the IBA Reception and Maturation Facility and the Metals Recovery Facility. The facility will include the following infrastructure:

- Reception and Maturation area;
- Processing / screening area;
- Storage and loading area for metals; and
- Loading area for materials to landfill.

Waste Acceptance

IBA will be delivered from incinerator plants to the Drehid WMF. On arrival, the waste delivery vehicle will be processed, weighed and directed to the appropriate location. IBA that has not already been screened and still containing metals will be directed to the IBA Reception and Maturation Facility. Waste will be initially unloaded at the IBA Reception and Maturation Facility where the material is then stockpiled in maturation bays for a period of approximately eight weeks to reduce the moisture content and improve its quality.

The design and construction of the IBA Reception and Maturation Facility will allow for the unloading of four vehicles at a time. Once unloaded the delivery vehicles will then leave site via the wheelwash and weighbridge.

Maturation Process

The primary purpose of the maturation process is to reduce the moisture content and also to reduce the pH levels by chemical reactions including carbonation (uptake of carbon dioxide from the atmosphere). This process stabilises and reduces the mobility and leaching of any heavy metals and soluble salts contained in the IBA. Reducing the moisture content of the IBA from approximately 20% to 15% will also increase the efficiency of the screening and extraction process and ensure that the quantity of metals going to landfill are minimised.

Once deposited in the reception area, the IBA will be shaped into stockpiles within the storage bays, by use of onsite front wheel loaders or excavators. The stockpiles will be up to 6 m in height and longitudinally separated by reinforced concrete retaining walls.

Table 3.5: Storage Bays and Maturation Period

Dimensions of Proposed Storage Area		Theoretical Maturation Period
Width	29.5	200,000 TPA @ 1.2 T/m^3 3,205 m^3/week ~ 9 weeks
Depth	33	
Height	6	
No. of Bays	5	
Volume	29,205 m^3	

The design of the maturation area is to allow for a phased filling and emptying sequence to ensure that the required maturation period can be achieved. Vehicles will reverse up to the reception/unloading area where they will deposit the IBA material and then from the unloading area the material will be moved into the storage bay stockpiles by front wheel loader.

The maturation or storage bays will be covered to prevent an increase in moisture content, resulting from precipitation; however, it is also left open at the sides and ends to allow an airflow through the maturation area.

Figure 3.7: Typical IBA Maturation Bay

At the end of the designated maturation period the maturation bays are unloaded by front wheel loaders and the matured IBA will be transferred to the Metals Recovery Facility.

Runoff from the maturation area will be collected and reused to hydrate and maintain the correct conditions for maturation of the stockpiles and to prevent fugitive emissions of dust. Any excess runoff will be directed to the leachate treatment area for treatment and disposal off site.

3.6 IBA METAL RECOVERY FACILITY

IBA Processing

The IBA will be pre-processed prior to deposition in the Non-Hazardous Landfill to remove metals for recovery. Ferrous metals are extracted magnetically, while non-ferrous metals are sorted using the eddy current technique, which is based on the phenomenon that changing magnetic fields create small currents in metal objects. A Metals Recovery Facility for the IBA has been designed, based on the parameters detailed in Table 3.6 below.

Table 3.6: IBA Maturation and Metals Recovery Facility Design Criteria

Criteria	Assumption
Mass Flow	120 tonnes/hr
Moisture Content	15%
IBA Composition	- Mineral Fraction (85 – 90%) - Unburnt (1 – 5%) - Ferrous and Non-ferrous (7 – 10%)
Output Fractions	- Ferrous metals - Nonferrous metal parts 0 - 18 mm (in various size fractions) - Stainless steel elements and compounds - Slag

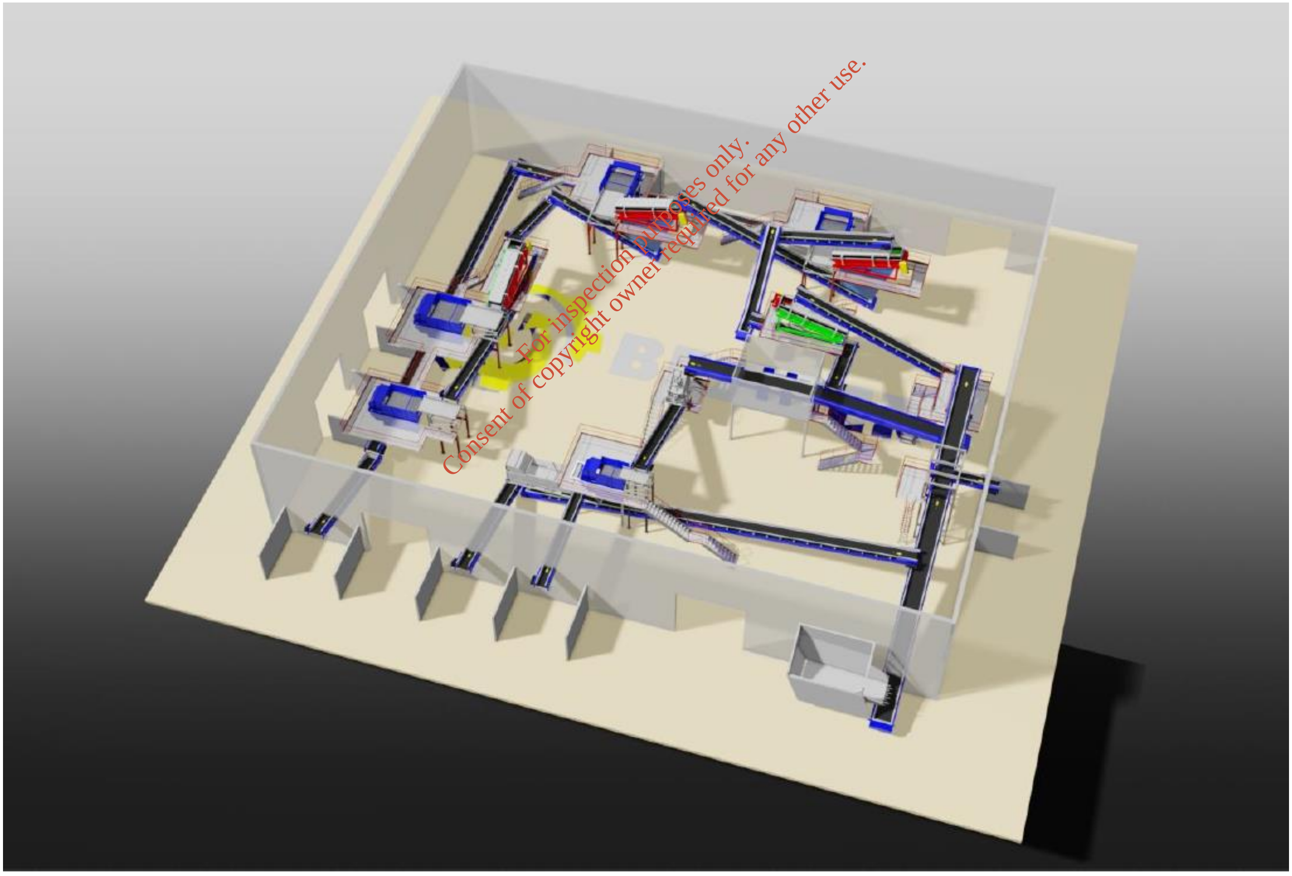


Figure 3.8: Typical Layout of IBA Metal Recovery Processing Equipment

The matured IBA will be transferred from the storage bays using a front wheel loader to deposit the IBA into the input hopper. This input hopper is located on the exterior of the Metals Recovery Facility. The first step in the process will be to screen out oversized materials using a fixed bar screen, this fixed bar screen is located with the input hopper; the residual material is then conveyed into the building. Ferrous content in the oversized material will be removed by hand sorting or using a magnet and subsequently exported from the site for recovery, while the residual oversized material is deposited in the Non-Hazardous Landfill.

The second step will be to separate the ferrous metals by initially using an overband magnetic separator, following this, the material is put through a coarse screen (with a screen of 50 mm) and then a finer screen (flip-flop screen with a screen size of 18 mm). The larger fractions are crushed and recirculated through this step until the ferrous materials are removed.

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 will be 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.

Figure 3.9: Typical Overband Magnet Installation

The third step will be to process the material that passes the 18 mm flip flop through a series of screens with decreasing screen size which classifies/grades the remaining material according to size and subsequently through Eddy Current Separators to remove the non-ferrous metals from each of these fractions.

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.

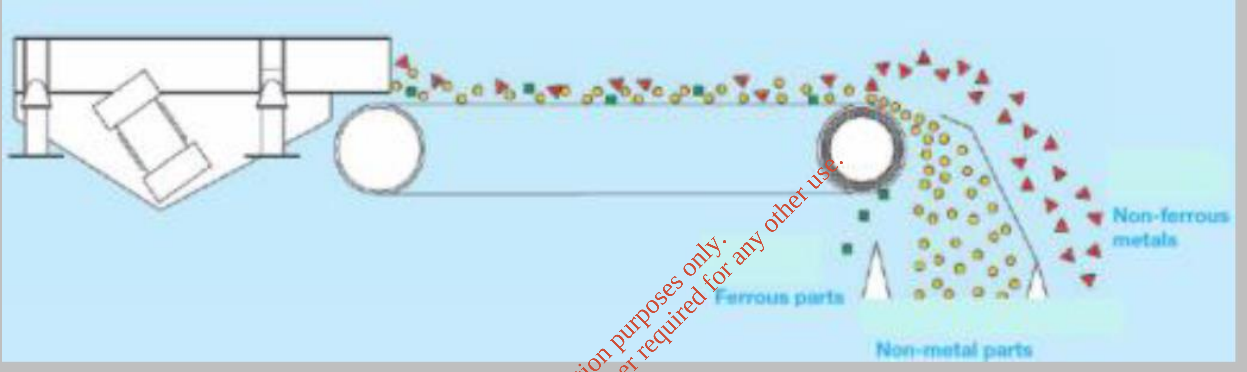


Figure 3.10: Eddy Current Separator Principle

The resulting output fractions from the IBA screening and metal recovery process will be:

- Ferrous metals;
- Nonferrous metal parts 0- 18 mm (in various size fractions);
- Stainless steel elements and compounds; and
- Residual IBA.

All the metals will be collected inside the Metals Recovery Facility in transport containers, which are subsequently collected and transported off site for recycling. The residual IBA will be conveyed outside the building and deposited into a vehicle for transport and will then be deposited in the Non-Hazardous Landfill. The residual IBA that is landfilled can be segregated from the other waste streams so as to provide options should it become viable for recovery in the future, subject to the necessary regulatory approvals.

It is not anticipated that there will be any wastewater generated through the process, except for occasional wash down water and any runoff from the maturation area. This will be collected and reused to hydrate the IBA maturation stockpiles as required, with any excess wastewater transferred within the site to the onsite leachate treatment facility for initial treatment. Following initial treatment, this will be transported offsite to an approved WWTP for final treatment and disposal.

Table 3.7: Expected Mass Balance for the Incinerator Bottom Ash Maturation & Metals Recovery Facility

Input	TPA
Incinerator Bottom Ash	200,000
Output	**TPA**
Evaporation Loss (maturation process)	11,765
Residue to Landfill	173,235
Recovered Metals	15,000

Dust Control

The Metals Recovery Facility will include mechanical ventilation and dust extraction, to extract and treat air at various points in the recovery process. The dust filter will be located on the exterior of the building and the extracted air will be vented through a stack similar to that in Figure 3.11. There will be an estimated 65,000 m^3/hr drawn through the filtration system.

Figure 3.11: Typical Dust Filter System

3.7 ASH SOLIDIFICATION FACILITY

Pre-treatment of incinerator flue gas treatment residues (FGTR) and fly ash is typically required to ensure that hazardous waste landfill leaching criteria are met (in particular for soluble salts (TDS) and lead) and to enhance the structural durability of residues. BAT waste treatment options for the pre-treatment of hazardous waste such as fly ash and flue gas treatment residues prior to landfill include solidification, vitrification or washing technologies.

Solidification is a widely-used method which includes all processes that physically and hydraulically encapsulate residues and produces the most satisfactory results in terms of environmental performance (compliance with criteria/long term behaviour) and cost. The solidification process is used in various facilities across Europe including at Indaver's facility at Antwerp in Belgium (the project team visited this facility and liaised closely with its operators during the design process).

The hydraulic binding method is robust, flexible to different waste forms and does not require heat, thus keeping energy use down. This method also minimises dust emissions, gas emissions and leachate production.

The technique is the mixing of the waste with mineral or hydraulic binder (cement, slag or similar pozzolanic material), water and acids (which are used in the process to control the pH and promote buffering reactions that help reduce leaching of salts and heavy metals). The process involves a reaction between water and a binder (cement or similar) to form a chemical and physical encapsulation of the leachable components (metals, salts). The residues are thus incorporated into the binder matrix.

Table 3.8: Potential Volumes of Hazardous Waste from Waste-to-Energy Facilities

Source	Capacity (TPA)	Fly Ash and FGTR (TPA)
Poolbeg	600,000	27,000
Output		**TPA**
Carranstown	220,000	10,000
Other	300,000	13,620
Total	**1,120,000**	**50,620**

Solidification Process

The solidification process involves the combination of waste material and ground material (such as cement or similar) with liquids (leachate/acid/water) to pre-determined ratios through an electronically controlled batch process. The process involves a reaction between water and a binder (cement or similar) to form a chemical and physical encapsulation of the leachable components (metals, salts). The residues are incorporated into the binder matrix and subsequently deposited in a lined landfill.

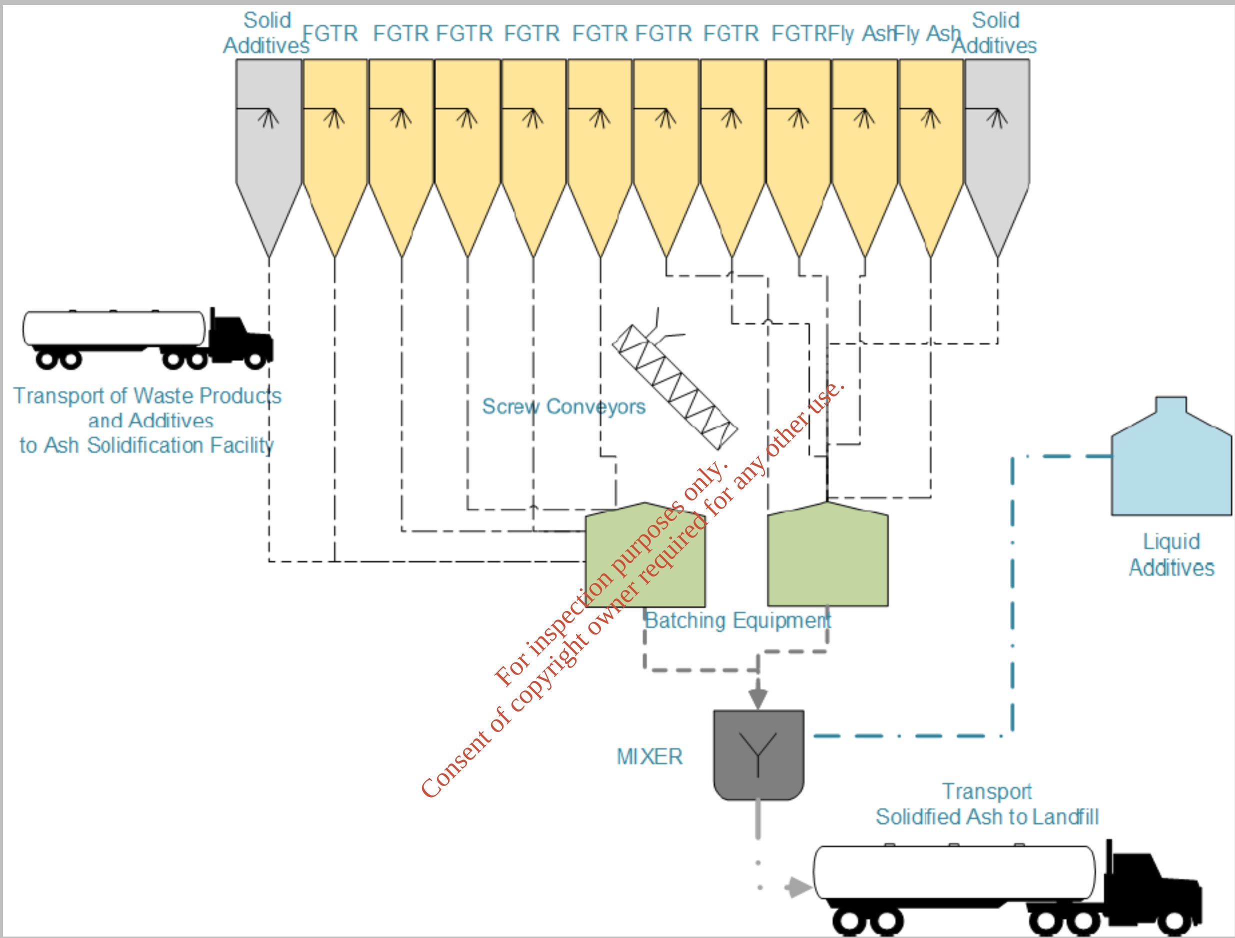


Figure 3.12: **Solidification Process**

Waste Acceptance

The waste, which will be in powder form, will be transported, in fully enclosed bulk silo trucks, from the source sites to the Facility. On arrival, the waste delivery vehicle will be processed, weighed and directed to the hazardous waste acceptance area.

The design and construction of the solidification building will be such that that the waste delivery vehicles will enter the solidification building to deliver the waste to the Ash Solidification Facility. Four waste receiving bays will be provided at the Solidification Building to allow for unloading of four vehicles at a time.

Within the waste receiving bay, the contents of the waste delivery vehicles will be pumped into the storage silos, by fully enclosed piped system. Vents on the storage silos will have dust filters, to prevent escape of waste during the unloading process. Ground materials (such as cement) will also be delivered to site in exactly the same manner as the waste materials, and this material will be stored in dedicated onsite silos. Process water will be provided by reusing the leachate from the Hazardous Landfill. Acid may either be imported or it may be possible that waste acid, generated as a by-product from the onsite gas cleaning process (sulphuric acid), may be reused. In either case the acid will be stored in appropriately bunded storage tanks at the Ash Solidification Facility.

Once unloaded the delivery vehicles will then leave site via the wheelwash and weighbridge. The Ash Solidification Facility will include the following infrastructure:

- Process building;
    - Waste reception bays – 4 No.;
    - Process area with a weighing scales and a mixing unit; and
    - Solidified material outgoing bay.
- External storage silos to store waste materials awaiting solidification;
- External storage silos to store ground material (cement);
- External bunded acid tanks (liquid additives tank); and
- External bunded process water (leachate) storage tank.

Waste Storage

The incoming waste and the ground material are stored on site in storage silos. The required liquids are stored separately, with the acid being stored in a bunded storage tank, and the leachate generated from active phases of the Hazardous Landfill (including runoff from the yard around the ash solidification facility) will be collected and transferred to a bunded storage tank from where it will be used as process water in the solidification process.

Silos and Conveyors

The incoming waste will be stored in silos until it is required for the solidification process. At this point, it is then conveyed into the Solidification Building and combined with the cement, water and acid to form the solidified waste.

Figure 3.13: Typical Silo/Conveyor Installation

Batching Process

From the silos, the waste material and ground material will be transported to the mixing unit, using an enclosed auger conveyor, where it will be combined with the process water and acid to predetermined ratios through an electronically controlled batch process where it will be batched into a stabilised granular material.

Mixer

Figure 3.14: Typical Mixer Installation

This material is then placed into a site vehicle, which will be waiting inside the building in the stabilised material transport bay, and subsequently transported to and deposited in the Hazardous Landfill where this granular material will solidify. At no stage will the vehicles delivering waste to the Ash Solidification Facility enter the Hazardous Landfill itself.

Quality Control and Testing

The design of the hazardous waste solidification process is based on a standard recipe which uses standard ingredients; waste (flue gas treatment residue, fly ash) + ground material (cement, alternatives for cement with the same properties) + leachate/water + optional acid (in function of pH-control). The final recipe will be based on the result of laboratory testing of the incoming waste streams that need to be treated. The recipe will be refined and altered as required to ensure that licence criteria are satisfied. Weighing bunkers will be used to batch and measure accurately the waste and the liquid quantities.

The waste will come from plants that are in continuous operation (incinerators), so the expected variation in the waste is minimal. It is proposed that a sampling method related to the volume of the waste stream is implemented, resulting in the sampling and analysing of one in every 10 to 20 delivery vehicles. For new waste streams, a sample will be taken from each load and a simulated mix will be tested in the onsite laboratory to determine the optimal recipe prior to batching.

Sampling of the batched material will comply with the Waste Acceptance protocol, to be agreed with the Agency. The sampling frequency will comply with Directive 2003/33/EC (refer to Section 5.5 for more details) and the frequency will be dependent on the material to be batched, i.e. testing of new waste streams will be more frequent than regular waste streams. In addition, it is proposed to take samples once per month on the landfill to check conformity with the conditions of the IED License. This will be carried out by drilling cores to extract material from the landfill and subsequently testing the material in a laboratory.

Environmental Control

During the process of unloading the waste vehicles into the silos, air will be released from the silos through a vent. These vents will be protected with dust filters to ensure that there will be no release of dust to atmosphere.

A standard wet scrubber will be provided in the Solidification Building to treat the excess air pressure from the mixer and to collect the vapour above the site vehicle into which the solidified waste is deposited. These areas will be under negative pressure and the vapour will be treated with a standard wet scrubber, prior to emission to atmosphere through a vent stack. The water will be reused in the process so there will be no water emissions from the process.

Mass Balance for the Ash Solidification Facility

With respect to the Ash Solidification Facility, process control during the solidification operation ensures the production of a consistent stabilised waste product. According to the mix design, appropriate quantities of ground material and process water are added to the combined ash material (fly ash & FGTR). The finished solidified waste will amount to approximately 145% of the weight of the original waste.

Table 3.9: Expected Mass Balance for the Ash Solidification Facility

Input	TPA
Hazardous Waste from Incineration Process	50,620
Ground Material (Cement or similar)	7,593*
Process Water (Acid and Water Mix)	12,655
Output	**TPA**
Solidified Waste to Landfill	70,868

*The ratio is likely to be in the region of 15-20%. A worst case of 20% has been allowed for in calculating the associated traffic movements, however the final ratio will be determined following onsite trial mixes, (It is noted that from a similar plant in Belgium the actual percentage is approximately 15%).

4 DESCRIPTION OF ANCILLARY OPERATIONS

4.1 LEACHATE MANAGEMENT

A herringbone leachate collection system will be constructed on top of the basal liner in each of the landfills with the leachate draining to collection sumps from where the leachate is pumped via side slope risers to the relevant locations, namely:

- MSW Landfill – Leachate pumped to the leachate storage tanks in the existing leachate management area (until completion of the leachate treatment facility).
- Non-Hazardous Landfill – Leachate pumped to raw leachate storage tanks in the proposed onsite leachate treatment facility.
- Hazardous Landfill – Leachate pumped to storage tanks in the hazardous waste reception area for recycling as process water in the ash solidification process.

It will be possible to pump leachate independently from each of the leachate collection sumps. This allows for more flexibility with respect to the management of the leachate on-site, particularly during the active life of the site.

In addition, the leachate collection system is also designed in such a manner that, following the closure of the landfill and when the leachate levels in the landfill decrease, it will be possible to pump the leachate directly from the collection sumps for tankering off-site. This will allow for the option of decommissioning the on-site leachate holding tanks and treatment plant, as required.

The head of leachate in the waste body is maintained below a level of 1 m in height, a level sensor will be set at a level below 1 m and when the leachate reaches this level the leachate will be pumped to the relevant storage tanks.

A system control and data acquisition (SCADA) system for monitoring the depth of leachate in each of the phases has already been developed at the site that allows for the automatic activation of the pumps in each of the leachate collection sumps. The SCADA system also ensures that leachate is only pumped to the leachate storage/treatment area when there is sufficient capacity in the storage tanks. If this capacity is not available, then the leachate can be recirculated to existing cells for temporary storage or can be tankered off-site for disposal. The existing SCADA system will be extended for the proposed Non-Hazardous and Hazardous Waste Landfills at the site.

4.1.1 Leachate Treatment Facility

The leachate treatment plant can cater for the treatment of leachate from the existing and proposed landfill infrastructure at the Drehid WMF but is primarily intended for the treatment of leachate from the Non-Hazardous Landfill and the MSW Landfill. The layout of the proposed leachate treatment facility is shown on Drawing No. 8108-2086 with elevations and sections provided on Drawings No. 8108-2087.

Leachate, which is collected in the leachate collection system in each of the landfills will be pumped to the holding tanks within the leachate treatment area, for storage prior to treatment and transport off-site. The proposed leachate treatment facility design is based on a modified version of the Sequencing Batch Reactor (SBR) aerobic biological treatment process.

This has been used successfully in numerous similar applications during the last four decades. The process (described in detail below) comprises aerobic and anoxic phases of treatment, and further incorporates ultrafiltration membranes for the separation of biological solids form a very clear final effluent. In summary, the treatment process is shown schematically in Figure 4.2.

The treated leachate will then be transported off site by road tankers, for safe disposal at a municipal WWTP, making use of existing on-site storage and loading infrastructure.

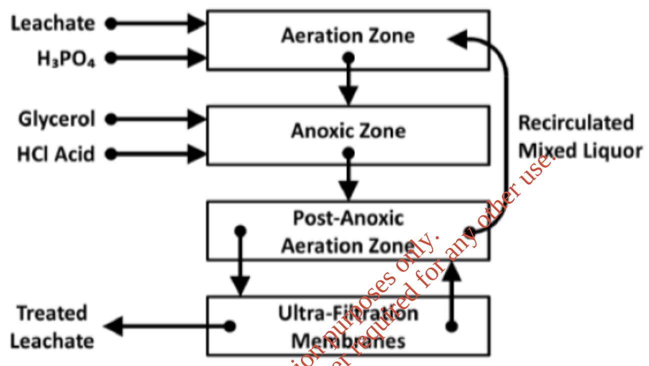


Figure 4.1: Schematic Representation of the Treatment Process for the Drehid Plant

The design of the leachate treatment plant proposed for the pre-treatment of leachates at Drehid is based on an innovative process design that has been developed, tested, and installed successfully at several landfill sites in the UK and overseas, where very similar leachates have required treatment, is proposed. Very similar leachate treatment systems have been operated successfully for several years at Bletchley Landfill Site in Buckinghamshire, UK (2011), Vissershok Landfill Site, Cape Town, South Africa (2011), Connon Bridge Landfill in Cornwall and at Winterton Landfill on Humberside. These treatment plants are capable of treating concentrations of nitrate-N as high as 1500 mg/l, down to values below 10 mg/l.

Biological denitrification is a complementary step to biological nitrification, during SBR treatment of landfill leachate. Leachate is added into an initial Aeration Zone in which all degradable organic compounds are treated, and ammoniacal-N is biologically oxidised to nitrate. Mixed Liquor (the treated leachate containing bacteria which carry out treatment) is then pumped into a stirred but unaerated Anoxic Zone in which nitrate is reduced to nitrogen gas, following addition of supplemental carbon such as the waste product Glycerol, from biodiesel production. Agitation, and further aeration in a Post Anoxic Aeration Zone, then releases bubbles of the inert gas, nitrogen, attached to the biomass or dissolved in the mixed liquor. Denitrification of a nitrified leachate also reduces the amount of alkali reagent necessary to be added from an external source to achieve nitrification, as alkalinity is released during the denitrification process itself.

A fully-treated leachate permeate containing very low levels of degradable organic compounds, of ammoniacal-N, and also relatively low concentrations of nitrate-N, can be withdrawn from the Post Anoxic Aeration Zone using Ultra-Filtration (UF) Membranes. Residual mixed liquor is then recycled back into the extended aeration tank, to allow the acclimatised bacteria to carry out further treatment of incoming leachate.

The Anoxic process is carefully controlled by means of redox sensors, which minimise automated supplemental carbon additions, while maintaining redox levels in an optimum zone for the biological denitrification reaction.

4.1.1.1 Proposed Configuration and Operation

An outline design of the plant is shown on Drawing No.'s 8108-2086 & 8108-2087. The entire treatment facility will be contained within a sealed and bunded area with secondary containment provided sufficient to contain 110% of the volume of the largest reactor, when full to the brim.

Raw leachate from the proposed Non-Hazardous Waste Landfill and from the existing MSW Landfill, will be pumped to the leachate treatment area and stored in separate Raw Leachate Balance Tanks (RLBTs), in order to allow separate feeding of selected volumes from each source, during each treatment cycle/each 24-hour period.

The RLBTs will comprise three separate and identical circular, reinforced concrete, roofed RLBTs, each with a functional capacity of 134 m^3 and a nominal wall height of 4.25 m, providing storage for a total of 402 m^3 of this leachate, representing 3 days' supply of leachate, at maximum design treatment rates.

All of the RLBTs are located within the bunded area, and adjacent to the access road, and will be equipped with facilities to allow them to be either filled by road tankers, or emptied by road tankers, in a secure manner. However, in normal operation, they will be filled by site pumps, with suitable protection to prevent overfilling. Leachate from each tank will be dosed precisely, as required, into the treatment process by means of duty/standby pumps, and electrically actuated valves.

The main treatment reactors will be constructed as concentric, reinforced concrete tanks, comprising an external aeration tank (AET), a middle anoxic tank (ANZ) and a central post anoxic aeration tank (PAT) as described above. Figure 4.3 shows a similar treatment plant layout, for illustrative purposes.

Figure 4.2: Similar Concentric Tank arrangement at Bletchley Leachate Treatment Facility, Buckinghamshire, UK. (Photograph provided for illustrative purposes)

Since odour is not a concern from the treatment reactors (concentrations of potentially odorous components such as organic compounds or ammonia are very low at all times), and also to ensure that temperatures do not rise to inhibitory values during treatment, the tanks do not have roofs.

The AET has a nominal wall height of 6.5 m, a typical operational depth of 5.0 m, with an external diameter of 25.0 m and an internal diameter of 15.0 m, providing an operational volume of approximately 1400 m^3. Aeration and turbulent suspension and mixing of biological solids will be provided by four submerged 18.5 kW venturi aerators, which allow full aerobic biological treatment of leachate which it receives. The control of operational pH-values if required, to within an optimal range of selected values, will be achieved by means of automated dosing of either sodium hydroxide or hydrochloric acid solutions. Very occasional (typically monthly) dosing of low volumes (<10 litres) of phosphoric acid will take place, in order to ensure that the process is not inhibited by lack of the nutrient phosphorus. Automated addition of antifoam solution will take place to control any foam production during treatment. Mixed liquor from the AET will be automatically pumped into the adjacent ANZ to achieve desired treatment performance.

The ANZ will also have a nominal wall height of 6.5 m, a typical operational depth of 5.9 m, with an external diameter of 15.0 m and an internal diameter of 8.0 m, providing an operational volume of about 750 m^3. Full three-dimensional mixing of biological solids will be achieved by installation of three submerged 7.5 kW mixers. Automated dosing of supplemental carbon will be controlled by readings from redox probes, to provide optimum conditions for denitrification of nitrate to nitrogen gas. Mixed liquor from the ANZ will overflow into the central PAT, as required.

The central PAT will also have a nominal wall height of 6.5 m, a typical operational depth of 5.0 m, and an external diameter of 7.5 m, providing an operational volume of about 220 m^3. The tank will be mixed and aerated by means of a single 7.5 kW submerged venturi aerator. Mixed liquor from the PAT will circulate through an adjacent UF Plant, from which filtration membranes extract up to 140 m^3/d of treated permeate, which comprises final effluent from the system, and passes into the Treated Leachate Balance Tank (TLBT). Residual mixed liquor from the UF Plant passes back into the PAT, which overflows back into the AET via an overflow arrangement. A Mains Water Storage Tank for use by the UF Plant will be located nearby, for use during automated membrane cleaning cycles, which will also involve small volumes of cleaning chemicals, housed within the UF plant.

The circular TLBT will be unroofed and also made of reinforced concrete, with a nominal wall height of 4.25 m, a diameter of 10.5 m, and a maximum operational volume of 300 m^3. Treated leachate will be pumped from the TLBT into the two existing storage tanks, each of volume 200 m^3, which have to date been used for storage of raw leachate, prior to removal offsite by road tankers. Together, the three TLBTs provide a capacity of 700 m^3 for treated leachate, representing five days treatment capacity, and sufficient to allow for the fact that treated leachate will be tankered for off-site disposal only on weekdays, even during Bank Holiday periods. Arrangements for loading of tankers from the two existing 200 m^3 capacity tanks will be upgraded, as required.

4.1.1.2 Chemical Storage and Delivery

A separate area of secondary containment, within the main bunded area, adjacent to the road, will be dedicated to storage of chemicals used during the treatment process. An emergency shower and eyewash station are located within this area, in case of any spillages of chemicals.

Chemicals to be stored within this area will be contained within purpose-built tanks incorporating integral secondary containment, and all dosing arrangements will also be in accordance with recognised industry practice. These include:

- 32% w/v sodium hydroxide, in a 30 m^3 container;
- Supplemental carbon, in an identical 30 m^3 container;
- 34% hydrochloric acid, in a 6 m^3 container, with adjacent water scrubber;
- 85% phosphoric acid, in a 1.5 m^3 container; and
- Antifoam solution, housed in two 1 m^3 IBCs, replaced individually as needed using a fork-lift truck.

All of these chemicals are used safely at many similar leachate treatment facilities. Deliveries of chemicals will typically be each month or less frequently, by road tankers, which will park on the dedicated slip road adjacent to the bunded area and separated from it by a 0.5 m high nib wall, complete with hand-railing, and protected by means of Armco barriers. Any spillages during delivery will drain into the main bunded area of the treatment plant, and all drainage (including rainfall) from within this area will flow by gravity into a sump, from where it will be automatically pumped into the Aeration Tank in the treatment plant. Similar arrangements are in-place for any spillages within the bunded area containing chemical storage tanks.

4.1.1.3 Operational Issues

All process tanks will be provided with safe means of access as appropriate, and with safe means of removal for all aerators, mixers, pumps, etc. This will involve davits and winches, and the main treatment tank is then fitted with a lifting beam with mechanical lifting winch at high level, which will allow equipment to be transported to the car park, for loading into vehicles in case off-site repairs are required.

The Control Building will comprise a modified 12.2 m x 2.5 m ISO Container, which will include the main plant control systems and SCADA and incorporate a small laboratory for sample preparation and testing. It will be located outside the secondary containment bunded area, adjacent to a tarmac area reserved for car parking, equipment laydown, and storage as required.

The biological treatment process will generate excess biological solids, in the form of sludge, which will need to be wasted from the process and disposed of. This sludge will be very well oxidised, the treatment process having a very long mean sludge age during treatment, of many hundreds of days. The sludge will not contain significant concentrations of any hazardous substances and at many sites is routinely returned to the landfill along with the solid wastes being landfilled, as is proposed at the Drehid WMF. It is also possible to add the sludge to waste materials being composted in adjacent facilities.

When running at maximum treatment rates, sludge generation will be equivalent to about 20 m^3/d of unthickened sludge with a solids concentration of 5,000 mg/l. Sludge could be disposed of in this form, but an area has been allocated within the bunded area which can be used for installation of a simple sludge thickening centrifuge, which will concentrate sludge solids into 0.6 m^3/day of a thickened sludge containing about 20% solids by weight. This will be stored in a skip, to be disposed of into the landfill on a regular basis, with sludge wasting and thickening carried out on an estimated three-week basis.

4.1.1.4 Emissions Controls

The treatment process will give rise to the following potential emissions:

Point source gaseous emissions are only likely at the raw leachate balance tanks. The methanogenic leachate which will primarily be treated has low odour and all RLBTs will be roofed to minimise any emissions to atmosphere. Raw leachate can also contain dissolved methane and risks from the potential presence of methane gas in the headspace of the RLBTs will be managed by routine incorporation of zoning, taking account of ATEX Directives (the name commonly given to the two European Directives (94/9/EC & 1999/92/EC) for controlling explosive atmospheres).

There will be no significant emissions of dust.

Point source water emissions will be thoroughly managed by means of secondary containment/bunding as described above, for both process reactors and for chemical delivery, storage and dosing as well as by a SCADA control system, which will always ensure that any fault will ‘fail safe’ in accordance with good industry practice. Main reactors will be constructed of reinforced concrete, as water retaining structures under industry codes, and have an excellent record for use in many similar landfill leachate applications.

All systems to manage both gaseous and water emissions will be designed taking note of the UK EA *Guidance for the Treatment of Landfill Leachate* (2007)[4], which although not incorporated by the Irish Government, nevertheless has been adopted in England, Wales, Northern Ireland, and Scotland, and contains much valuable guidance and information for the safe management and treatment of landfill leachates.

Noise Emissions from the treatment process will be minimal. The main mechanical equipment with any potential for significant noise emissions during leachate treatment is generally that associated with aeration and mixing of process reactors (for example, compressors, etc). These processes will be carried out by mixers and venturi aerators submerged at a depth of 4 – 5 m, within reinforced concrete tanks, and will give rise to little noise.

The main use of energy during treatment will be during the aeration and mixing of treatment reactors, and within the ultrafiltration process. Because aeration capacity is divided into four separate venturi units, one or two of these will be turned off during periods when treatment rates are reduced. In addition, because the venturi units are water-cooled, and submerged within the tank, the waste heat which they generate will be extremely valuable in maintaining optimum biological treatment temperatures during colder months of the year. The ultrafiltration plant will only operate each day until the required volume of treated leachate been discharged as permeate, and then will switch off and remain idle, having automatically carried out a membrane cleaning cycle.

4.1.2 Off-site Leachate Removal

It is proposed that the leachate produced at the facility will be treated onsite and subsequently transported via 23 m^3 (5,000 gallon) road tankers to be treated at Osberstown WWTP, or other Irish Water treatment plant at the discretion of Irish Water. Correspondence has taken place between Bord na Móna and Irish Water with respect to this arrangement as referenced in the EIAR.

It is envisaged that leachate will only be transported to the approved WWTP on weekdays. The average daily quantity to be transported to the facility will be of the order of 123 m^3, which equates to 5.3 tankers per day. Over the active lifetime of the facility, the maximum daily quantity of leachate generated from the Drehid facility will be of the order of 230 m^3, however as the capacity of the leachate treatment facility is in the region of 140 m^3 per day, any excess will be recirculated into the landfill body. As the treated leachate will only be transported on weekdays, the maximum quantity of treated leachate which will be transported from the site is 196 m^3 per day which equates to a maximum of seven tankers per day.

From studies carried out into the impact of leachate on municipal WWTPs, it is identified that less than 4% by volume of high strength leachate would not result in a deterioration of plant performance (Casey

[4] UK Environment Agency (EA) *Guidance for the Treatment of Landfill – Leachate UK Environment Agency Sector Guidance Note IPPC S5.03, February 2007, 182pp*

1994, after Henry 1985)[5]. The closest and most likely WWTP to receive the treated leachate from Drehid is Osberstown WWTP in Naas, County Kildare. This has recently been upgraded to 130,000 population equivalent (PE) and it is noted that the maximum volume of leachate would constitute less than 1% of the hydraulic load at the inlet to this WWTP. As the leachate will be pre-treated at the Drehid Facility, it is not expected that the proposed volumes of treated leachate will have any effect on the WWTP. During the detailed design of the proposed WWTP, further discussions will be held with Irish Water on the achievable treated leachate composition and acceptance at a WWTP.

4.1.3 System for Monitoring the Level of Leachate

The level of leachate in the waste body will be continuously monitored using hydrostatic sensors located in the leachate collection sumps and at other locations in the site.

Sensors will be connected to a SCADA system which interprets the leachate level and if levels exceed the maximum permitted an alarm will be activated and the appropriate action will be taken.

4.2 LANDFILL GAS MANAGEMENT

The MSW and Non-Hazardous Landfills will be constructed with landfill gas collection infrastructure to collect gas generated from the degradation of the waste body, primarily in the breakdown of bio-degradable material. Landfill gas collection is not proposed for the Hazardous Landfill due to the inert nature of the waste. This approach is in compliance with the approach adopted at existing landfills that accept inert hazardous waste, similar in nature to the proposed Hazardous Landfill.

The gas collection infrastructure will be connected to the existing landfill gas management system, which includes a 5MW landfill gas utilisation plant and three landfill gas flares. Two of the landfill gas flares are associated with the gas utilisation plant. The landfill gas utilisation plant converts landfill gas into electricity for export to the national grid and was installed in 2013. The plant also serves to reduce the facility's carbon footprint whilst ensuring the safe capture and destruction of landfill gas. As part of the utilisation plant, there are four gas engines.

At the beginning of 2016 there were 3 no. electricity connections into the Drehid WMF:

- the road entrance connection which serves the entrance lighting and electric gate;
- the connection which served the electrical requirements of the landfill and composting plant; and
- the connection into the landfill gas utilisation plant to primarily facilitate the export of electricity.

The current electricity generation capacity of the landfill gas utilisation plant is greater than the permitted export allowance to the National Grid. In September 2016, the site commenced the usage of excess electricity, generated by the landfill gas utilisation plant, in the landfill, composting plant and service buildings. These facilities are now primarily powered by electricity generated on the site. The connection

[5] Eoin Syron, Michael J. Semmens and Eoin Casey, Performance Analysis of a Pilot-Scale Membrane Aerated Biofilm Reactor for the treatment of Landfill Leachate (1994)

which previously served the electrical requirements of the landfill and composting plant was made redundant.

A mains electricity supply remains in place into the landfill gas utilisation plant to facilitate the export of electricity to the National Grid and to provide for the importation of electricity when the landfill gas utilisation plant is offline for maintenance and therefore not generating electricity.

It is proposed to monitor the following emissions to air from the gas management system:

- carbon monoxide (CO) (continually);
- nitrogen oxides (NO_x) (biannually);
- sulphur dioxide (SO_2) (biannually); and
- particulates (utilisation plant only) (annually).

There are no significant odour emissions from either the landfill gas utilisation plant or the landfill gas flares.

4.3 LABORATORY FACILITIES

It is proposed to provide a laboratory in the Maintenance Building which will allow for the carrying out onsite of routine leachate, groundwater and surface water monitoring requirements for the site. This laboratory will also provide for the preparation and testing of mixes for the onsite Ash Solidification Facility. Basic parameters (e.g. dry solids, volatile solids, pH) for process control measures for the biological treatment process will also be measured in this laboratory. A stove and a small oven for drying samples will be provided in the laboratory. Portable instruments such as pH and temperature meters, a conductivity meter etc. will be retained on-site in the laboratory.

The full suite of analyses for groundwater and surface water will not be carried out at the site laboratory. An external, accredited laboratory will carry out the analysis of samples in accordance with the Conditions of the IED Licence.

4.4 SYSTEM CONTROL AND DATA ACQUISITION (SCADA)

A System Control and Data Acquisition System (SCADA) system is currently in place at the Drehid WMF and will be extended to incorporate the further development of the facility as required.

The SCADA system will monitor and control leachate generation/treatment, gas management, surface water discharge and odour emissions at the facility as well as key process operations including composting temperatures. The SCADA system is set up to continuously monitor key parameters and to act or generate an alarm in the event that any parameter is outside of its accepted range. Critical alarms will be texted to selected mobile phone numbers thereby ensuring the communication of critical alarms to responsible individuals on a 24-hour basis.

5 SITE INFRASTRUCTURE AND OPERATIONS

5.1 FOUL AND SURFACE WATER DRAINAGE

The overall surface water drainage layout for the Drehid facility is shown on Drawing No. 10369-2011 in Appendix A. Further detailed drawings of the foul and surface water drainage network for the proposed development of the Drehid WMF are provided in Drawing No.'s 8108-2017 to 8108-2033 included with the Proposed Development EIAR.

Rainfall on active areas of the landfills will generate leachate and will be managed through the leachate drainage infrastructure in the landfill liner system. Rainfall on capped areas of the landfills will be isolated from waste material and diverted into the surface water management system via a surface water swale along the external toe of the landfill area. Surface water from the waste control area and road network will also be diverted to the surface water management system as well as groundwater pumped out from the undercell drainage networks.

Proprietary grit interception traps and oil interceptors will be installed through which intercepted run-off from hard stand and parking areas within the site will be diverted. The outfall from the grit trap and oil interceptor will be discharged to the surface water attenuation lagoons for further treatment. These lagoons are sized to provide adequate capacity for a 100-year storm event, to meet facility fire-fighting water requirements and to provide water to meet process demands when necessary. Overflow from these attenuation lagoons will be at greenfield run-off rates (i.e. 5.84 m/s) and will be diverted through ICWs to provide an additional step in the treatment train, prior to discharge to a nearby bog drainage channel. Separate attenuation lagoons and ICWs have been designed to manage run-off from the proposed new infrastructure areas.

Flow diagrams of the proposed stormwater management for non-hazardous and hazardous landfill areas are shown in Figures 5.1 and 5.2.

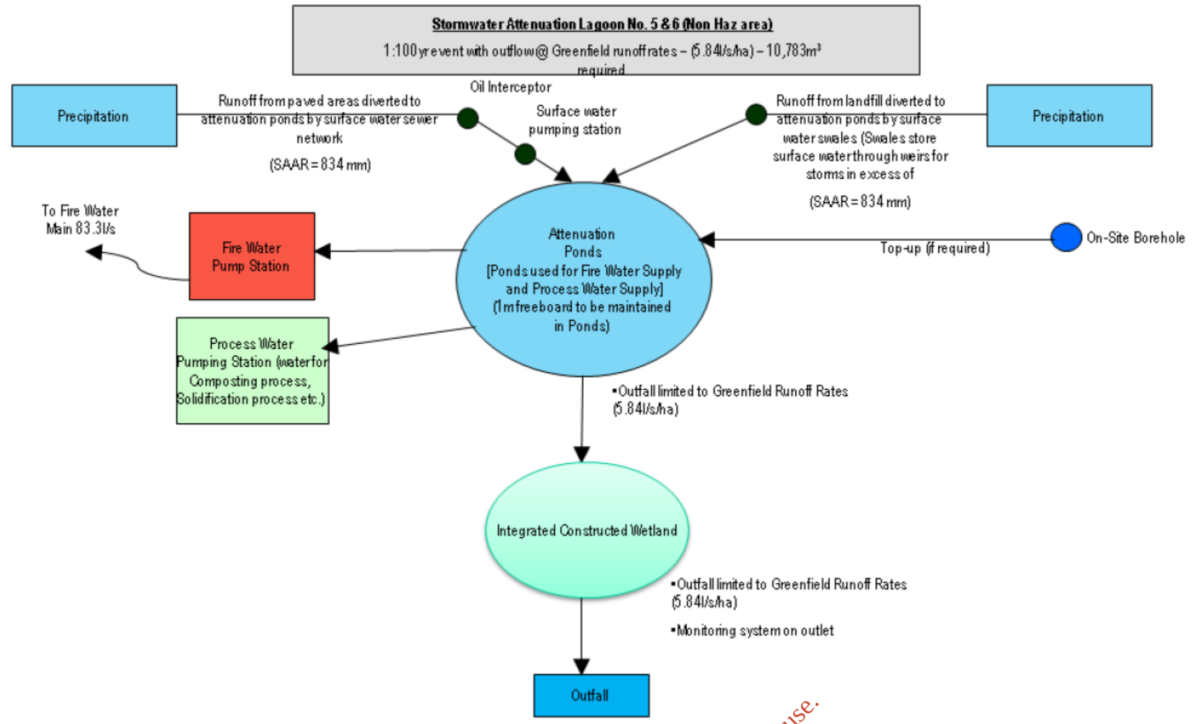


Figure 5.1: Stormwater Management Non-Hazardous Landfill Area

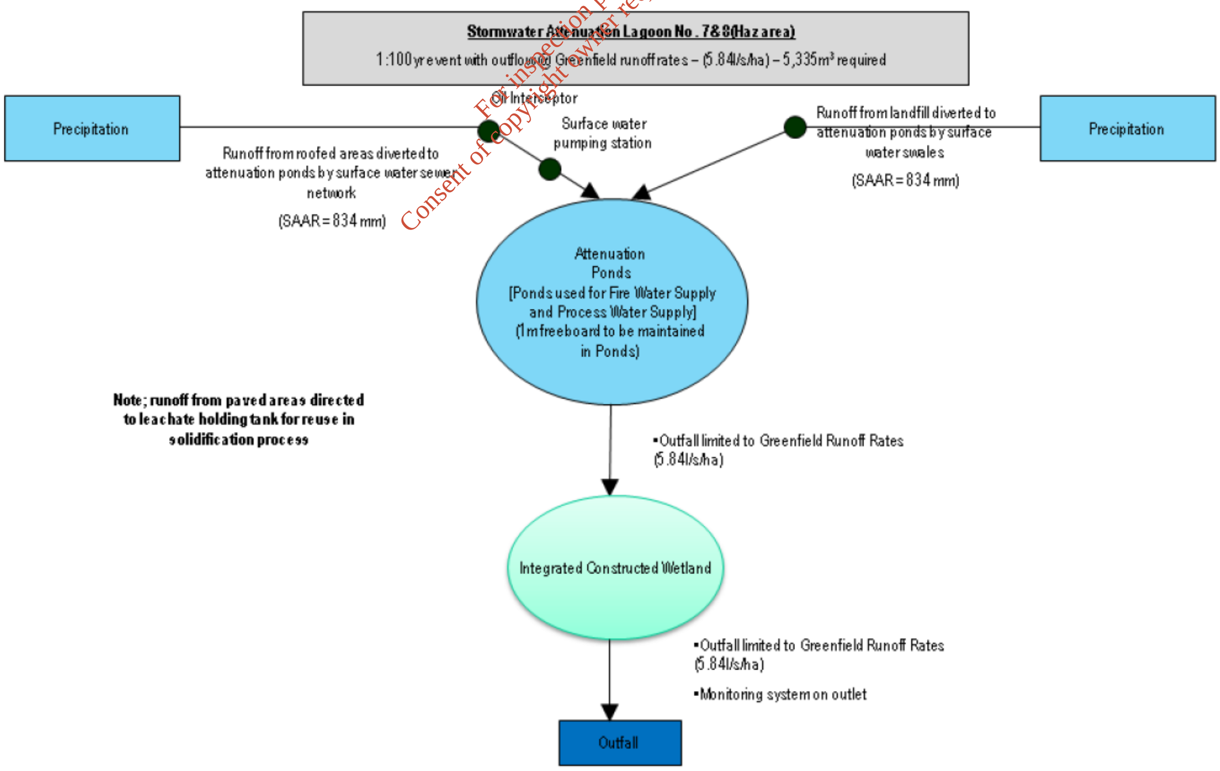


Figure 5.2: Stormwater Management Hazardous Landfill Area

The outflow from the ICWs will flow into existing man-made drains which discharge into a central culvert/main drain. This main drain flows into an existing attenuation pond located to the southwest of the main site infrastructure. This attenuation pond allows for some level of treatment of the run-off prior to discharge to the Cushaling River at the western margins of the bog.

The existing surface water infrastructure will be retained and modified as necessary to feed into the proposed new layout.

5.2 FOUL WATER DRAINAGE

Sources of foul water at the facility are:

- Wastewater from sanitary facilities;
- Overflow water from the wheel wash;
- Run-off from the waste reception areas; and
- Leachate from the MSW, non-hazardous and hazardous waste landfills.

Sanitary wastewater (i.e. wastewater from toilets, washing facilities, kitchens etc.) will be collected in each building and directed to the onsite leachate treatment facility, via the foulwater collection network. The foul collection network will be a combined gravity/pumped system, due to the distance from the network and the flat gradient of the site. The foul water drainage layout in shown on Drawing No. 10369-2011 in Appendix A. The existing sanitary wastewater treatment plant will be decommissioned.

The onsite leachate treatment facility will provide preliminary treatment and the treated effluent will subsequently be tankered off-site to a suitably licensed WWTP for further treatment and disposal.

Appendix 4 of the Engineering Services Report included with the EIAR (Appendix 3.1 of the EIAR) contains calculations with respect to the foul water discharge loading and network characteristics. The wastewater collection system will be fully isolated from the surface water collection system during the lifetime of the facility.

The existing foul water infrastructure will be retained and modified as necessary to feed into the proposed new layout.

5.3 WATER SUPPLY

The requirements and proposed source of water for the various elements of the Drehid WMF are identified in Table 5.1 below.

Table 5.1: Water Supply Requirements

Water Requirement	Source
Potable water	Water dispensers
Domestic non-potable water requirements (toilets, sinks etc.)	On-site borehole
Fire-fighting requirements	On-site attenuation lagoons with back-up supply from on-site borehole
Process water requirements (non-potable) for processes involved in the processing of wastes prior to deposition in the landfills	Recycled leachate On-site attenuation lagoons
Water required for cleaning, wash-down and other operational requirements such as dust suppression.	On-site attenuation lagoons On-site borehole

Water supplied from the onsite borehole will be pumped to the site infrastructure, via a water treatment plant, which will treat the water to remove iron, manganese and ammonia to acceptable limits. It is estimated that the peak water demand for fresh water requirements for the development will be approximately 2.5 l/s (see water balance calculations in Appendix 2 of the Engineering Services Report included as Appendix 3.1 to the Proposed Development EIAR).

Water from the surface water attenuation lagoons will be used for fire-fighting purposes and for process water requirements. A new dedicated fire water main will be constructed as part of the proposed development. Fire hydrants, to comply with the requirements of the Building Regulations, will be located on this fire watermain.

Further detail on the water supply provisions for the Drehid WMF are provided in the Engineering Services Report.

5.4 WASTE QUARANTINE AND INSPECTION

Any unsuitable waste discovered at the MSW landfill will be transferred to the existing waste quarantine area adjacent to the proposed new welfare building. Unsuitable waste identified at the non-hazardous landfill will be transferred to the quarantine area in the storage yard adjacent to the landfill.

There will be a dedicated hazardous waste quarantine area located adjacent to the ash solidification facility.

Further detail on incoming waste acceptance procedures, rejection of unsuitable incoming waste and inspection requirements are detailed in Section 5.5.

5.5 TRAFFIC CONTROL AND SECURITY

All waste traffic will access the Bord na Móna landholding by turning from the R403 regional road into the existing site entrance and then travelling along the existing access road to the entrance to the waste facility. All waste vehicles will travel to the Waste Control Area at the location shown on Drawing No. 8108-2010, where the weight, source, type etc. of the incoming waste will be recorded and instructions will be given as to where the vehicle may proceed with the waste. Access to the incoming and outgoing weighbridges and to each of the waste deposition areas within the site will be controlled by the security barriers, which will be operated via a vehicle number plate recognition system.

An adequate number of signs will be positioned strategically around the site to direct users to each location within the facility in a proper manner as shown on Drawing No. 2010-2047.

Car parking for 57 No. cars will be provided adjacent to the Welfare Building. An additional 33 No. parking spaces for HGV's and 8 No. car parking spaces will be provided at the Waste Control Area. 5 No. car parking spaces will include electric car charging facilities.

Site security arrangements to prevent unauthorised access at the facility will include the following:

- The existing main entrance from the R403 regional road has secure fencing, stonewalls and pillars (2.4 m high fencing and a 7 m wide electric drive cantilever security gate that is closed outside normal operating times);
- Fencing around the entire boundary of the Facility footprint, with the exception of the site entrance, will comprise of post and chain link fencing. The fencing layout is shown on Drawing No. 8108-2006, with fencing details presented in Drawing No. 8108-2057;
- A CCTV system monitors the existing access from the R403 regional road and the infrastructure associated with the existing Drehid WMF. This will be extended to include the proposed new infrastructure; and
- Anti-intruder alarms will be located in all lockable facility buildings.

In addition to the above, site signage relating to the Drehid WMF indicating opening times and contact details is currently maintained at the main site entrance. The signage will be updated accordingly for the proposed development. The site security infrastructure will be checked daily and any damage will be immediately temporarily repaired with any additional permanent repair executed within 48 hours of discovery.

5.6 DELIVERY AND RECEPTION OF WASTE

All waste vehicles entering the facility will be required to enter the Waste Control Area, to enable the processing of documentation. The vehicles will park in the Waste Control Area and the driver will proceed to the proposed Waste Control Building, for document processing and subsequently be directed to the appropriate location within the facility.

Four proprietary weighbridges, two to weigh incoming vehicles and the second two to weigh outgoing vehicles, each capable of weighing and recording up to 60 tonnes, will be provided at the facility at the locations outlined on Drawing No. 8108-2010. A Weighbridge Kiosk will also be provided adjacent to the outgoing weighbridges. Each weighbridge will be linked to the Waste Control Building and to the Weighbridge Kiosk, which will include proprietary customised software to allow for the recording of details of each waste movement to the site including the following:

- Haulier name;
- Vehicle registration;
- Waste source;
- Waste type (EWC Code);
- Laden weight; and
- Empty weight.

The weighbridges are necessary to allow for the free-flow of vehicular traffic and to ensure efficient turnaround times at the facility. Entry control barriers will be provided at each of these weighbridges.

5.7 WASTE ACCEPTANCE

Waste will be accepted at the facility only from customers who are holders of a waste collection permit, unless exempted, under the *Waste Management (Collection Permit) Regulations (S.I. No. 820 of 2007)* as amended. The facility will not accept waste delivered directly by the general public and a civic amenity facility will not be provided at the site.

Waste contractors using the site will be required to have a contract with Bord na Móna and the site waste acceptance procedure will apply to all waste deliveries to the site. This will ensure that all contractors will be assessed in advance and that the general composition of the waste will be known. Any contractors who arrive on-site without such a contracted agreement will be refused entry and turned away.

The waste contractor/carrier will be required to provide documentation, which allows a written record to be maintained for each load of waste arriving at the facility. The following information will be recorded:

a) the date;
b) the name of the carrier (including if appropriate, the waste carrier registration details);
c) the vehicle registration number;
d) the name of the producer(s)/collector(s) of the waste as appropriate;
e) the name of the waste facility (if appropriate) from which the load originated including the waste licence, IED licence or waste permit register number;
f) a description of the waste including the associated EWC codes;
g) the quantity of the waste recorded in tonnes; and
h) the treatment, where applicable, to which the waste has been subjected.

Bord na Móna will also record the following information:

- the name of the person checking the load; and
- where loads or wastes are removed or rejected, details of the date of occurrence, the types of waste and the facility to which they were removed.

Three levels of testing and compliance are required for the acceptance of material based on 2003/33/EC, namely:

- Level 1: Basic Characterisation;
- Level 2: Compliance with Basic Characterisation (i.e. consistency testing for regularly generated
- wastes); and
- Level 3: On-site Verification.

Table 5.2: Testing Requirements

Testing Level	Responsibility	Objective
Level 1: Basic Characterisation	Waste Producer	Full understanding of the waste.
Level 2: Compliance with Basic Characterisation (i.e. contingency testing for regularly generated wastes)	Waste Producer	Periodic sampling to demonstrate consistency with original understanding of a regularly generated waste (i.e. the basic characterisation) using key characteristics. For singularly produced waste streams, Level 2 testing is not required.
Level 3: On-site Verification	Landfill Operator	Consistency / compliance with basic characterisation for visually non-conforming wastes and 'quick check' of key relevant characteristics where appropriate.

Following satisfactory documentation check and initial on-site verification of authorised vehicles at the Waste Control Area, these vehicles will be directed to the appropriate location within the facility. While unloading, the waste is subject to further visual inspection by site staff. Should any unacceptable wastes be discovered, the load or any relevant part thereof will be removed to the Waste Inspection Area for further investigation. If the non-conformity has been identified after unloading the waste, the waste will be loaded back on the truck and held in the Waste Inspection Area.

If a load has been rejected while still contained, the truck or trailer will be moved into the Waste Quarantine Area in agreement with the carrier. In the case that the non-conformity is only related to wrong or incomplete documentation, the truck may be held until it is in order. In the event the waste is found to be non-conforming, the waste will either be reclassified and disposed of appropriately or removed from the site by the carrier. The carrier will be required to notify Drehid WMF of the final destination of the waste load.

The current Waste Acceptance Procedure for the existing facility submitted to and agreed with the Agency in accordance with the existing IED Licence is included in Appendix C. Upon issuing of the new IED Licence for the facility, this Waste Acceptance Procedure will be updated and submitted to the Agency for approval.

5.8 WHEEL WASH

Wheel washes will be provided at the site, at the locations shown on Drawing No. 8108-2010. Details of the wheel washes are shown on Drawing 8108-2055. It is proposed to position the wheel washes to ensure that waste vehicles leaving the waste reception areas do not carry excess waste onto the adjoining road infrastructure.

The wheel washes will have a self-contained water recirculation system. A tank will store water for washing purposes while a pump will re-circulate the water back into the tank during washing. Solids that settle at the base of the tank will be removed by a vacuum tanker. Water will only be discharged to the foul water system during the periodic replenishment of the used process water with fresh water.

5.9 MAINTENANCE AND WELFARE

A new maintenance building will be constructed to provide all necessary facilities required for the operation and maintenance of the facility. The building will also provide a location for the maintenance and repair of mobile site equipment, such as excavators and dump trucks.

The maintenance building will be constructed as a steel portal framed structure with a proprietary cladding and incorporating roller shutter doors. Internally the floors will be reinforced concrete floor slabs. Details of the structure and dimensions of this building are included in Drawing No. 8108-2096 and 8108-2097. This building will be fitted with secure storage areas to accommodate power tools, other small plant and equipment. A proprietary bunded container, compliant with EPA requirements, will be provided for the storage of hydraulic and engine oils. The building will be supplied by 3-phase power and will include both security and fire alarm systems. It is envisaged that the maintenance building will include:

- Laboratory facilities and associated office;
- Store room; and
- Maintenance area including a service pit and an overhead gantry.

It is proposed to convert a building that is currently used as a maintenance building for the facility into a welfare building. The modifications will consist of alterations to the internal layout and access/egress from the building as works required for compliance with Building Regulations. The proposed layout of the welfare building is provided on Drawing No. 8108-2098. It is envisaged that the welfare building will include the following facilities:

- Canteen;
- Changing room;
- Washing/Drying Room (washing and drying of clothing);
- Toilets and showers; and
- First Aid / Store Room.

The design of the welfare and the maintenance building includes all necessary provisions required for the operation and maintenance of the facility in accordance with relevant safety, health and welfare at work legislation and other legal requirements.

5.10 FUEL STORAGE

Bunded fuel storage will be provided for the diesel fuel that will be required for the on-site plant and equipment. This bunded fuel storage area will be roofed and located adjacent to the Maintenance Building at the location shown on Drawing No. 8108-2096. This bunded fuel storage area will comprise of a proprietary diesel tank with a capacity of c.32,000 litre (32 m^3) and a 5,000 litre (5 m^3) kerosene tank located in a bund with a total capacity of 60 m^3. There is also a 2,000 litre bunded kerosene tank located in the compost facility.

5.11 HOURS OF OPERATIONS

The facility will operate six days per week as follows:

- Monday to Saturday: 07.30 to 19.00

Various processes at the facility will operate on a continuous basis (24 hours per day and seven days per week) and will be fully automated outside the foregoing hours of operation. Such processes include the composting process and the leachate treatment process.

Waste will be accepted to and outputs will depart from the proposed development between 07.30 and 18.30. Waste acceptance at the facility will only take place outside these hours when required to cater for the late arrival of refuse vehicles due to breakdown or other exceptional circumstances. Waste that is accepted at the facility at or near closure of operating hours will be unloaded at the appropriate waste reception area, stored overnight and processed during the next working day.

6 ALTERNATIVES

The Drehid WMF is an active waste facility with ongoing landfilling of MSW and composting of suitable organic wastes. This waste activity is currently licenced by the Agency under Reg. Ref. W0202-03 and is permitted until 2028. The submission of this IED Licence application to the Agency includes permission to continue these current activities and, thus, there were no alternatives considered for these activities.

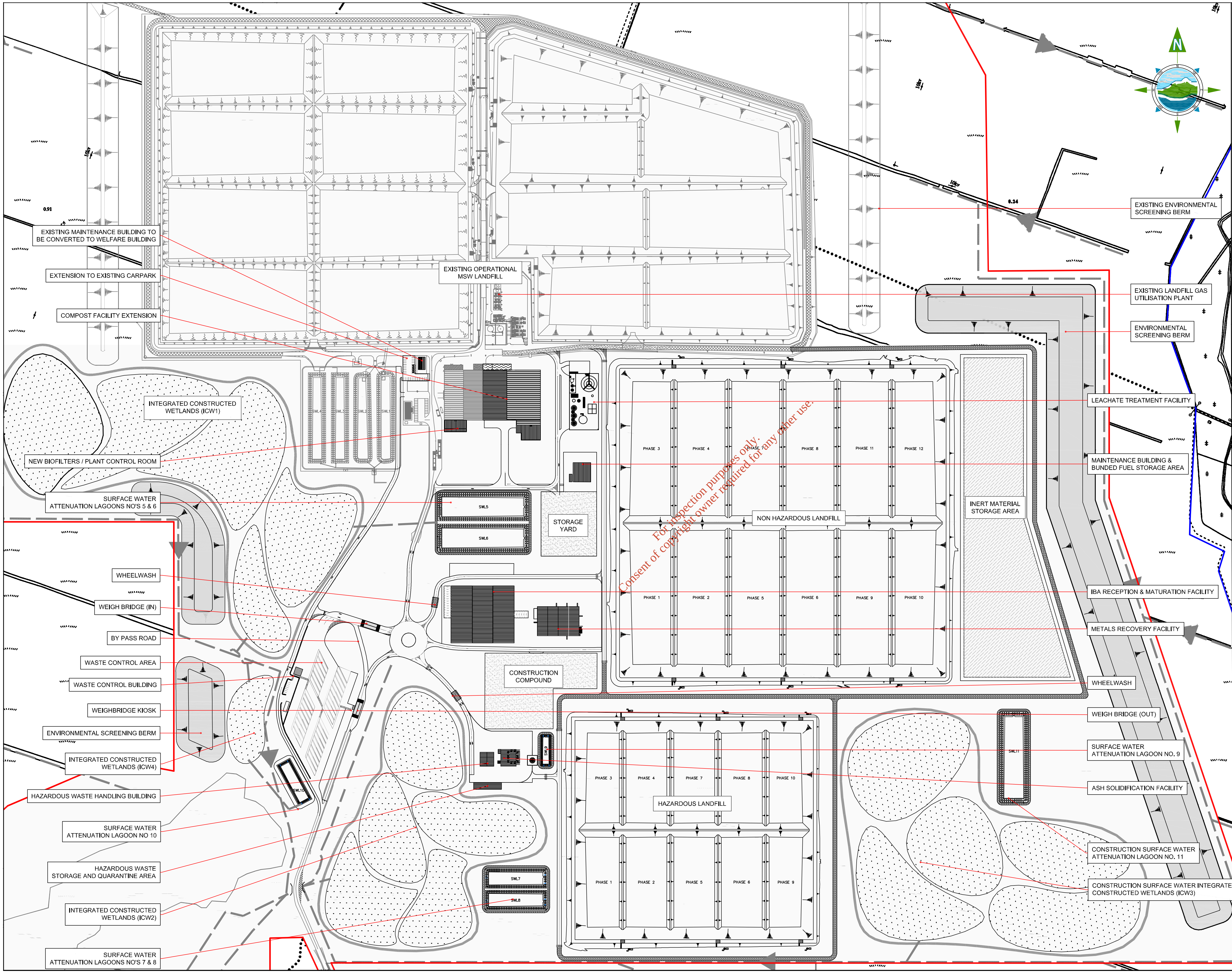
A detailed assessment of the reasonable alternatives to the Proposed Development has been carried out and is presented in Chapter 4 of the EIAR. This assessment of alternatives includes:

- Alternative Locations;
- Alternative Layouts;
- Alternative Size and Scale of the Development; and
- Alternative Technologies.

APPENDIX A

Drawings

10369-2010: Facility Master Plan
10369-2011: Surface Water and Foul Drainage Master Plan



GENERAL LEGEND

BORD NA MÓNA OWNERSHIP BOUNDARY

APPLICATION BOUNDARY

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

OSI 1:5,000 SERIES SHEET NO'S:
3187, 3188, 3253, 3254, 3318, 3319, 3381, 3382.

50m 0 50m 100m 150m

A	Dec. '18	EIAR ISSUE	MN	RH
Rev	Date	Description	By	Chkd.

Client: BORD NA MÓNA
Naturally Driven

Project:
DREHID WASTE MANAGEMENT FACILITY

Title:
FACILITY MASTER PLAN

Scale @ A3:	1:5,000	
Prepared by: M. Nolan	Checked: R. Hunt	Date: December 2018
Project Director:	D. Grehan	
Drawing Status:	Planning	

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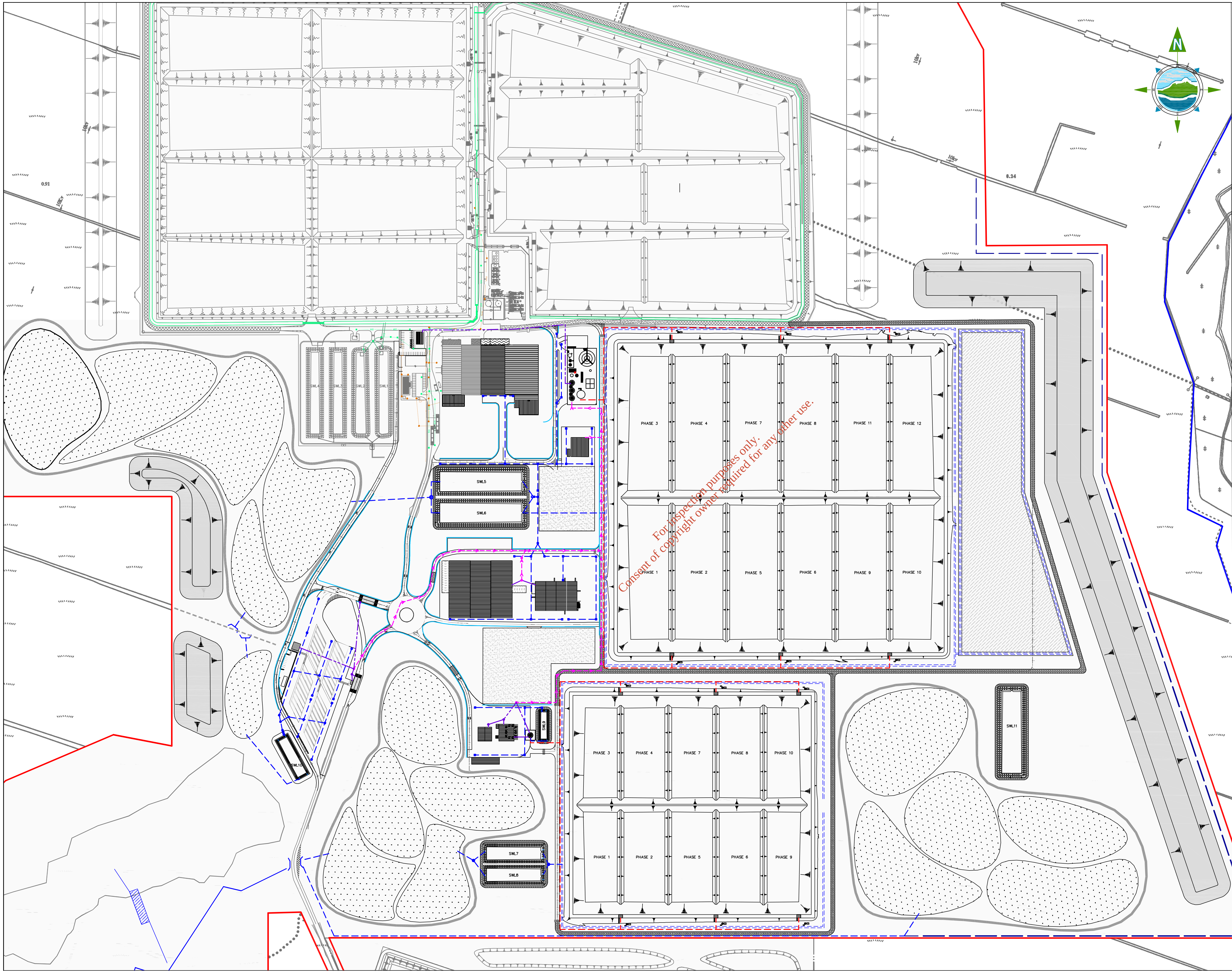
Drawing No.: 10369-2010
Revision: A



GENERAL LEGEND

BORD NA MÓNA OWNERSHIP BOUNDARY	APPLICATION BOUNDARY
PROPOSED SURFACE WATER SWALE	PROPOSED LEACHATE COLLECTION NETWORK
PROPOSED FOUL GRAVITY MAIN	PROPOSED FOUL RISING MAIN ROUTES
PROPOSED SURFACE WATER NETWORK	PROPOSED SURFACE WATER FILTER DRAIN
EXISTING SURFACE WATER NETWORK	EXISTING FOUL COLLECTION NETWORK
PROPOSED SURFACE WATER SWALE	

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
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OSI 1:5,000 SERIES SHEET NO'S:
3187, 3188, 3253, 3254, 3318, 3319, 3381, 3382.

50m 0 50m 100m 150m

Rev	Date	Description	By	Chkd.
A	Dec. '18	EIAR ISSUE	MN	RH

Client: BORD NA MÓNA
Naturally Driven

Project:
DREHID WASTE MANAGEMENT FACILITY

Title:
SURFACE WATER & FOUL DRAINAGE MASTER PLAN

Scale @ A3: 1:5,000

Prepared by:	Checked:	Date:
M. Nolan	R. Hunt	December 2018

Project Director: D. Grehan

Drawing Status: Planning

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Drawing No.: 10369-2011 Revision: A

APPENDIX B

Waste Sampling and Testing for Disposal to Landfill

TOBIN
Consulting Engineers

1 Introduction

The Landfill Directive places controls on waste disposal at landfills. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC. Council Decision EN 2003/33/EC sets specific limits, commonly referred to as 'Waste Acceptable Criteria (WAC) leaching limits' on landfilled wastes. These apply to all wastes destined for disposal in a landfill for hazardous, stable non-reactive hazardous and inert waste. This document summaries the WAC testing, proposed derogation, pre-treatment and testing at the proposed Hazardous Landfill at Drehid.

The Landfill Directive specifics a number of wastes that cannot and will not be accepted at Drehid Hazardous Landfill. These include: liquid waste; waste which in a landfill would be explosive, corrosive, oxidising, flammable or highly flammable; hospital and other clinical wastes; whole and shredded used tyres.

In Section 2.0 of the 2003 Decision, three times higher limit values for specific parameters listed may be acceptable, if

- the competent authority gives a permit for specified wastes on a case by case basis for the recipient landfill taking into account the characteristics of the landfill and its surroundings and
- Emissions from the landfill (taking into account the limits for those specific parameters in this section) will present no additional risk to the environment according to a risk assessment.

In this case, Member States must report to the Commission on the annual number of permits under this provision and must define criteria for compliance with the limit values.

1.1 Flue Gas Treatment Residues (FTGR)

FTGR typically does not comply with WAC for hazardous landfill without some form of pre-treatment. Stabilisation / solidification as a pre-treatment process is recognized through the 'waste list' of Commission Decision 2000/532 under label 19 03 "stabilised/solidified wastes". Classical techniques of stabilisation consist of mixing residues with mineral or hydraulic binders (e.g. cement, slag or other puzzolanic materials), additives like acids to control the pH and to cause buffering reactions that help reduce leaching (in particular of Pb) and water to ensure hydration reactions take place. Cement is the most widespread binder used for FGT residue treatment. However, it is possible to supplement cement with other puzzolanic materials. The process involves a reaction between water and the binder to form a chemical and physical immobilisation/encapsulation of the leachable components (metals, salts). The residues are thereby incorporated in the binder matrix. The treated residues typically reach their maximum strength after 28 days.

The main environmental concern with respect to APC residues is leaching of[1]:

- Easily soluble salts such as Cl and Na. Although not toxic for humans in typical concentration levels these components may significantly affect ecosystems and spoil drinking water resources.
- Heavy metals such as Cd, Cr, Cu, Ni, Pb, and Zn. Heavy metals and trace elements can potentially be present in concentrations harmful for humans as well as for ecosystems.
- Dioxins. Although dioxins and furans do not easily leach, release of these contaminants is of major concern because of their toxicity.

The three times derogation is sought to allow the deposition of flue gas treatment residues (FTGR) and fly ash which contain elevated salt, lead and zinc concentrations. The exemption is only sought in relation to well characteristic and specific was streams such as FGTR. It is proposed to apply for a three times derogation in relation to Total Dissolved Solids (TDS), Chloride, Sodium, Lead, Cadmium and Zinc.

1.2 Available Export Outlets for FTGR / Transboundary Impacts

FGTR is produced from the flue gas treatment system of waste to energy facilities. At present, the residue from the only operating commercial waste to energy plant on the island is sent for disposal to salt mines in Germany.

As the UK prevents imports of hazardous waste for disposal, the nearest outlets for FTGR disposal are in continental Europe. In the UK there are some initiatives to encourage recycling of FTGR e.g. through block making (carbon8). In 2017, the UKs Department for Environment Food & Rural Affairs (DEFRA) reversed a plan to phase out a rule allowing hazardous waste materials from energy from waste plants to be disposed of in landfill, due to 'limited availability' of alternative outlets for the material.

At present main facilities used for Irish WTE facilities are:

- NOAH AS Langoya Island facility in Norway is an old limestone quarry, and
- Various underground salt mine in Germany

One of the goals of sustainable waste treatment is to create a 'sink' for hazardous components, insofar as they cannot be destroyed. Waste treatment should aim to separate inorganic hazardous components into final waste fractions which can be safely disposed of in a landfill after immobilisation.

Two of the key objectives of the Irish National Hazardous Waste Management Plan 2008 – 12 and the Proposed Revised National Hazardous Management Waste Plan are

- increased self-sufficiency in management of hazardous waste and
- reducing exports

[1] ISWA/Thomas Astrup, Technical University of Denmark (2008) Management of APC residues from W-t-E Plants

FGTR is the largest waste streams arising in Ireland that would utilize hazardous landfill capacity. Developing an outlet in Ireland would considerably reduce the environmental and economic cost of exporting these residues. In addition the availability of the European facilities may be reduced by the large increase in the use of WTE facilities across Europe. Over ten EU countries still landfill more than 50% of their municipal waste (Eurostat, 2014). Since 1995, the amount of municipal waste incinerated in the EU-27 has risen by 32 million tonnes or 100 % and accounted for 64 million tonnes in 2015. An increase in compliance with the Landfill Directive and an increase in Waste to Energy across Europe may place large pressures on existing FTGR facilities, limiting the ability to export Irish wastes.

2 Waste Acceptance Criteria

WAC testing should be carried out on the 'as-landfilled' waste: that is, the waste that has undergone the necessary pre-treatment. The WAC test methods require the waste sample to be processed before analysis and the specified test method will detail the processing the laboratory is required to undertake and how they should report the results.

The Landfill WAC limits are based on:

- Total concentration limits for the organic components; and
- Leachable components (metals, anions, cations).

Testing will be carried out in accordance with BS EN 12457-2002.

3 Hazardous Landfill and proposed derogation

Hazardous landfills including the proposed Drehid Hazardous Landfill can only accept hazardous waste and a small quantity of inert waste/non-hazardous waste as cover material. Waste Classification guidance will be used to first establish whether or not a waste is hazardous, set out in the EPA (2015) guidance '*Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous'*.

If the waste is hazardous as determined by EPA 2015 guidance, it will be further assessed against the Waste Acceptance Criteria before it can be disposed at the proposed Hazardous Landfill. This will involve completing the basic characterisation of the waste, which includes testing the waste and comparing to the limit values ('WAC limits') given in the Council Decision EN 2003/33/EC, and as detailed in the guidance, "*Waste acceptance at Landfills Guidance on waste acceptance procedures and criteria* (EA, 2010)". [2]

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296422/geho1110btew-e-e.pdf

Waste acceptance at the Ash Solidification Facility will need to <10% loss on ignition (LOI); or a total organic carbon (TOC) of <6%. It is important to limit the organic value in the wastes that are to be solidified. Experience has shown that waste solidification may be hampered by high organic content; therefore it is proposed to only accept waste with low organic content at the Drehid Hazardous Landfill.

3.1 Proposed Derogation to WAC Limit Values – Hazardous Landfill

EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II to Directive 1999/31/EC, specifies the cases where higher limits than those set in the Decision can be permitted[3] as follows;

> In certain circumstances, up to three times higher limit values for specific parameters listed in this section other than:
>
> Dissolved organic carbon (DOC) in sections 2.1.2.1, 2.2.2, 2.3.1 and 2.4.1 (i.e. class A, B and C);
>
> BTEX, PCBs and mineral oil in section 2.1.2.2, (class A);
>
> Total organic carbon (TOC) and pH in section 2.3.2 (class B in case of co-disposal), and
>
> Loss on ignition (LOI) and/or TOC in section 2.4.2 (class C), and restricting the possible increase of the limit value for TOC in section 2.1.2.2 (Class A) to only two times the limit value) are acceptable, if —
>
> The competent authority gives a permit for specified wastes on a case-by-case basis for the recipient landfill, taking into account the characteristics of the landfill and its surroundings, and — emissions (including leachate) from the landfill, taking into account the limits for those specific parameters in this section, will present no additional risk to the environment according to a risk assessment.
>
> Member States shall report to the Commission on the annual number of permits issued under this provision. The reports shall be sent to the Commission at intervals of three years as part of the reporting on the implementation of the Landfill Directive in accordance with the specifications laid down in Article 15 thereof.

Deposition of hazardous waste at Drehid Hazardous Landfill will comprise primarily FTGR and fly ash from Irish waste to energy facilities. At present, the FTGR from the operating commercial waste to energy plants on the island is sent for disposal to salt mines in Germany[4]. For Drehid Hazardous Landfill it is proposed that a three times derogation will be sought for the following parameters;

- Total Dissolved Solids;

[3] Landfills according to EU legislation are separated into four different classes, which are landfill class A for inert waste, landfill class B for non-hazardous waste, landfill class C for hazardous waste and landfill class D for underground storage systems.
[4] Indaver Carranstown - EPA IED licence W0167-03

- Chloride;
- Lead;
- Zinc;
- Arsenic, and
- Cadmium.

While a three times derogation is sought, the results of the Hydrogeological Risk Assessment and in environmental impact assessment all parameters will be below their respective limits in the bedrock aquifer and at all groundwater monitoring locations downgradient of that location. All non hazardous parameters are below their respective limits at the nearest sensitive receptor, the River Cushaling. Due to the low magnitude of impact and low sensitivity of the surrounding environment, the residual impacts on the surrounding hydrological and hydrogeological regime at the site are considered to be minor and mainly long term in nature.

4 Pre-treatment

Some form of treatment of the raw FGTR is typically necessary to achieve compliance with the 3x Derogation WAC criteria, particularly for soluble salts [Total Dissolved Solids / TDS] and Lead. Pre-treatment can also enhance the structural durability of the FTGR.

The Reference Document on Best Available Techniques for the Waste Treatments Industries (BREF) identifies a number of treatment options including stabilisation / solidification, vitrification or washing technologies as Best Available Techniques (BAT) for the pre-treatment of hazardous waste prior to landfill. Stabilisation / solidification is a widely used method and is recognised through the waste list of Commission Decision 2000/532 (under category 19 03 "stabilised/solidified wastes" as follows;

> *Solidification includes all processes that physically and hydraulically encapsulate the residues. This method is the most widely applied treatment technique because it produces the most satisfactory results in terms of environmental performance (compliance with criteria / behaviour in the long term) and cost. Hydraulic binding is robust, flexible to different waste forms and can be used cold thereby consuming little energy during treatment. Classical techniques of stabilisation consist of mixing residues with mineral or hydraulic binders (e.g. cement, slag or other pozzolanic materials, additives like acids to control the pH and to cause buffering reactions that help reduce leaching (in particular of Pb) and water to ensure hydration reactions take place. Cement is the most widespread binder used for FGTR treatment. However, it is possible to supplement cement with other materials including pozzolanic materials.*

Council Decision 2003/33/EC provides that waste "may be granular waste (rendered chemically stable) or solidified/monolithic". For this reason, waste operators may consign pre-treated FGT residues to hazardous landfill as either granular or monolithic waste depending on the criteria set by the relevant Member State. For example, in France pre-treated FGT residues are typically consigned as monolithic waste to hazardous landfill whereas in Belgium, pre-treated residues are consigned as granular hazardous waste.

In addition to different acceptance criteria, monolithic and granular wastes are also tested differently:

In the granular test, the sample is crushed. Therefore the test does not take into account the physical binding of the cement, and crushing the samples can result in higher salt content measurements.

In the monolithic test, the sample is not crushed. Therefore, it takes into account the physical binding of cement during the solidification process.

At present, Member States can decide which analytical protocol is used e.g. which test is undertaken and at what time (directly after solidification or after 1 month of reaction / hardening). For granular waste on hazardous waste landfill, only test itself is defined. The sample testing timing is also determined by the Member State and is important, because residues perform differently prior to full reaction/hardening, just as in the construction industry, cement takes time to "cure".

5 Testing

Three levels of testing and compliance are required for the acceptance of material based on 2003/33/EC, namely:

- Level 1: Basic Characterisation
- Level 2: Compliance with Basic Characterisation (i.e. consistency testing for regularly generated wastes)
- Level 3: On-site Verification

Testing Level	Responsibility	Objective
Level 1: Basic Characterisation	Waste Producer	Full understanding of the waste.
Level 2: Compliance with Basic Characterisation (i.e. consistency testing for regularly generated wastes)	Waste Producer	Periodic sampling to demonstrate consistency with original understanding of a regularly generated waste (i.e. the basic characterisation) using key characteristics. For singularly produced waste streams, Level 2 testing is not required.
Level 3: On-site Verification	Landfill Operator	Consistency / compliance with basic characterisation for visually non-conforming wastes and 'quick check' of key relevant characteristics where appropriate.

5.1 Level 1 Basic Characterisation

Waste producers are responsible for describing their waste in detail. This will include background information on the source and origin of the waste that they should have access too. They may also need specific chemical test data unless there is a justifiable reason why testing is not required. The Basic Characterisation must include the following;

- Waste source and origin;
- The code applicable to the waste under the List of Waste (LoW);
- Determination if the waste has any hazardous properties as per WM3 or EPA (2015);
- In the case of hazardous waste, the properties which render it hazardous;
- The process producing the waste;
- The waste treatment applied, or a statement of why treatment is not considered necessary;
- The appearance of the waste (including smell, colour, consistency and physical form);
- Confirmation that the waste is not prohibited from disposal to landfill (for example liquid waste and whole used tyres);
- The class of landfill the waste can be disposed at, and
- Confirmation of whether the waste requires testing.

5.2 Level 2 Compliance with Basic Characterisation

The waste producer may undertake Compliance testing to show that a 'regularly generated waste' remains consistent with the original Basic Characterisation. Testing is therefore to demonstrate that variability is within an acceptable range. Council Decision 2003/33/EC requires that Compliance Testing is carried out at least once per year and to the scope and frequency determined by the Basic Characterisation for regularly generated wastes. For regularly generated well characterised waste such as fly ash it is proposed to sample every 5,000 m^3. Infrequently generated waste will require a sample every 1,000 m^3.

5.3 Level 3 Verification

Verification testing is to confirm that the waste conforms to the Basic Characterisation at the point of disposal. Checks at this stage are primarily visual and through verification of the accompanying documentation for each load received. However, routine samples and testing of waste will also be undertaken to confirm the Basic Characterisation.

Trucks will deliver the FGTR to the Ash Solidification Facility at the Drehid facility. The solidification process will involve the mixing ratios of FTGR to cement or other additives. The ratio will be controlled so as to ensure the treated waste meets the Drehid Hazardous Landfill's WAC. Following solidification the material will be stored/cured for 28 days within a hazardous landfill cell. The solidified material will then be tested to ensure that it complies with the WAC. Sampling will include core samples of placed FTGR material. Testing will be undertaken at an independent accredited lab.

5.4 Non Compliances

Where sample results exceed WAC leaching limits at the site of production (that is, with the Basic Characterisation or Compliance testing for regularly generated wastes) these must be resolved.

If a landfill operator such as Drehid accepts and deposits waste at the landfill prior to the receipt of test results that exceed a WAC test limits, they must report that exceedance to the waste producer. Drehid must also provide a risk assessment (or reference to a suitable existing risk assessment) to the EPA to show that the substance that exceeded the limit will not result in a significant environmental threat.

Once a failure has been identified, the landfill will not continue to accept deliveries of the waste until the characterisation data has been reviewed and measures taken to stop a reoccurrence.

APPENDIX C

Drehid Waste Management Facility

Existing Waste Acceptance Procedure (Rev 4)

Title

Waste Acceptance Procedure

Purpose: This document has been prepared in compliance with Condition 8.1.6 of the Waste Licence (W0201-03) and Council Decision 2003/33/EC on establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Council Directive 1999/31/EC on the landfill of waste and details the appropriate method for the acceptance of waste for disposal.

Scope: This procedure covers all incoming wastes for disposal and engineering use.

References:
EPF 20.1 Waste Contract Form
EPF 20.2 Waste Inspection Form
EPF 20.3 Waste Consignment Certificate
EPF 20.4 Waste Acceptance Criteria
EPF 8.1 Environmental Incident Investigation Report Form
EPF 8.2 Incident Notification Form
EPF 10.1 Corrective and Preventative Action Form

Procedure

1.1 The types and annual quantities of waste for disposal, as specified in Schedule A.2 of the Waste Licence W0201-03 are shown in Table 1 below.

WASTE TYPE	MAXIMUM (TONNES PER ANNUM)
Non-Hazardous Municipal, Commercial & Industrial wastes	360,000 Landfill – up to 31st December 2017 120,000 Landfill – from 1st January 2018 25,000 Composting Unit
Inert Waste	No limit where used in landfill engineering

1.2 Waste Treatment:

As specified in Licence Condition 8.1.1 only pre-treated wastes are acceptable for disposal as set out in Article 6 (a) of the Landfill Directive.

In accordance with Licence Conditions 8.1.2 regarding the acceptance of biodegradable municipal waste, the following limits shall apply:

(i) From 1 July 2010 to 30 June 2013 inclusive, a maximum of 47% by weight of municipal solid waste (MSW) accepted for disposal to the body of the landfill shall comprise biodegradable municipal waste (BMW), measured on a calendar year basis or, in 2010 and 2013, part thereof,

(ii) From 1 July 2013 to 30 June 2016 inclusive, a maximum of 30% by weight of MSW accepted for disposal to the body of the landfill shall comprise BMW, measured on a calendar year basis or, in 2013 and 2016, part thereof, and

(iii) From 1 July 2016, a maximum of 15% by weight of MSW accepted for disposal to the body of the landfill shall comprise BMW, measured on a calendar year basis or, in 2016, part thereof.

Any Inert waste accepted at the facility is subject to treatment where technically feasible as set out in Licence Condition 8.1.9.

The acceptance of waste at the facility will require the producer disposing the waste to either treat the waste at its source, or at an approved Licensed or Permitted treatment facility, where technically feasible.

1.3 Waste Characterisation, Testing & Monitoring

Waste Acceptance at Drehid Waste Management Facility will be carried out in compliance with the requirements of Council Decision 2003/33/EC.

Bio-stabilised residual waste shall be sampled every 500 tonnes from each source. This sample will be subject to the AT4 Test.

In order for biostabilised material to qualify for an exemption from the landfill levy, the customer is required to demonstrate that an adequate “Separation Process” has been carried out to remove plastic, metal and other non-organic material from the biodegradable fraction of municipal waste.

1.4 Basic Characterisation

Basic Characterisation is required for each type of waste prior to approval for disposal at Drehid Waste Management Facility. The producer of the waste, or the person responsible for its management, is responsible for the completion of EPF 20.1 - Waste Contract Form, and ensuring that the characterisation information is correct. Independent laboratory testing may be required to determine the leaching behaviour of the waste.

Bord na Móna will require the submission of the following information for all waste types prior to approval for disposal:

- Details of the source and origin of the waste.

Title

Waste Acceptance Procedure

- Information on the process producing the waste (description and characteristics of raw materials and products).
- Description of the waste treatment applied in compliance with Article 6(a) of Council Directive 99/31/EC, or a statement of reasons why such treatment is not considered necessary.
- Code according to the European Waste Catalogue.
- Data on the composition of the waste (and the leaching test results, where the waste is not classified in Chapter 20 of the European Waste Catalogue and / or where there has been no pre-treatment carried out on the waste).
- Appearance of the waste (smell, colour and physical characteristics).
- Information to prove that the waste does not fall under the exclusions of Article 5(3) of the Council Directive 99/31/EC.

All waste accepted into Drehid Waste Management Facility shall be in compliance with Council Decision 2003/33/EC.

During basic characterisation, it is established whether wastes are regularly generated in the same process or whether wastes are not regularly generated. This differentiation has an impact on both the frequency and extent of tests for basic characterisation and compliance:

If wastes are regularly generated from the same process in a single installation, or from the same process in different installations but the measurements sufficiently show the range and variability of the characteristic properties, then those wastes can be considered characterised and shall subsequently be subject to compliance testing only, unless significant changes in the generation process occur.

If wastes are not regularly generated in the same process and are not part of a well characterised waste stream, then each batch of such waste will need to be subject to basic characterisation, which also means that no compliance testing is needed.

Basic characterisation will be performed and / or paid for by the waste producer or by the person responsible for its management.

1.5 Compliance Testing

In order to check regularly arising waste streams, any waste that has been deemed acceptable for disposal at Drehid Waste Management Facility on the basis of basic characterisation shall be subject to compliance testing, to determine if it complies with the results of basic characterisation and the relevant acceptance criteria. The testing parameters and frequency will be determined following basic characterisation.

The compliance test shall, as a minimum, consist of a batch leaching test, and shall be carried out in the scope and frequency and for the key variables as determined during basic characterisation. Analysis Methods and Limit Values are as per Environmental Procedure Form (EPF) 20.4 – Waste Acceptance Criteria.

2.0 Load Acceptance:

All holders of waste collection permits under the Waste Management Permit Regulations 2001, who wish to deliver waste to the facility for disposal will need to submit a copy of their Facility Licence/Permit and Waste Collection Permits for relevant Regions, along with a completed Waste Contract Form (EPF 20.1) and accept the terms and conditions of the site.

2.1 Arrival of Waste on Site:

When a waste load arrives at the facility the Weighbridge Operator and any other site staff present check whether all site rules for hauliers are being and have been adhered to. Once a vehicle is approved for access to the site it will enter the entry weighbridge, where the Weighbridge Operator will perform the documentation check and the first visual inspection if possible.

2.2 Documentation Check:

The documentation accompanying the waste load is checked by the Weighbridge Operator. All relevant details relating to the producer and the carrier must be completed as well as all relevant sections relating to the description of the waste. The Weighbridge Operator will establish whether the waste has been approved by reviewing the Waste Consignment Certificate EPF 20.3 which should travel with the consignee and deemed acceptable. The waste load shall only be accepted if the Weighbridge Operator is satisfied that all necessary information has been supplied. Should any of the above not be the case, the waste load has to be quarantined and the facility manager or nominated deputy informed immediately.

2.3 On-Site Verification:

The Weighbridge Operator performs the initial visual inspection of the waste load to verify that the waste delivered is the same as that described in the documentation and has been subject to basic characterisation. The Weighbridge Operator is aided by the CCTV system the weighbridge office if free vision is not possible. If the initial on-site verification at the weighbridge fails, the Weighbridge Operator will reject the load and immediately inform the facility manager.

If the waste load has passed both initial checks it can be conveyed to the disposal area.

2.4 Unloading of Waste:

While unloading, the waste is subject to further visual inspection by site staff. Adequate lighting will be provided during operating hours in hours of darkness. Documented inspections are carried on selected loads using EPF 20.2 Waste Inspection Form. If the load also passes this check it can be spread on the working face for compaction. Should any unacceptable wastes be discovered, the load or any relevant part thereof will be removed to the Waste Inspection Area for further investigation.

If the waste load is fully compliant, the driver will on completion of unloading exit through the wheel wash back to the weighbridge.

2.5 Procedure for Rejected Waste Loads:

During any of the above described steps, a waste load may be rejected. The incident will be recorded in EPF 8.2 Waste Incident Form. Whenever a waste load is rejected, it will be held until a decision has been made on how to proceed.

If the non-conformity has been identified after unloading the waste, the waste will be loaded back on the truck and held in the Waste Inspection area.

If a load has been rejected while still contained, the truck or trailer will be moved into the Waste Quarantine Area in agreement with the carrier. In the case that the non-conformity is only related to wrong or incomplete documentation, the truck may be held until it is in order. In the event the waste is found to be non-conforming, it will be decided whether to allow the producer to remove it to an authorised destination or remove it using a specialist in the event of it being a difficult waste. The carrier will be required to notify Drehid Waste Management Facility of the final destination of the waste load.

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