DREHID WASTE MANAGEMENT FACILITY (EXISTING FACILITY)

INDUSTRIAL EMISSIONS (IE) LICENCE APPLICATION

NON-TECHNICAL SUMMARY

December 2018

TOBIN CONSULTING ENGINEERS

DOCUMENT AMENDMENT RECORD

Client:	**Bord na Móna Plc.**
Project:	**Drehid Waste Management Facility**
Title:	**IE Licence Non-Technical Summary**

PROJECT NUMBER: 10369				DOCUMENT REF: 10369-R-007			
A	Final	RH	17/12/18	RH	17/12/18	DG	17/12/18
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
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1 INTRODUCTION

Bord na Móna Plc. (hereafter referred to as Bord na Móna) operates the Drehid Waste Management Facility (WMF), situated near Carbury, County Kildare. The Drehid WMF is an integrated waste management facility which principally includes a municipal solid waste (MSW) landfill and a Composting Facility. The Drehid WMF operates subject to an Industrial Emissions Directive (IED) licence, issued by the EPA (Reg. No. W0201-03), and subject to the planning approval for the facility.

Bord na Móna intends to further develop the existing Drehid WMF and submitted a planning application to An Bord Pleanála (ABP) (ABP Ref. No. 300506) for the proposed works on the 20th of December 2017.

The IE Licence application area of 272 ha includes an area of approximately 120 ha where development will take place for the first time; i.e. approximately 152 ha of the application area includes infrastructure and buildings which currently form part of the existing WMF, and this area principally includes the existing MSW landfill and the existing borrow areas.

The overall Bord na Móna landholding comprises 2,544 ha is located within the townlands of Drehid, Ballynamullagh, Kilmurry, Mulgeeth, Mucklon, Timahoe East, Timahoe West, Coolcarrigan, Corduff, Coolearagh West, Allenwood North, Killinagh Upper, Killinagh Lower, Ballynakill Upper, Ballynakill Lower, Drummond, Kilkeaskin, Loughnacush and Parsonstown at Carbury, County Kildare.

1.1 PROPOSED DEVELOPMENT

Bord na Móna intends to further develop the existing Drehid WMF and submitted a planning application to ABP (ABP Ref. No. 300506) for the proposed works on 20 December 2017. The proposed works are summarised as:

- Changes to the volume and nature of wastes to be accepted at the landfill disposal facility;
- Development of additional non-hazardous and new hazardous landfill capacity to provide for the sustainable landfill of these waste streams for twenty-five years;
- Pre-treatment or processing of certain waste streams prior to landfill;
- Increasing the volume of waste to be accepted at the composting facility and the removal of the restriction on the operating life of the composting facility contained in Condition 2(2) of ABP Ref No. PL.09.212059;
- On-site treatment of leachate; and
- Development of associated buildings, plant, infrastructure and landscaping.

The application for the proposed development at Drehid WMF has been made directly to An Bord Pleanála (ABP) as Strategic Infrastructure Development under the provisions of Section 37 of the Planning and Development (Strategic Infrastructure) Act, 2006, the Planning and Development Act, 2000 as amended and the associated Planning Regulations.

An EIAR for the proposed development was included with the planning application and includes the following:

- Volume I – Non-Technical Summary
- Volume II – Main EIAR
- Volume III – Drawings
- Volumes IV - Appendices

The EIAR for the proposed development includes a cumulative impact assessment of the proposed development with the existing Drehid WMF facility, an already permitted (but not yet built) mechanical biological treatment (MBT) facility adjacent to the proposed development and relevant planning applications made in the area surrounding the site.

This EIAR is included in Section 6 of the IE Licence Application.

Following consultation with the Agency, it was determined that an updated EIAR was required to be prepared for the existing facility and submitted with the IE Licence Application. This EIAR (Existing Facility EIAR) was required to update the previous EIS for the existing facility (prepared in 2008) in accordance with the requirements of the new EIA Directive (Directive 2014/52/EU) which came into effect in May 2017. The Existing Facility EIAR contains the following and is included in Section 6 of the IE Licence Application:

- Volume I – Non-Technical Summary
- Volume II – Main EIAR
- Volume III – Drawings
- Volumes IV - Appendices

1.2 FACILITY DETAILS

1.2.1 Class of Activity

The classes of activity being applied for are specified in the First Schedule of the Environmental Protection Agency Act 1992, as amended, as follows.

The principal activity to be carried out on the site is:

Class 11.5: Landfills, within the meaning of section 5 (amended by Regulation 11(1) of the Waste Management (Certification of Historic Unlicenced Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 524 of 2008)) of the Act of 1996, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25,000 tonnes, other than landfills of inert waste;

The following classes of activity are also applied for:

Class 11.1: The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required;

Class 11.2(b): Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment;

Class 11.2(c): Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving blending or mixing prior to submission to any of the other activities listed in paragraph 11.2 or 11.3;

Class 11.4(a): Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment;

Class 11.4(b): Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving (i) biological treatment; and (iii) treatment of slags and ashes;

Class 13.6: Independently operated treatment of waste water (to which the Urban Waste Water Treatment Regulations 2001 do not apply) and discharged by an installation to which Part IV applies.

1.2.2 BREF and BAT

The relevant BAT Reference Document (BREF) for the facility is *Waste Treatment*.

The BAT Guidance Note *Waste Sector (Landfill)* (Dec 2011) has also been followed.

Where relevant, the existing emission limit values for infrastructure currently in place, operational and licenced at the facility have been applied in this Application. For new infrastructure, the relevant emission limit values outlined in the above BREF have been applied.

1.2.3 COMAH Regulations

The EC (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2006 do not apply the Drehid WMF.

2 DESCRIPTION OF THE SITE OPERATIONS

2.1 FACILITY LAYOUT AND INFRASTRUCTURE

A detailed overview of the layout of the facility is shown in the Site Layout Plan (Drawing No. 10369-2014). 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.

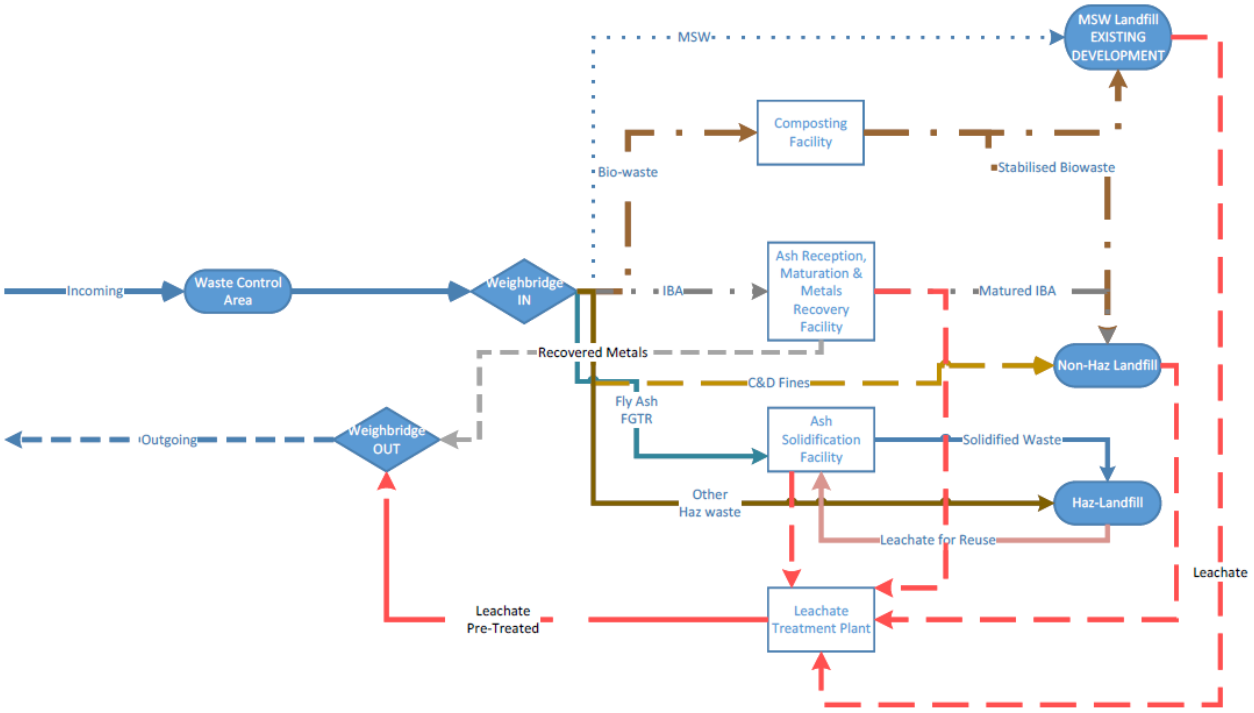

Figure 2.1: Unit operations flow diagram

2.2 OVERVIEW OF SITE INFRASTRUCTURE

A summary of the key site infrastructure is presented in Table 2.1.

Table 2.1: Site infrastructure

Ref	Infrastructure	Details
1	Access road	Existing access road from the R403 will be retained. This road is c. 4.8 km in length.
2	Weighbridges (4 No.), weighbridge kiosk, waste control building and waste control area	2 No. weighbridges in and 2 No. weighbridges out. Each capable of weighing and recording up to 60 tonnes.
3	Wheelwashes	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.
4	Inspection and quarantine area	Separate quarantine areas will be provided for the non-hazardous and hazardous landfills. The existing quarantine area for the MSW landfill adjacent to the proposed welfare building wil be retained.
5	Maintenance building	A new steel portal frame maintenance building will be constructed adjacent to the non-hazardous landfill.
6	Welfare building	The existing maintenance building will be converted to a welfare building.
7	Administration building	The existing administration building will be retained.
8	Fuel storage	The 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.
9	Standby generators	Standby generators are located at various locations around the site as requried for critical infrastructure.

10	Security fencing	The existing post and chain link fencing at the facility boundary will be extended to include the new infrastructure footprint. Security fencing and gate at the site entrance will be retained.
11	Oil interceptors	Located on surface water drainage from hardstanding areas where vehicles will be parked or depositing waste.
12	Surface water attenuation lagoons	4 No. existing attenuation lagoons located adjacent to administration building will be retained. 7 No. additional attenutation lagoons will be constructed. Lagoons will be lined with HDPE overlaying geotextile layer.
13	Intergrated constructed wetlands (ICWs)	Overflow from the attenuation lagoons will be diverted through ICWs, prior to discharge to the peatland drainage system.
14	MSW Landfill	Total of 15 No. phases comprising an engineered landfill liner including leachate collection system, landfill gas collection infrastructure and undercell drainage pipework. As of November 2018, 13 No. of 15 No. phases have been constructed.
15	Compost Facility	Includes waste reception, compost tunnels, hygenisation tunnel, product storage, leachate collection, mechanical ventilation and odour abatement system.
16	Non-Hazardous Landfill	Total of 12 No. phases comprising an engineered landfill liner including leachate collection system, landfill gas collection infrastructure and undercell drainage pipework.
17	Hazardous Landfill	Total of 10 No. phases comprising an engineered landfill liner including leachate collection system and undercell drainage pipework.
18	IBA Maturation Facility	Covered storage bays for incoming IBA with open sides to allow for airflow through. Located adjacent to the non-hazarodus landfill.
19	IBA Metals Recovery Facility	Covered facility with magnetic removal for ferrous metals and eddy current removal for non-ferrous metals. Includes washdown water collection system and mechanical ventilation.
20	Ash Solidification Facility	Covered facility for the solidification of incinerator flue gas treatment residues (FGTR) and fly ash. Incoming ash waste and cement is stored in dedicated storage silos which are combined and mixed with process water (from hazardous landfill leachate) and acid. The resulting residue is transferred to the hazardous landfill. Includes water recirculation, mechanical ventilation and odour abatement.
21	Hazardous waste handling facility	Covered storage faciity to provide off-loading and temporary storage for incoming palletised/bagged hazardous waste streams prior to disposal in the Hazardous Landfill. This facility will also be used as an inspection area for hazardous waste materials before transportation to the hazardous landfill.
22	Hazardous waste storage and quarantine area	Covered storage facility for quarantined materials and temporary storage of hazardous wastes.
23	Landfill gas utilisation plant	Landfill gas abstraction from the MSW and non-hazardous landfill to the landfill gas utilisation plant which includes four gas engines to convert landfill gas into electricity and three landfill gas flares.
24	Leachate treatment facility	Leachate treatment facility designed to accommodate leachate from the landfills as well as sanitary wastewater, run-off from waste reception areas and process effluent from composting facility. The deign is a modified verison of the sequencing batch reactor (SBR) aerobic biological treatment process.

There will be a combination of excavators, compactors and bulldozers in operation on the landfills which will be required for landfill cell construction, waste placement, gas infrastructure installation and capping. All plant in use at the facility will be serviced in the maintenance building.

2.3 SERVICES

2.3.1 Water Supply

Water supply requirements for the facility are presented in Table 2.2 along with the supply source.

Table 2.2: Water supply requirements

Water Requirement	Source
Potable water	• Water dispensers
Domestic non-potable water (toilets, sinks, etc.)	• On-site borehole
Firefighting	• On-site attenuation lagoons, with back-up supply from on-site borehole
Process water (non-potable)	• Recycled leachate • On-site attenuation lagoons
Cleaning, washdown and dust suppression	• On-site attenuation lagoons • On-site borehole

Water supplied from the on-site borehole will be pumped to the existing water supply infrastructure and an additional distribution main will be installed for the proposed development and, where possible, will be looped, as per best practice. Non-potable water for domestic purposes will be treated in a water treatment plant, which will remove iron, manganese and ammonia to acceptable limits.

A dedicated firewater main will be constructed and fire hydrants, to comply with the requirements of the Building Regulations, will be located on this firewater main.

2.3.2 Surface Water Drainage

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. 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 integrated constructed wetlands (ICWs) have been designed to manage run-off from the proposed new infrastructure areas.

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 modified as necessary to feed into the proposed new layout.

2.3.3 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 foul water 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.

Leachate from the MSW Landfill, Non-Hazardous Landfill and non-hazardous waste reception area will be directed to the onsite Leachate Treatment Facility which will provide preliminary treatment. Excess leachate generated in the Hazardous Landfill and hazardous waste reception area as well as the Compost Facility which is not required for use as process water in the Ash Solidification Facility or the composting process will also be directed to the Leachate Treatment Facility. The treated effluent will subsequently be tankered off-site to a suitably licensed WWTP for further treatment and disposal. 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 modified as necessary to feed into the proposed new layout.

2.3.4 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.

2.3.4.1 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. 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 for disposal at a municipal WWTP.

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 comprises aerobic and anoxic phases of treatment, and further incorporates ultrafiltration membranes for the separation of biological solids to form a very clear final effluent.

2.3.5 *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 5 MW 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.

2.4 FUELS, OILS AND CHEMICALS

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.

Engine, gear and hydraulic oils are required for plant maintenance and will be stored in the Maintenance Building. The storage containers for engine, gear and hydraulic oil will be kept in a proprietary bunded container which will be stored on the concrete floor in the maintenance building.

Chemicals required for leachate treatment will be stored within the Leachate Treatment Facility and will be contained within purpose-built tanks incorporating integral secondary containment, and all dosing arrangements will also be in accordance with recognised industry practice. Substances will include:

- 32% w/v sodium hydroxide;
- Supplemental carbon;
- 34% hydrochloric acid;
- 85% phosphoric acid; and
- Antifoam solution.

Sulphuric acid is also required for odour emission abatement at the Compost Facility.

The ash solidification process requires the addition of cement, process water and acid to the hazardous incinerator ash to form a stabilised granular material. The acid may either be imported, or it may be possible that waste acid, generated as a by-product from the on-site gas cleaning process (sulphuric acid), may be reused.

2.5 WASTES GENERATED AND STORED ON-SITE

Leachate generated from the deposition of waste in the landfills will be managed as outlined previously. The treated leachate will be transferred off-site in tankers to a suitable municipal WWTP.

Sediment generated from the on-site grit and oil interceptors will be collected and sent off-site for treatment/disposal at appropriately licensed facilities.

Waste sulphuric acid generated as a by-product from the on-site gas cleaning process will be reused, where possible, in the ash solidification process.

The IBA Metals Recovery Facility will recover up to 15,000 TPA of metals from incoming IBA waste which will be collected and exported from site for recycling.

The facility operates a source segregation policy to maximise the recovery of potential recyclable and recoverable materials from operational waste generated. Small quantities of waste oils and batteries generated during the on-site plant maintenance will be kept in a dedicated storage container in the Maintenance Building and removed off-site at regular intervals for treatment at appropriately licensed facilities.

2.6 EMISSIONS

2.6.1 Air Emissions

There are three flares (F1, F2 and F3) located in the landfill gas management compound. F1 is running continuously to flare off gas generated in the MSW Landfill with F2 and F3 running intermittently depending on the nature of the landfill gas being generated and the operation of the landfill 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 with associated emissions to air.

The proposed development will include ventilation systems and odour abatement systems in the Compost Facility, IBA Metals Recovery Facility and the Ash Solidification Facility. The function of the building ventilation system will be to provide a number of air changes per hour and to maintain a negative air pressure environment within each building. The maintenance of a negative pressure environment within each 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 and other odour creating processes. The core components of the odour abatement system include acid scrubbers, humidifiers and biofilters. There will be one biofilter emission stack located at the Ash Solidification Facility. There will be four biofilter emission stacks associated with the Compost Facility. The Metals Recovery Facility will have a single atmospheric emission stack.

2.6.2 Emissions to Surface Water

All surface water run-off from the facility will discharge into engineered surface water attenuation lagoons which are sized to provide adequate capacity for a 1 in 100-year storm event. Overflow from the attenuation lagoons will be diverted through ICWs to provide an additional step in the treatment train prior to discharge into a nearby man-made bog drainage channels. These drainage channels in turn discharge into a central culvert/main drain which flows into an existing attenuation pond located to the southwest of the main site infrastructure.

The outfall from the existing attenuation pond is into the Cushaling River at the western margins of the bog. The Cushaling River is in turn a tributary of Figile River.

2.6.3 Noise Emissions

Noise emissions associated with the facility will include traffic entering and exiting the site, mobile plant working at landfill areas, mobile plant accessing composting and waste processing buildings, external operational plant and equipment as well as any noise break-out from operational noise within on-site buildings.

2.7 ABATEMENT MEASURES

2.7.1 Air Emission Abatement

Building ventilation and odour abatement systems will be provided to treat relevant emissions to air at the facility. 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.

The Ash Solidification Facility will include a ventilation and odour abatement system to extract and treat air from the mixer and from the solidified waste discharged into the waiting dump truck. The air will be treated in an odour control unit (wet scrubber or similar) and vented though a stack.

The existing and proposed Composting Facility will include a ventilation and 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.

3 DESCRIPTION OF EXISTING SITE CONDITIONS

A Site Condition Report has been prepared for the facility and is included with the Licence Application.

A Screening for Baseline Report has also been carried out and determined that a full Baseline Report is not required.

3.1 SOIL

The entire facility footprint is underlain by peat soils. Based on the Von Post scale, the peat varies from H2-H7 and is predominantly dry (B1 to B3). Laboratory moisture content of the peat typically varies from 100 to 500% [1].

Peat depths range from approximately 0.2 m to 2.3 m with the shallowest peat depths located towards the central area of the proposed Non-Hazardous Landfill. Peat depths deepen to the north and northwest (2.5 m) at the proposed infrastructural buildings. To the east and south of the proposed Hazardous Landfill footprint, peat depths are typically 1 m to 1.5 m above the mineral subsoil.

Construction of Phase 13 of the MSW Landfill was completed in June 2018 and site preparation, including peat stripping, for Phases 14 and 15 has also been completed. Peat surveys prior to commencement of construction of the MSW Landfill indicated that the thickness of peat within the initial MSW Landfill footprint (western mound) varied from 0.5 m to 1.5 m and the peat thickness within the MSW Landfill extension footprint (eastern mound) varied from 0.5 m to 2.0 m.

The depth to bedrock under the proposed development site is >10 m below ground level (mbgl), based on borehole data. Geophysical surveys have confirmed the borehole data and identified deeper bedrock (20 to 30 m) to the centre of the proposed Non-Hazardous Landfill and to the centre and south of the proposed Hazardous Landfill site. The minimum depth to bedrock identified in the geophysical survey carried out as part of the planning application in 2017 is 9 m.

The subsoils which underlie the overall site are predominantly fine grained. The composition of the subsoil recorded from trial pits was relatively consistent across the site, with some notable exceptions. The subsoils encountered in the trial pits underlying the peat comprise soft to very stiff (proposed development area) and firm to stiff (existing infrastructure locations), grey to blue-grey, SILTs, CLAYs and SILT/CLAYs with occasional to frequent sub-angular to sub-rounded gravels and cobbles. Cobbles are predominantly argillaceous limestones (>75%) with occasional siltstone, sandstones and pale limestones.

Subsoil permeability tests indicate that the underlying material at the proposed development has a horizontal permeability of $<1 \times 10^{-9}$ m/s and an average vertical permeability of 6.4×10^{-10} m/s. Permeability values in this range are considered to be low permeability and in the lower range of permeability values for Irish Tills.

[1] Oven drying method of peat soil return results >100% in accordance with British Standard BS 1377-2.

3.2 GROUNDWATER

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. The vulnerability category is based on the relative ease with which infiltrating water and potential contaminants may reach groundwater in a vertical or sub-vertical direction. The permeability and thickness of the subsoil, which influences the attenuation capacity, are important elements in determining the vulnerability of groundwater.

A groundwater vulnerability map for County Kildare has been prepared by the Geological Society of Ireland (GSI) as part of the Groundwater Protection Scheme. According to the information available at present from the GSI, the vulnerability rating for the site is classified as Low over the majority of the site, which is the rating that affords greatest natural protection against contamination.

In areas further to the west of the existing MSW Landfill where sand and gravel directly underlie the peat deposits, the vulnerability is assessed as Moderate. Sand and gravel from this area have previously been used in the construction of landfill infrastructure, where suitable. Significant sand and gravel deposits do not underlie either the existing MSW Landfill or the proposed additional landfill footprint.

There are no potable groundwater abstraction wells located within 1 km down-gradient of the proposed Hazardous and Non-Hazardous Landfill footprint. There are no source protection zones within 4 km of the proposed development. In addition, the potential to develop groundwater sources on the site is negligible due to the significant treatment requirement to treat groundwater from the area to a potable water quality. Groundwater at the site is not and will not be used as a drinking water supply.

An overview of the groundwater chemistry is provided in the Site Condition Report and briefly summarised below.

The groundwater chemistry signature at the site is one of a calcium bicarbonate groundwater. The pH of the groundwater varies within the range of pH 6.9 to pH 8.1. There is no significant difference in the pH between the shallow boreholes (average pH 7.4) and the deeper boreholes (average pH 7.5). Based on the site data, there is no trend in the groundwater data between preconstruction and operation of the existing landfill, however some variability in conductivity concentrations is noted in the upgradient shallow wells. This is possibly due to the presence of construction berms on the western and northern section of the existing site. No significant variation occurs between upgradient and downgradient wells at the existing facility.

As per the 2017 AER, the monitoring results were generally consistent with those obtained during previous years, with naturally elevated levels of ammonia detected at all monitoring wells. The monitoring programme confirmed that the site activities are not impacting on groundwater quality.

3.3 SURFACE WATER

As part of the environmental site investigations for the existing Drehid facility, a number of surface water sampling stations were established at the boundary of the Bord na Móna landholding.

These monitoring locations included the following:

- SW4 – Monitoring location at Dillon's Bridge (Cushaling River);
- SW5 – Monitoring location for discharge from the existing attenuation lagoon for Bord na Móna landholding, prior to discharge to the Cushaling River; and
- SW6 – Monitoring location for discharge from existing MSW landfill attenuation lagoons (Lagoon No.1 to No.4).

Any potential surface water discharges from the proposed development enter the Cushaling River, therefore it is appropriate to focus monitoring on this watercourse. Weekly monitoring is carried out at SW4, SW5 and SW6.

Weekly surface water results indicate chloride concentrations are typically less than 18 mg/l. The pH values recorded are slightly basic ranging from 7.1 to 8.1, which is within the maximum allowable concentration (MAC) for drinking water (i.e. >6.5<9.5) and typical of surface water samples in the surrounding environment.

Ammonium concentrations at the Bord na Móna landholding in 2015 and 2016 are variable and typically range from 0.05 to 0.5 mg/l. Elevated levels of ammonia are considered to be reflective of the redox conditions (chemical oxidation and reduction conditions) within the peat subsoils, the redox conditions being reducing in this case. There is no evidence of increasing ammoniacal nitrogen at the discharge point to the Cushaling River (SW5) over the last nine years of monitoring data and results are comparable to the predevelopment concentrations. Ammoniacal nitrogen levels at the Bord na Móna landholding are naturally high due to the peat environment and are similar to preconstruction levels (0.3 to 2 mg/l).

The monitoring results of the surface water discharge from the overall Bord na Móna landholding are generally in compliance with the appropriate surface water discharge standards specified in the IED licence (W0201-03) for the existing Drehid facility. The inspections carried out throughout 2017 did not identify the presence of any impact on the drainage system associated with site activities.

The most recent quarterly compliance submission (Q3) for surface water monitoring was submitted to the Agency in November 2018. No exceedances of any parameters were recorded.

A biological assessment of the Cushaling River was carried out in accordance with Schedule C.3 of the existing IED License in August 2017. Sampling was undertaken at one monitoring location downstream of the facility. As the river rises onsite, there is no upstream sampling location. The assessment used the EPA Q-rating system for the evaluation of rivers and streams. Benthic macro-invertebrates were sampled

qualitatively using kick-sampling and the results indicated that the Q value to be Q3, which is moderately polluted.

The results reflect the findings of the previous assessment undertaken in September 2016 and that of the 2008 assessment, which was carried out prior to waste acceptance. The assessment indicates that the facility is not impacting upon the biological quality of the Cushaling River.

3.4 DESIGNATED SITES

There are no sites designated under the EU Habitats Directive and EU Birds Directive (i.e. Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)) located within the footprint of the facility. The nearest designated site is Hodgestown Bog (NHA) located at a distance of 3.5 km. The Grand Canal (pNHA) is not currently designated but for reference is located at a distance of 3.2 km from the facility boundary.

The nearest SAC is Ballynafagh Lake located at a distance eastward of 5.3 km from the site boundary. Ballynafagh Lake is not hydrologically linked to the Drehid WMF site and the lake is upgradient of the site in terms of groundwater flow direction.

3.5 AIR QUALITY

In terms of the existing air quality environment, baseline data and data available from similar environments indicates that levels of nitrogen dioxide, carbon monoxide, particulate matter less than 10 microns and also less than 2.5 microns and benzene are well below the National and European Union (EU) ambient air quality standards.

3.6 NOISE

The existing environment within the Bord na Móna landholding is a remote location, containing an operational landfill with associated infrastructure and a Composting Facility. The closest noise sensitive locations are some 850 m from its western boundary with additional noise sensitive locations set back at distances in excess of 950 m around the remaining boundaries.

The current noise environment is surveyed on an annual basis to comply with the existing IED Licence. The results of the most recent annual surveys have been reviewed and confirm that the operation of the existing facility contributes very low noise levels to the surrounding environment over day and night-time periods.

4 EMISSIONS FROM THE FACILITY

4.1 SOIL AND GROUNDWATER

There will be no emissions to soil or groundwater from the Drehid WMF.

The basal lining system for the landfill infrastructure is designed to protect the underlying soil and groundwater environment and ensure compliance with Council Directive 2006/118/EC in relation to the protection of groundwater. A hydrogeological risk assessment (HRA) has been carried out and included in the Proposed Development EIAR. The HRA results indicate that with the landfill designed and constructed in accordance with the details provided in Chapter 3 of the EIAR, it is unlikely that any significant impact to groundwater will occur.

4.2 SURFACE WATER

There will be five surface water emission points (SW6, SW9, SW10, SW11 and SW12) from the surface water drainage network across the site. As outlined in Section 2.3.2, the surface water drainage network will divert run-off from the site into strategically located surface water attenuation ponds which in turn will discharge into the ICWs. The above surface water emission points are located on the discharge points from the ICWs into the bog drainage network which will divert surface water to the existing surface water attenuation pond located to the south-west of the existing and proposed infrastructure. The outfall from the surface water attenuation pond is into the Cushaling River at the western margins of the bog. A further surface water emission point (SW5) is located at this outfall location.

4.3 AIR

There will be 14 No. emission to atmosphere points at the Drehid WMF. These are summarised as follows including key parameters proposed for monitoring:

- Landfill gas flares (3 no.) – F1, F2 and F3
  - Nitrogen oxides, carbon monoxide and sulphur dioxide
- Landfill gas utilisation plant (4 no.) – E1, E2, E3 and E4
  - Nitrogen oxides and particulates
- Compost facility (4 no.) – Compost 1, 2, 3 and 4
  - Ammonia, hydrogen sulphide and mercaptans
- Ash solidification plant (1 no.) – Ash Solidification 1
  - Particulates and ammonia
- Metals recovery facility (1 no.) – Metals Recovery 1
  - Particulates
- Leachate treatment facility (1 no.) – Leachate Treatment 1
  - Ammonia

The above infrastructure and emission points will include abatement measures as outlined in Section 2.7 above.

4.4 NOISE

Noise will be generated during the operational phase of the facility from site activities and from traffic on the road network associated with the facility. Noise monitoring is currently carried out on an annual basis in compliance with the existing IED Licence and noise modelling carried out for the proposed facility development shows that noise levels will be below the licence noise limits during all periods assessed.

Noise monitoring is proposed at five locations on an annual basis including one noise sensitive location (N1) and four locations on the facility boundary (N2, N3, N4 and N5).

Specific maximum noise levels for daytime, evening and night-time are set out in the Application Form.

4.5 SUMMARY OF EFFECTS

The residual impacts of the emissions from the facility, when mitigation measures have been taken into account, are outlined in the relevant Chapters of the Proposed Development EIAR.

4.6 MONITORING

Monitoring will be carried out at the locations and at the frequencies specified in the Application.

5 WASTE ACCEPTANCE AND AVOIDANCE

5.1 WASTE ACCEPTED TO THE FACILITY

It is proposed to accept waste materials to the Drehid WMF for disposal to the MSW Landfill, Non-Hazardous Landfill and Hazardous Landfill and to accept suitable biodegradable material to the Compost Facility for composting. It is also proposed to accept suitable waste materials to the facility for use as engineering materials at the landfill.

The summary of the waste quantities proposed for acceptance to the Drehid WMF, as set out in Section 4.3 of the Application, is as follows:

- MSW Landfill – 120,000 TPA (pre-treated municipal waste for disposal)
- MSW Landfill – 120,000 TPA (engineering materials for recovery)
- Non-Hazardous Landfill – 250,000 TPA
- Hazardous Landfill – 85,000 TPA
- Compost Facility – 90,000 TPA

The total quantity of waste proposed for acceptance to the Drehid WMF is 665,000 TPA.

As per the above, it is proposed to accept a maximum of 580,000 TPA of non-hazardous waste to the facility and a maximum of 85,000 TPA of hazardous waste.

5.2 WASTE AVOIDANCE

The compost facility enables the treatment of biodegradable waste and comprises a recovery activity. There are waste quantity losses from the composting processes and the facility output can be recovered as a compost material for spreading on land or recovered in the MSW or Non-Hazardous Landfill as daily cover, avoiding the need to import engineering materials to the site for this purpose.

Leachate generated in the hazardous landfill will be recirculated for reuse in the ash solidification process. Leachate generated in the MSW and Non-Hazardous Landfills will be subject to preliminary treatment on-site in the leachate treatment facility prior to removal off-site in tankers for disposal at a municipal wastewater treatment plant (WWTP).

Sludge generated from the leachate treatment process will be disposed of in the landfill eliminating the need for disposal off-site.

Any silt and sludge materials retained in the surface water interceptors at the site will be collected by a dedicated hazardous waste contractor and transferred off-site for recovery, where possible. Similarly, any waste oils generated from maintenance works will be collected by a suitably authorised waste contractor and opportunities will be sought for off-site recycling or recovery of the waste oil.

Waste materials generated by operational and construction staff at the facility will be source segregated to maximise the recyclable and recovery potential of the waste. Dedicated wheelie bins will be provided suitable locations on the site for segregation of waste materials into mixed dry recyclables, organic waste and mixed non-recyclables. Mixed non-recyclable (residual) waste will be disposed of to the MSW Landfill and organic waste will be transferred to the compost facility, ensuring the minimal transfer of waste off-site from the facility.

Dry mixed recyclable waste will be collected from the site, as required, by AES Ltd. and transferred off-site for recycling.

6 BEST AVAILABLE TECHNIQUES

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 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. 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 landfill infrastructure has been designed and will be operated in accordance with the EPA's *Final Draft BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities* published in December 2011.

7 CLOSURE AND CESSATION OF ACTIVITIES

The existing MSW Landfill has a closure date of 2028 and it is proposed to construct a new Non-Hazardous and Hazardous Landfill to accept waste for 25 years. Therefore, there is a defined lifetime for accepting waste for landfilling at the facility. It is proposed to extend the existing composting facility and remove the restriction on the operating life of the facility.

A Closure, Restoration and Aftercare Management Plan (CRAMP) has been prepared to outline the facility decommissioning and closure, which will involve the removal of all residual consumable materials and wastes, cleaning and removal of all plant and equipment, cleaning of all buildings and an assessment of soil and groundwater conditions. Following closure, Bord na Móna may, depending on the future plans for the facility, proceed with demolition of the compost plant building.

The CRAMP has been prepared in accordance with the Agency guidance on assessing and costing environmental liabilities [2]. The CRAMP will be reviewed and updated annually during the preparation of the Annual Environmental Report (AER). The Plan may also be reviewed based on the impacts of infrastructural developments (e.g. final capping) and any future on-site incidents that have the potential to affect soil and groundwater quality.

Successful closure of the landfill facility would entail the completion of the decommissioning phase of the site closure as set out in the CRAMP. Successful decommissioning of the Pre-Processing Facilities and the Compost Plant will only be complete when all equipment, materials, infrastructure or any other materials that could result in environmental pollution, are removed from the site and recycled, recovered or disposed in accordance with all regulations in force at the time and there is no soil or groundwater contamination at the site.

Following the completion of the site clean out, Bord na Móna will appoint an experienced independent environmental auditor, who will be approved by the Agency, to carry out a Closure Audit and produce a Validation Report that demonstrates the successful implementation of the CRAMP.

[2] EPA, *Guidance on assessing and costing environmental liabilities* (2014)

8 ENVIRONMENTAL QUALITY

Bord an Móna and the Drehid WMF Environmental Management Systems are accredited to ISO 14001:2015 which was achieved in September 2018. The EMS is audited by the NSAI and current certificates issued to Bord na Móna and AES Ireland are provided on the AES website.

9 TRANSBOUNDARY EFFECTS

The regional or transboundary effects of the facility on emissions of CO_2 was assessed using the Design Manual for Roads and Bridges screening model. The results show that the effect of the Drehid WMF on national greenhouse gas emissions will be insignificant in terms of Ireland's obligations under the EU 2020 Target (EU 2014).

10 ALTERNATIVES

Alternative technologies were considered for the following elements of the proposed development works at the Drehid WMF:

- Treatment of Fly Ash and Flue Gas Treatment Residues (FGTR);
- Treatment of Incinerator Bottom Ash (IBA);
- Leachate Treatment; and
- Biological Treatment Processes.

10.1 TREATMENT OF FLY ASH AND FLUE GAS TREATMENT RESIDUES (FGTR)

A number of different treatment options were considered for the fly ash and FGTR arising from the various waste to energy facilities currently in operation and planned in Ireland. If possible, it is preferential to recycle the residues into products e.g. salts, gypsum and filler material for salt mines. However, internationally only a small fraction of fly ash and FGTR are recovered and for the majority of this hazardous waste type, no sustainable and economical feasible methods of reutilisation are available. Sustainable disposal in an engineered landfill for hazardous wastes in Ireland is therefore considered the best alternative option but this necessitates the pre-treatment of the fly ash and FGTR prior to landfilling. With respect to fly ash and FGTR, the main objective of landfilling is to remove the residues from general circulation and to ensure that the release of contaminants from the residues occurs at acceptable levels and preferably at levels similar to natural geological materials. To fulfil this requirement, most cases involve some level of residue treatment before placing the residues at the landfill. In many European countries, the aim is to ensure that leachate from landfilled waste is acceptable in the surrounding environment without the need of treatment after an active phase of about 30-50 years.

The alternative treatment options considered for the fly ash and FGTR included:

- Solidification and chemical stabilisation of Fly Ash and FGTR;
- Thermal treatment of Fly Ash and FGTR;
- Extraction and separation processes for Fly Ash and FGTR;
- Chemical stabilisation of Fly Ash and FGTR;
- Other methods or practices for Fly Ash residues; and,
- Recovery and Utilisation.

Although the many methods of both recovery and treatment methods for fly ash and FGTR are well known, landfilling is still the predominant option in many parts of the world due to the lack of economic and/or regulatory incentives.

The use of fly ash and FGTR in construction here in Ireland is neither regulated (approved) or incentivised and has not been carried out. It is important to stress that all kinds of available treatment options include some kind of landfilling or storage of solid residue.

The most robust and sustainable option available is considered to be the solidification of the fly ash and FGTR utilising cement as an additive. This technique is probably the most common method for the treatment of fly ash and FGTR and is widely used in Europe and Japan, considered BAT and well proven. This option is therefore proposed for the Drehid site.

10.2 TREATMENT OF INCINERATOR BOTTOM ASH

The facility provides for the acceptance and treatment of IBA prior to being deposited at the Non-Hazardous Landfill. The Poolbeg WTE Facility does not include a treatment process for the extraction of ferrous and non-ferrous metals. The primary function of the IBA Processing Facility will, therefore, be to recover the ferrous and non-ferrous metals from the IBA prior to the IBA being deposited within the Non-Hazardous Landfill.

The recovery system and operations are fully enclosed within the Metals Recovery building as opposed to being external. HGV's will deliver the IBA into the Reception and Maturation building to be deposited in a storage area. In considering alternatives, the inclusion of a maturation step has been determined as this which allows for the optimisation of the metal recovery operations. After the maturation period, the IBA will be transferred to the Metals Recovery Facility. Within this building, the main internal processes will include screening and crushing of material and separating the ferrous and non-ferrous metals from the IBA material. The processing equipment considered for this operation are BAT, proven technologies and include overband magnets and eddy current separators. Following processing, residual ash will be loaded onto vehicles for deposition within the Non-Hazardous Landfill whilst the recovered material will be transported offsite.

Currently, there are no standards and indeed no market for the utilisation of IBA in construction projects which require significant volumes of fill material such as some roads projects. Therefore, initially the screened residual IBA will be deposited onsite within the non-hazardous landfill. The reutilisation of treated IBA for construction purposes in Ireland is not yet approved and therefore was not considered a viable option at this time. However, the proposed facility in Drehid includes screening of the IBA into various aggregate sizes, the extraction of metals and for handling the IBA separate from other waste streams prior to consignment to landfill. The opportunity to utilise the treated IBA off-site in construction projects can therefore be reconsidered in the future.

10.3 LEACHATE TREATMENT

Phoenix Engineers were appointed as Technical Consultants by Bord na Móna, in January 2016, to provide professional services for the evaluation of landfill leachate treatment technologies at the Drehid WMF. The Consultant was required to recommend the most feasible leachate treatment configuration to be installed at Drehid, taking into account the outcome of detailed technical and financial appraisal of alternative options.

Work involved the detailed appraisal of a wide range of leachate treatment technologies, and the combination of several technologies to achieve the required standards for treated leachate quality, and

also examined potential disposal routes for treated leachate, and the possibility that each of these might be achieved reliably and consistently.

Technologies that were considered include the following:

- Aerobic biological treatment with extended aeration, including full denitrification;
- Ultrafiltration installed as part of the above;
- Biological Aerated Filter (BAF);
- Reverse Osmosis (RO) on both raw and pre-treated leachates;
- Granular Activated Carbon (GAC) polishing;
- Evaporation of raw and pre-treated leachates;
- Reed Bed polishing processes;
- "Ammonia Splitter" technology, offered as part of evaporation processes;
- Ammonia Stripping;
- Advanced Oxidation; and
- Membrane Bioreactor (MBR).

In all cases, it was recognised that no single leachate treatment process was capable of achieving standards required for optimum discharge, so combinations of processes would be needed.

A number of recommendations were made by the specialist consultant which led to the design of the Leachate Treatment Plant as set out in the Proposed Development EIAR.

10.4 BIOLOGICAL TREATMENT PROCESSES

One of the main aspects of the further development of the Drehid WMF is the expansion of the capacity of the existing composting facility. Composting and anaerobic digestion were considered for the stabilisation of the organic fraction to satisfy EPA requirements.

Composting and anaerobic digestion are natural processes of decomposition that take place under controlled conditions in the presence and absence of oxygen respectively. In the case of anaerobic digestion, methane gas is generated which is converted to green electricity where the electricity can be exported to the national grid.

The alternative biological treatment process considered for the facility included the following:

- Anaerobic Digestion (AD) Processes; and
- Composting Processes Including;
    - Outdoor Systems;
    - Indoor Windrow Systems;
    - Tunnel Systems; and
    - Continuous Flow Systems.

The last three categories listed can generically be referred to as enclosed or in-vessel systems where the process conditions including air supply, moisture content and temperature can be controlled and all potential emissions (air and effluent) can be contained, collected and treated.

Owing to the high aeration rates and process control provided by tunnel composting systems and the resultant high rates of biological stabilisation, it was decided to propose a tunnel composting system (similar to the existing composting facility) for the composting process for the proposed further development of the facility.

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