



## **DREHID MECHANICAL BIOLOGICAL TREATMENT FACILITY**

### **PLANNING APPLICATION ENVIRONMENTAL IMPACT STATEMENT**

#### **VOLUME II**

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## 1 INTRODUCTION

### 1.1 BACKGROUND

#### 1.1.1 *Background to Proposed Development*

Bord Na Móna Plc. (hereafter referred to as Bord na Móna) proposes to develop a Mechanical Biological Treatment (MBT) facility (Drehid MBT Facility) in its landholding located within the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare.

The site is located within a larger Bord na Móna landholding, which comprises 2,544 hectares (ha). That landholding is outlined in blue on Figure 1.1 and 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.

The permitted and operational Drehid Waste Management Facility is located within this landholding and is located approximately 1km north of the proposed MBT Facility site. The MBT Facility site is located approximately 3.5km north of Allenwood and 10km south of Enfield. Access to the Drehid Waste Management Facility is by means of a 4.8 km long dedicated access road from the R403 regional road at Killinagh Upper (between Allenwood and Derrinturn). It is proposed that this access road will also be used for the MBT Facility.

The location of the proposed MBT Facility within the Bord na Móna landholding was optimised with regard to environmental considerations.

Given that access to the proposed MBT Facility will be by means of the already permitted and existing site entrance at the R403 regional road, it will be ultimately accessible via a network of regional routes which in turn link with the National Motorway network. The R403 lies south, and southwest and west of the site. The R403 joins the R402 at Carbury to the northwest of the site. The R402 connects to the M4 while the R403 connects to central and south County Kildare. The M4 (Dublin to Sligo/Galway) motorway is located approximately 9km to the north of the proposed MBT Facility location, while the M7 (Dublin to Limerick/Cork) motorway is located approximately 17km to the south of the proposed MBT Facility location.

This application by Bord na Móna for the development of the Drehid MBT Facility is being made directly to An Bord Pleanála 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.

Strategic Infrastructure Development (SID) comprises defined categories of development which are considered to be of national or regional strategic importance. SID provisions were inserted into the Planning and Development Act, 2000, as amended, by the Planning and Development (Strategic Infrastructure) Act 2006. The 2006 Act provides generally for applications for permission/approval for specified private and public strategic infrastructure developments to be made directly to An Bord Pleanála.

The Seventh Schedule to the 2000 Act lists the classes of infrastructure development which, if considered by An Bord Pleanála to be strategic infrastructure development, require direct application for permission to An Bord Pleanála instead of the local planning authority. Specific SID project categories relating to private developers fall into three classes set out in the Seventh Schedule namely: energy infrastructure; transport infrastructure; and environmental infrastructure.

If a proposed development falls into one of these classes the prospective applicant must enter into a pre-application consultation process with An Bord Pleanála, in accordance with the provisions of Section 37B of the 2000 Act, as amended, in order for An Bord Pleanála to establish whether the proposed development is deemed to be SID.

Following pre-application consultations with the applicant, An Bord Pleanála must decide whether a Seventh Schedule development is (or is not) SID by reason of the fact that the proposed development would, if carried out, fall within one or more of the following criteria set out in Section 37A(2) of the 2000 Act:

- (a) the development would be of strategic economic or social importance to the State or the region in which it would be situate;
- (b) the development would contribute substantially to the fulfilment of any of the objectives in the National Spatial Strategy or in any regional planning guidelines in force in respect of the area or areas in which it would be situate;
- (c) the development would have a significant effect on the area of more than one planning authority.

If the proposed Seventh Schedule Development is deemed to be SID, An Bord Pleanála will confirm this, requiring the prospective applicant, if progressing, to make the planning application directly to An Bord Pleanála, or to scope the requirements of the obligatory Environmental Impact Statement (EIS) with An Bord Pleanála if they so wish.



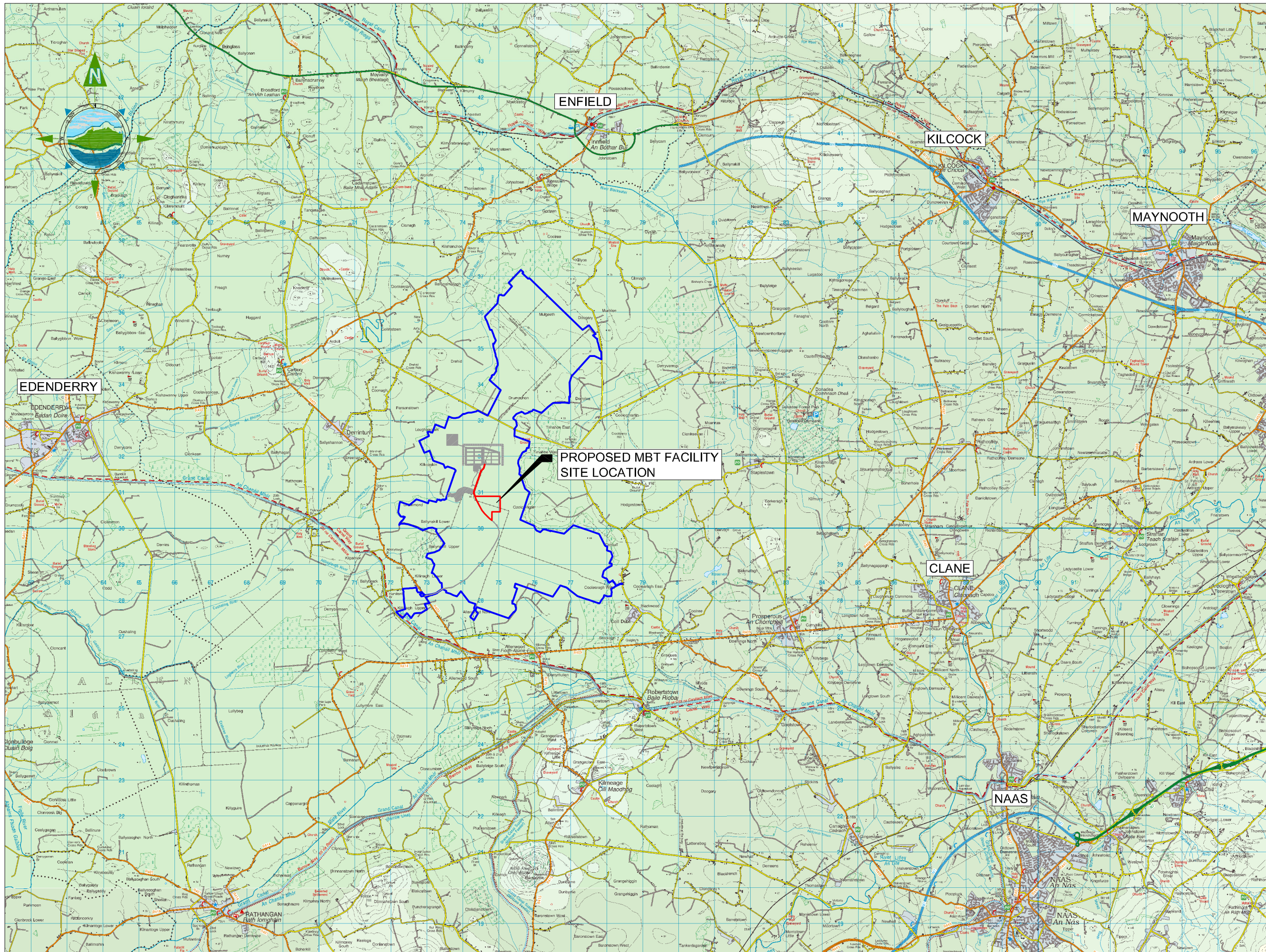
In October 2010, in accordance with the provisions of Section 37B of the 2000 Act as amended, Bord na Móna made a request to An Bord Pleanála for pre-application consultations in respect of the proposed development. Once this application for consultation was made, details of the proposed development were posted on the website of An Bord Pleanála (file reference 09.PC0106).

Subsequently, representatives of Bord na Móna met with staff of An Bord Pleanála in its offices on three separate occasions namely on the 7<sup>th</sup> of December 2010, on the 27<sup>th</sup> of April 2011 and on the 9<sup>th</sup> of August 2011. (Minutes of these meetings are included as Appendix 1.1 to this document).

Following the completion of the pre-application consultation process, and having regard to the nature and extent of the proposed development, An Bord Pleanála issued a notice in accordance with Section 37B(4)(a) of the 2000 Act as amended, that it was of the opinion that the proposed development would, if carried out, fall within each of paragraphs (a) to (c) of section 37A(2). (Please note that a copy of this notice from the Board dated 23rd March 2012, in this regard, has been enclosed at Appendix 1.1)

Following the issuing of this notice by the Board under Section 37B(4)(a) of the 2000 Act, as amended, and in accordance with the provisions of Section 37E of the Planning & Development Act 2000, as amended, Bord na Móna is now making this application for the proposed MBT facility directly to An Bord Pleanála.





**GENERAL LEGEND**

OWNERSHIP BOUNDARY

ACTIVITY BOUNDARY

EXISTING PERMITTED WASTE MANAGEMENT FACILITY

#### NOTES

- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
- ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
- ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
- ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

1000m 0 1000m 2000m 3000m

Issue	Date	Description	By	Chk'd
A	05.05.12	ISSUED FOR REPORT	MN	ST

Client:

**BORD NA MÓNA**

Project: **DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:

**SITE OWNERSHIP PLAN**

Scale @ A3: 1:100,000

Prepared by: M. Nolan  
Checked: S. Tinnelly  
Date: November 2011  
Project Director: D. Grehan



Consulting, Civil and Structural Engineers,  
Block 10-3, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353 (0)1-8030406  
fax: +353 (0)1-8030409  
email: info@tobin.ie  
www.tobin.ie

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Drawing No.: **Figure 1.1** **A**



### *1.1.2 Company Background*

Bord Na Móna is Ireland's leading environmentally responsible integrated utility service provider. Established over 60 years ago to develop Ireland's peat resources, it is now active across a range of industries.

Today, Bord na Móna owns 80,000 hectares of peatland, located mainly in the Irish Midlands. To date this land has been primarily used for peat harvesting for energy and for horticulture growing media. Bord na Móna, employs approximately 2,100 people (2010/2011) and operates out of 30 localities mainly in Ireland, but also in the United Kingdom and eastern United States. In 2010/2011, it had a turnover of €382 million.

With a transition away from the traditional industries, heavily dependent on peat and other fossil fuels, Bord na Móna has embraced, at its core, a new vision for the future and a move to a new, more sustainable business. The Group's "A New Contract with Nature" creates a vision that ensures that Bord na Móna operations work in harmony with, and minimises the impact on, the environment. The Company's future pillars are renewable energy, resource recovery, environmental products and consumer products.

Bord na Móna's sustainability objectives for the future include:

- Diversion of waste from landfill
- The development of wind energy
- Increased levels of biomass co-fuelling at Edenderry Power
- Market leader in sustainable gardening and horticulture products
- Promote and enhance the national biodiversity on landholdings.

#### **1.1.2.1 Business Development**

Bord na Móna is now active across a wide range of industries with operating business units in the areas of:

- Fuels – the supply of peat as a fuel for the generation of electricity and to the residential heating market; and other fuel import and distribution businesses;
- Resource Recovery - the collection, recovery, recycling, treatment and disposal of waste;
- Land and Property – the management of the Company's land and property assets;
- Powergen – the management and operation of power generation assets which include the Edenderry Power Station, the Cushaling Peaking Plant and the Bellacorrick Wind Farm;
- Water – an emerging involvement in the management of water resources;
- Horticulture - a significant domestic and international business manufacturing and supplying peat and non-peat based horticultural products;

- Environmental - a leading solutions provider with a proven track record in the design, manufacture and installation of a wide portfolio of differentiated clean-tech technologies that deliver clean air and clean water solutions around the globe;
- Feedstock – the supply of peat and biomass materials for the generation of electricity in the Bord na Móna and ESB owned power stations as well as supplying peat for the Group's briquette manufacture, growing media and peat filtration activities.

Innovation underlies all of these activities and plays a key role in developing new environmentally responsible products and services. Following the launch of its Innovation Centre in 2008, Bord na Móna is investing over €50m in innovation, research and development over a five year period.

Many of Bord na Móna's current activities are regulated by the Environmental Protection Agency. Bord na Móna conducts its peat extraction activities under the terms of nine IPPC (Integrated Pollution Prevention Control) licenses and operates its Resource Recovery facilities, a peat deposition site and an ash repository site under the terms of a further nine Waste Licenses.

#### **1.1.2.2 Waste Management**

Bord na Móna's Resource Recovery activity comprises an integrated waste management business providing collection, recovery, recycling, treatment, and disposal services. The principal focus is on delivering exceptional customer service and maximising the re-use potential of managed waste materials, where possible, within the broader Bord na Móna Group.

Advanced Environmental Solutions (Ireland) Ltd (AES), was acquired by the Group in 2007, creating an opportunity to establish a strong presence in the Waste Management sector in Ireland. Today, waste collection services operated under the AES brand, provide domestic waste management to over 100,000 residential homes throughout the Midlands, South East and Mid West regions, and 8,000 commercial customers nationwide.

In terms of management facilities, Bord na Móna operates engineered landfills for the environmentally responsible disposal of peat ash from Ireland's 3 peat-fired power stations. The facilities are operated under the terms of the EPA licensing regime and cumulatively manage approximately 120,000 tonnes of waste each year.

Bord na Móna also operates a licensed composting facility near Athy, County Kildare. The facility is licensed to process 96,000 tonnes per annum (tpa) of green waste as

well as by-products from the brewing industry, cocoa shell and other biowaste. The final product is used to enhance the company's range of growing media products.

The Drehid Waste Management Facility - located immediately adjacent to the application site, is the Group's most extensive waste management facility. In 2005, Bord na Móna was granted planning permission<sup>1</sup> for the development of activities comprising an engineered residual landfill accepting 120,000 tpa; and a composting facility accepting 25,000 tpa of biowaste from household, commercial and industrial sources; and associated site infrastructure and development works. A waste licence was subsequently issued by the Environmental Protection Agency (EPA)<sup>2</sup>. The facility commenced operations in February 2008.

Planning permission was granted by An Bord Pleanála<sup>3</sup> in 2008 to intensify waste acceptance at the landfill to 360,000 tpa for a five-year period (until December 2013) and to extend the landfill footprint of the facility. The appropriate EPA waste licence<sup>4</sup> was granted in 2009. That licence was reviewed in June 2009 as a result of the introduction of limits on the acceptance of biodegradable municipal waste at landfill. A revised waste licence was issued by the EPA in March 2010<sup>5</sup>.

More recent permissions include the development of a landfill gas utilisation plant (October 2011) and an increase in the floor area of the previously permitted composting facility (November 2011).

Elsewhere, the Group has secured planning permission for the development of a 99,000 tpa materials recycling and transfer facility at Drumman, Co. Offaly.

The company also provides consultancy services to the waste management industry.

### **1.1.2.3 Regulatory Compliance**

Much of Bord na Móna's activities are carried out under the terms of a significant number of licenses issued by the Environmental Protection Agency. At present the Group holds 18 such licences - 9 IPPC and 9 waste licences.

## **1.2 PROPOSED DEVELOPMENT**

As outlined in Section 1.1., Bord Na Móna proposes to develop a Mechanical Biological Treatment (MBT) facility within its landholding located within the

---

<sup>1</sup> Kildare County Council Reg. Ref. 04/371; An Bord Pleanála Ref. PL.09.212059

<sup>2</sup> EPA Ref. W0201-01

<sup>3</sup> An Bord Pleanála Ref. PL09.PA004

<sup>4</sup> EPA Ref. W0201-02

<sup>5</sup> EPA Ref. W0201-03

townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare. The extent of the Bord na Móna landholding, which comprises 2,544 hectares (ha), is outlined in blue on enclosed Figure 1.1. No modifications to already permitted facilities, including the entrance from the R403 regional road, are envisaged.

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

Mechanical Biological Treatment through a combination of mechanical processing and biological treatment (such as composting and anaerobic digestion) reduces the volume of waste which requires treatment by disposal in landfill or incineration.

By virtue of the biological process in an MBT facility, biodegradable municipal waste can be biostabilised thereby eliminating its potential to generate methane (a harmful greenhouse gas) and leachate, thus contributing to the fulfilment of Ireland's targets under the Landfill Directive (1999/31/EC).

In deciding on the configuration of the biological process, and in particular the inclusion of Anaerobic Digestion (AD), consideration was had of the fiscal incentives for the development of AD– namely the Renewable Energy Feed In Tariff (REFIT). Regrettably, the current fiscal incentives in the Republic of Ireland make it difficult to create a compelling or indeed viable, economic argument for the development of AD. The REFIT for AD in the Republic of Ireland is currently significantly inferior to its equivalents in Northern Ireland and Italy (for example).

#### *1.2.1 Proposed Development - MBT with Composting and Optional Dry Anaerobic Digestion (AD) Step*

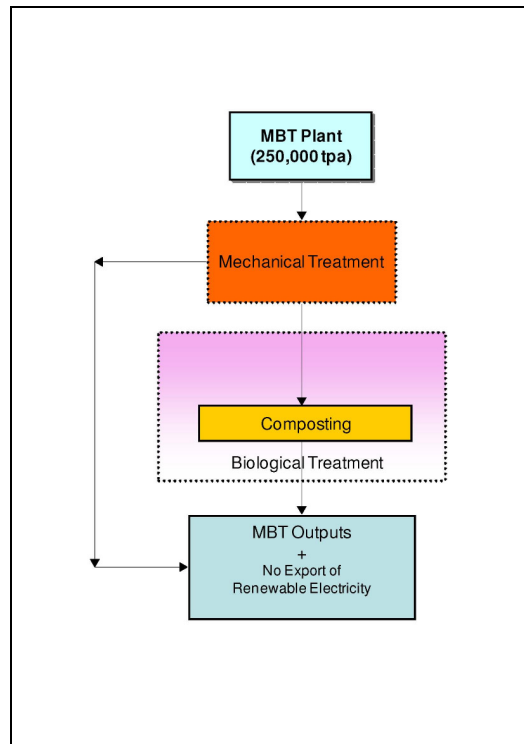
Therefore, Bord na Móna proposes the preparation of the Planning Application and Waste Licence Application for the proposed Drehid MBT Facility such that it provides for the development of an optional Dry AD step as part of the biological treatment stage. This approach has been subject to detailed pre-application discussions with both An Bord Pleanála and the EPA.

The biological treatment stage will include a composting step in any event. This Planning Application and Waste Licence Application includes for both scenarios (Configuration A (MBT with Composting), as illustrated in Flow Diagram No. 1 below and Configuration B (MBT with Dry Anaerobic Digestion and Composting) as illustrated in Flow Diagram No. 2 below) and the potential impacts and mitigation measures for both scenarios are considered for each environmental parameter within this EIS.

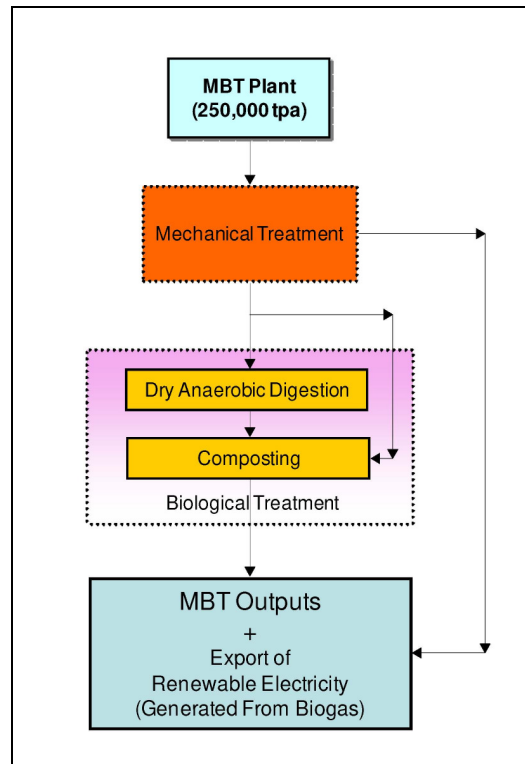
The design of the MBT Facility is such that there are no significant external differences between Configuration A (MBT with Composting) and Configuration B

(MBT with Dry Anaerobic Digestion and Composting). It is proposed that the AD plant and ancillary plant will be located within the enclosure of the biological treatment buildings. The main physical difference between the two Configurations will be that Configuration B will have a standby gas flare compound and a stack associated with the CHP plant. In addition, Configuration B will require physical infrastructure (i.e. overhead power line) to facilitate the export of electricity to the electricity network. Any required planning consents to facilitate this infrastructure will be arranged in due course by ESB Networks. Bord na Móna owned switch gear and transformers associated with the export of electricity will be located in the Electrical Room.

In the case of a decision to develop Configuration B (MBT with Dry Anaerobic Digestion and Composting), Bord na Móna will progress an application to ESB Networks for the export of electricity following the grant of regulatory approvals for the proposed development and prior to construction.



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



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

A detailed description of the development, including a description of the mechanical and biological processes for the MBT Facility with both Composting and the optional Dry Anaerobic Digestion Step, is included in Chapter 2 herein.

The proposed development will enhance recycling rates in the Kildare Waste Management Region and the wider geographical area. The proposed MBT Facility will ensure that waste is adequately pre-treated prior to being deposited in landfill in compliance with EPA guidance on Municipal Solid Waste Pre-treatment and Residuals Management, the 1999 Landfill Directive (1999/31/EC) and prevailing waste licence conditions. Ultimately, this will allow for the most rational use of previously permitted and available disposal capacity by ensuring that all waste that is finally disposed of to landfill has been subject to treatment and optimum rates of materials re-use and recycling, in accordance with the waste hierarchy.

The overall annual waste tonnage accepted at the existing Drehid Waste Management Facility and the proposed MBT facility will be the sum of the following:

- Municipal Solid Waste per annum accepted at the proposed 250,000 TPA MBT facility;



- Residual Municipal Solid Waste per annum accepted directly at the previously permitted 120,000 TPA landfill<sup>6</sup>; and
- Municipal Biowaste per annum accepted at the previously permitted 25,000 TPA composting facility.

However, in the context of the overall Bord na Móna facilities within this landholding, the combined annual waste tonnage accepted directly at the existing Drehid Waste Management Facility and at the proposed Drehid MBT Facility will be less than the 385,000 tonnes of waste per annum currently permitted for acceptance at the Drehid Waste Management Facility. At present the landfill at the existing Drehid Waste Management Facility is permitted to dispose of a total of 360,000 tpa, reverting to 120,000 tpa in December 2013. The proposed development will not involve any increase of landfilling above these maxima.

This EIS also considers the traffic implications of the MBT Facility being constructed and operating at the same time as the permitted Drehid Waste Management Facility (Landfill and Compost Facility) located within the Bord na Móna landholding and the implications of the MBT Facility operating beyond the life of the Drehid Waste Management Facility.

### 1.3 PLANNING POLICY STRATEGY AND CONTEXT

#### 1.3.1 *Relevant Planning and Development Policies*

This section demonstrates that the proposed MBT facility fully complies with the detailed requirements of all relevant statutory planning and development plans and policies including the following:

- Planning policies set out in the National Spatial Strategy and National Development Plan;
- Planning policies set out in the Regional Planning Guidelines for the Greater Dublin Area, 2010 – 2022;
- Local and County planning and development policies as set out in the Kildare County Development Plan, 2011 – 2017; and
- Policies set out in the Regional Waste Management Plan for County Kildare, 2005 - 2010.

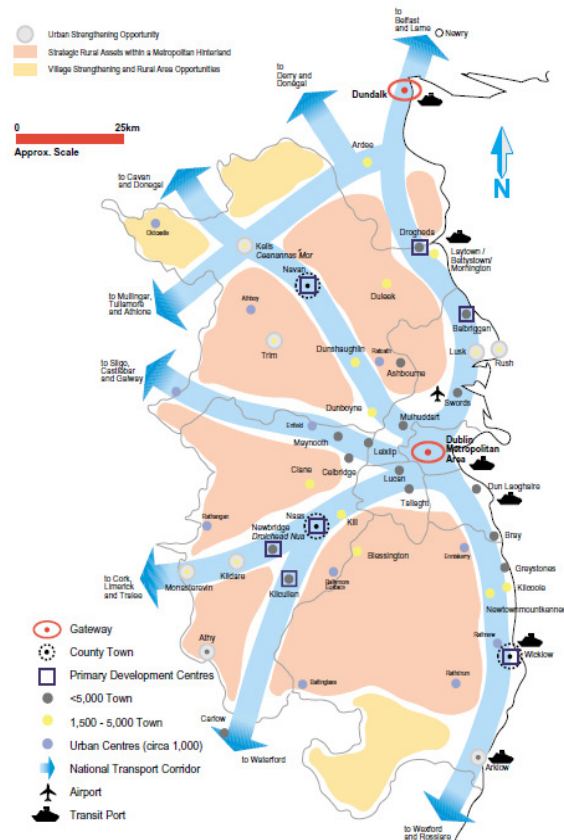
##### 1.3.1.1 **National Spatial Strategy and National Development Plan**

The National Spatial Strategy (NSS) was launched in 2002 and proposed a 20-year spatial framework to achieve more balanced regional development in Ireland. The

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<sup>6</sup> The residual municipal solid waste per annum accepted directly at the previously permitted landfill will be 120,000 tonnes less the MBT residues (which will also be deposited in the landfill during the lifetime of the Drehid Waste Management Facility).

vision underlying the NSS was a better balance of social, economic, physical development and population growth between regions.



**Figure 1-2** *Dublin and Mid East Regions (Spatial Vision for GDA)*

Source: National Spatial Strategy, Map 5, page 78, National Spatial Strategy 2002-2020

The vision for each of the eight regional planning areas set out in the NSS directly underpins the Regional Planning Guidelines for these areas including the RPGs for the Greater Dublin Area (which will be discussed in the following section). Figure 1.2 above illustrates the spatial vision for the Greater Dublin Area comprising the Dublin and Mid East Regional Authorities.

A key principle of the spatial vision for this region is to physically consolidate the growth of the metropolitan area (i.e. Dublin City and suburbs) while concentrating development in the hinterland of the metropolitan area (including County Kildare) in strategically placed urban centres.

Section 3.7 of the NSS specifically addresses the issue of the ‘Key Infrastructure’ required to realise the strategy. In relation to waste management infrastructure, the NSS states that:

*Waste management is a particular current priority. Efficient, effective and cost competitive waste management facilities are essential if industrial and enterprise activity is to thrive and develop in a balanced way across Ireland<sup>7</sup>.*

The National Development Plan 2007 - 2013 'sets out a strong framework for the promotion of regional development with a particular focus on investment in the National Spatial Strategy (NSS)'.<sup>8</sup> The NDP also notes the significant changes in terms of population and economic growth that have taken place in the Greater Dublin Area (GDA) and notes that this growth 'has also brought challenges, particularly in the area of infrastructure'.

It is evident that the provision of the proposed Mechanical Biological Treatment Facility on the same landholding as the existing Drehid Waste Management Facility will play an important role in addressing such challenges by ensuring the provision of more efficient, effective and cost competitive waste management infrastructure in the region.

#### **1.3.1.2 Regional Planning Guidelines for the Greater Dublin Area**

The Regional Planning Guidelines for the Greater Dublin Area 2010-2022 aim to direct the future growth of the Greater Dublin Area over the medium to long term and work to implement the strategic planning framework set out in the National Spatial Strategy (NSS) published in 2002.

The Greater Dublin Area (GDA) incorporates the geographical area of Dublin City, Fingal, Dún Laoghaire-Rathdown, South Dublin, Kildare, Meath and Wicklow. The Regional Planning Guidelines (RPGs) for this area set out a strategy for development in two main areas namely, the Metropolitan Area, which includes Celbridge, Kilcock, Leixlip and Maynooth and; the Hinterland, which includes the remainder of County Kildare. According to the RPGs, development in this Hinterland area is to be:

*"focused on the high quality integrated growth and consolidation of development in key identified towns, separated from each other by extensive areas of strategic green belt land devoted to agriculture and similar uses<sup>9</sup>.*

Of particular relevance to the consideration of the proposed development is Chapter 6 of the RPGs which sets out the key physical infrastructure needs for the GDA, listing key areas of priority investment under the different types of infrastructure such as

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<sup>7</sup> Section 3.7, Page 56, National Spatial Strategy, DoEHLG, 2001

<sup>8</sup> Page 22, 'Section 4: Integration of National Development Goals and Investment Strategies', National Development Plan, Government of Ireland, 2007

<sup>9</sup> Section 2.2, page 33, Regional Planning Guidelines for the Greater Dublin Area, 2010-2022

transport, water supply, waste water and surface water treatment, energy and communications, and waste management.

Section 6.7 states “waste management infrastructure provision is an important part of the physical infrastructure investment needed in the GDA for population and economic growth”. Key strategic policies and recommendations for waste management are set out in Section 6.7.1 and include the following Strategic Policy which emphasises the need to provide a range of options for the treatment and final disposal of waste:

***PIP5:** To ensure, from environmental, business and public health needs, that waste management remains a priority for local authorities and waste management regions in continuing to invest in promoting and facilitating reuse and recycling by residential and commercial sources and that high standard options for treatment and final disposal of waste are available within the GDA.*

The following strategic recommendations from the same section of the RPGs are also particularly relevant in the consideration of the proposed development:

***PIR36** The new waste management strategy across the regions of the GDA should seek to facilitate a balanced use of resources and greater adaptability and robustness of services. Integrated waste management should be considered from the perspective of the GDA as one singular functioning economic and spatial unit and to increase economies of scale.*

***PIR37** Encourage the expansion of increased levels of diversion of biodegradable waste from landfill through provision of or support for biological treatment facilities and home composting.*

***PIR40** Waste management facilities should be appropriately managed and monitored according to best practice to maximise efficiencies and to protect human health and the natural environment.*

***PIR41** Plans and projects associated with waste management that have the potential to negatively impact on Natura 2000 sites will be subject to a Habitats Directive Assessment (HDA) according to Article 6 of the habitats directive and in accordance with best practice and guidance.*

It is clear from the policies included above that the proposed development of a mechanical biological treatment facility on the same landholding as the site of the existing waste management facility at Drehid will help achieve the objectives set out

in the RPGs by providing additional options for the treatment of waste in the region including increased levels of diversion of biodegradable waste from landfill.

In addition, as this EIS demonstrates, the proposed development has been designed and sited and will be built in accordance with best practice for the protection of human health and the natural environment.

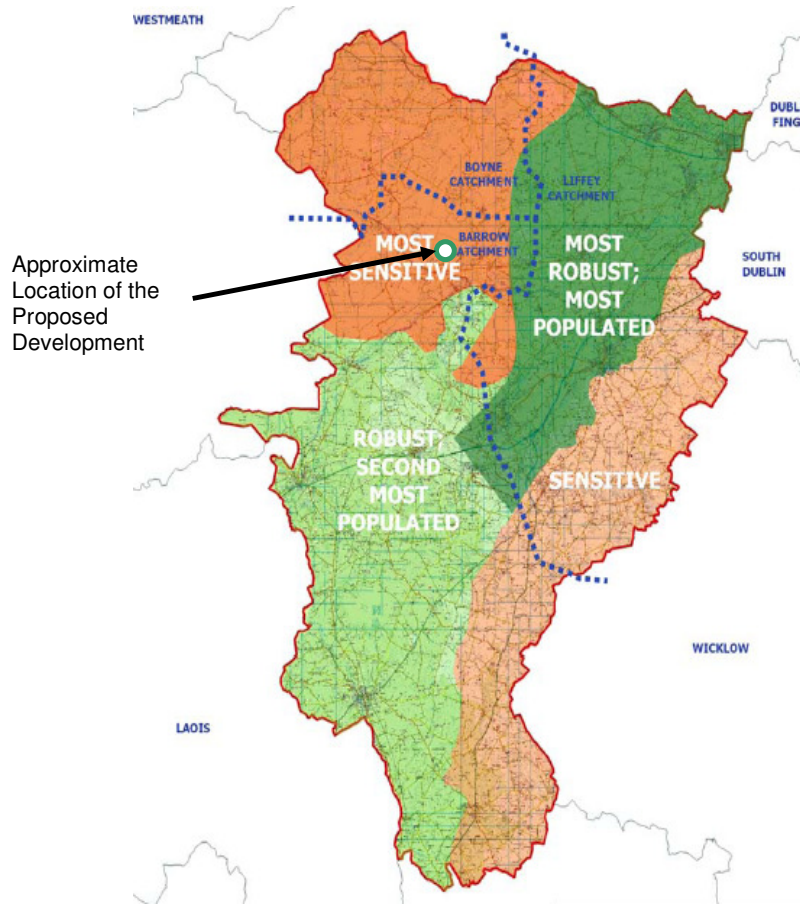
#### **1.3.1.3 Local and County Planning and Development Policies**

A key policy document against which the proposed development is to be assessed is the Kildare County Development Plan, 2011-2017 which sets out an overall strategy for the proper planning and sustainable development of County Kildare over the period 2011-2017 and beyond to the horizon year of 2022.

The overall development strategy for the County is outlined in Chapter 2 ‘*Core Strategy*’ which establishes a strategic approach to the management of development in the county. This overall core strategy builds on the principles established in the previous Kildare County Development Plan 2005-2011 and the framework provided by the National Spatial Strategy (NSS) 2002-2020 (see section 1.3.1.1 of this Chapter) and the Regional Planning Guidelines for the Greater Dublin Area (RPGs) 2010-2022 (see section 1.3.1.2).

Section 2.6 of the Development Plan entitled ‘*SEA and the Settlement Strategy*’ contains a map (see Figure 1.3 overleaf) which illustrates environmental conditions at a very broad strategic level for the county as a whole, having regard to a range of separate environmental factors.

With regard to the location of the proposed development the Development Plan indicates that environmental sensitivities in the County increase towards the north-west on account of bogs and wetlands. The Plan also highlights the fact that there is a lower proximity and concentration of quality transport and high capacity water services in this area.



**Figure 1-3** *Development Plan Macro Environmental Sensitivity Map*

Source: Section 2.6 Map 2.4, Kildare County Development Plan 2011-2017

It is important to note that according to the Development Plan “*as the map illustrates a broad scale generalisation of sensitivities, all applications for development must be considered having regard to the individual environmental conditions of the subject site*”.

In addition, Section 2.7 of the Plan ‘*Preferred Development Strategy*’ states that a key focus of the core strategy is on “*protecting the environment by implementing an environmental protection policy which recognises the various environmentally sensitive zones within the county but not to mutually exclude appropriate and otherwise acceptable uses and development*”.

The proposed development can be seen to fully comply with the Development Plan Core Strategy due to its use and its location on a site within the same landholding of a previously permitted Bord na Móna waste management facility. Furthermore, as this EIS demonstrates, the proposed development has been carefully sited and designed to take account of the individual environmental conditions of the subject site.



The next relevant section of the Development Plan for the purposes of the proposed development is *Chapter 5 ‘Economic Development’* a key aim of which is to “*support and facilitate the economic development of the county across a range of sectors*”. Section 5.5 identifies a number of factors which will influence the future economic development of the County including the availability of infrastructure. According to the Development Plan:

*“Adequate infrastructure is paramount to facilitate future economic development activity in the county. This includes water services, effective public transport networks, energy, telecommunications, waste management, education facilities, etc.”<sup>10</sup>*

Quality of Life is also identified as a key factor in facilitating future economic development and according to the Plan, specific actions which have been identified to improve quality of life include “*expanding infrastructural capacity for energy, waste, water and wastewater*<sup>11</sup>.” The importance of providing such infrastructural capacity is highlighted by the inclusion of the objective E04 in Section 5.10 ‘*Economic Development Objectives*’:

**EO 4:** *To ensure the provision of water, wastewater treatment and waste management facilities to accommodate future economic growth of the county and to reserve capacity in water services infrastructure for employment generating uses.*

The proposed development of a state of the art Mechanical Biological Treatment Facility within the same landholding as the existing Drehid Waste Treatment facility fully accords with this objective in that it would represent a significant step in ensuring that the County has adequate waste management infrastructure to facilitate future economic growth.

The next relevant chapter of the Development Plan is *Chapter 7 ‘Water Drainage and Environmental Services’*. Section 7.9 of the Chapter which addresses Environmental Services includes a stated aim “*to conform to European, National and Regional policies in relation to the provision of waste management and to protect and enhance water, air and noise quality.*”

Building on this aim, the Plan sets out two policies of the Council which can be seen to directly relate to the proposed development namely:

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<sup>10</sup> Section 5.5.2, Kildare County Development Plan, Kildare County Council, 2011

<sup>11</sup> Section 5.5.3, Kildare County Development Plan, Kildare County Council, 2011

*WM 1: To have regard, in the assessment of planning applications for waste management facilities inter alia, to the Waste Management Plan for County Kildare then prevailing, Waste Management Act 1996, EU Landfill Directive, EPA Landfill Manuals, EU Packaging and Packaging Waste Directive and DoEHLG policy statements viz. 'Changing Our Ways' and 'Preventing and Recycling Waste- Delivering Change' and 'Taking Stock and Moving Forward.'*

*WM 7: To ensure the provision of residual landfill in County Kildare (either directly by the Council or in co-operation or partnership with other local authorities and the private sector) is subject to the specific requirements of the County Kildare Waste Management Plan.<sup>12</sup>*

As the following section of this report demonstrates, the proposed development of an MBT Facility adjacent to the Drehid Waste Management facility has been assessed against, and complies with, all relevant sectoral strategies and guidance including the Waste Management Plan for County Kildare.

In addition, this EIS demonstrates all possible measures were taken to ensure that the proposed development will not have an undue impact on the environment. Furthermore, it is clear that the provision of such an MBT Facility will help facilitate the continued provision of a residual landfill in the County by assisting the landfill to operate in accordance with its current licence requirements, that waste is pre-treated prior to deposition and that the volume of biodegradable waste deposited is reduced, as required under the Landfill Directive.

Due to the location of the subject site, regard has been had to Development Plan **Chapter 10 'Rural Development'**, and in particular to those policies which relate to boglands in these areas as set out in Section 10.5 specifically:

*BL 1: To ensure that a balanced approach is taken to the development of the county's peat resources and the restoration of cutaway bogs, in order to minimise the negative impact on biodiversity and the archaeological and cultural heritage of the county.*

*BL 6: To support the development of the peatlands within the county for appropriate alternative uses, subject to environmental considerations and nature designations.*

The proposed development fully complies with these policies in that it forms part of a balanced approach to an area characterised by peatlands which involves the further

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<sup>12</sup> Section 7.10.1, Kildare County Development Plan, Kildare County Council, 2011



development of the Bord na Móna landholding at Carbury, Co. Kildare as a use which has full regard to all relevant environmental considerations and nature designations.

In the same way, the proposed development also fully complies with the key rural development objective, RDO 4 which is set out in Section 10.6:

***RDO 4: To ensure that all new developments and practices do not undermine rural ecosystems, landscapes and conservation areas and are conducted in a manner consistent with the protection of the local environment and in line with national legislation and relevant guidelines.***

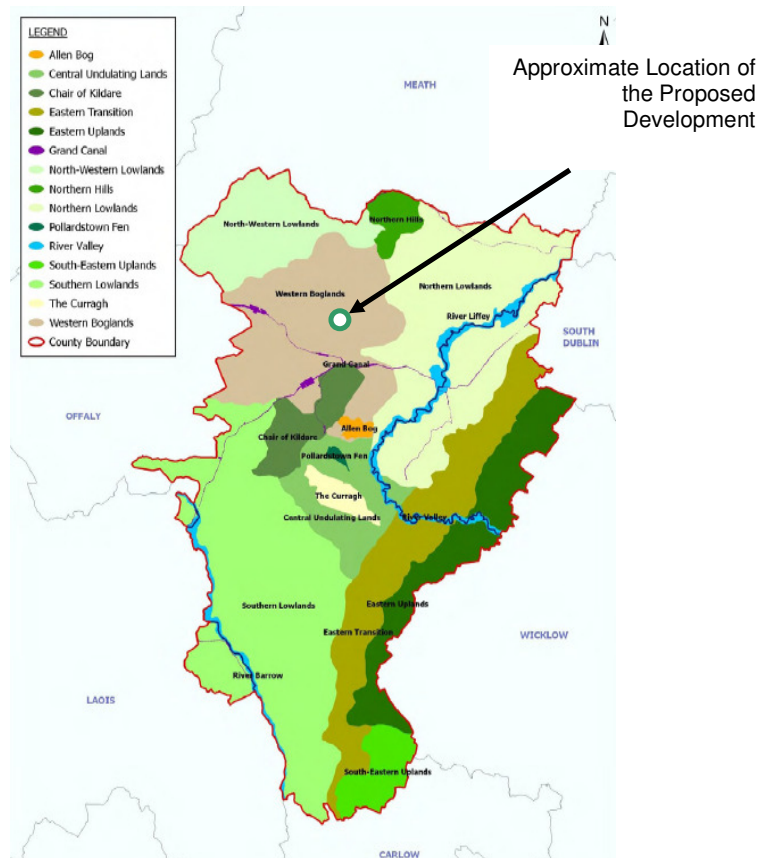
A final important section of the Development Plan in the consideration of the proposed development is Chapter 14 ‘*Landscape, Recreation and Amenities*’. In 2004, a Landscape Character Assessment of Kildare was undertaken and is contained in Volume II of the current County Development Plan.

As Figure 1.4 overleaf illustrates, this assessment has identified the area in which the subject site is located as ‘The Western Boglands’. According to the Landscape Character Assessment, the Western Boglands’ area is said to principally consist of peat extraction areas together with areas of pasture and large areas of woodland - both planted and naturalised.

Based on the findings of the Landscape Character Assessment a landscape sensitivity rating was developed for each of the Landscape Character Areas. Figure 1.5 shows that the Western Boglands Area has been designated a medium sensitivity landscape which, according to the Plan “*can accommodate development pressure but with limitations in the scale and magnitude*”<sup>13</sup>.

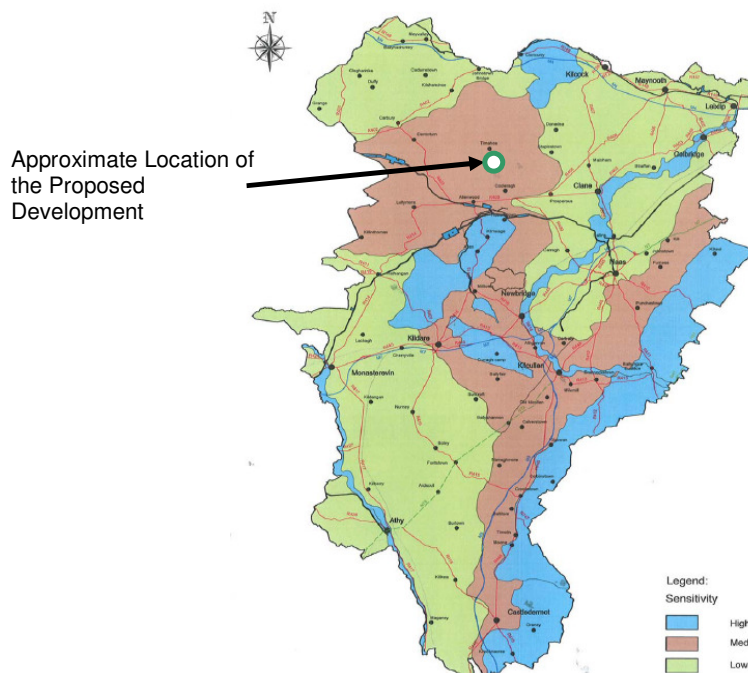
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<sup>13</sup> Section 14.4.1, Kildare County Development Plan, Kildare County Council, 2011



**Figure 1-4** *Development Plan Landscape Character Areas Map*

Source: Section 14.4. Map 14.1, Kildare County Development Plan 2011-2017



**Figure 1-5** *Development Plan Landscape Sensitivity Areas Map*

Source: Section 14.4. Map 14.2, Kildare County Development Plan 2011-2017

Chapter 14 also sets out specific landscape policies for lowlands plains and boglands character areas such as the Western Boglands including the following:

*LL 1: To recognise that the lowlands are made up of a variety of working landscapes, which are critical resources for sustaining the economic and social well-being of the county.*

*LL 2: To continue to permit development that can utilise existing structures, settlement areas and infrastructure, whilst taking account of the visual absorption opportunities provided by existing topography and vegetation.*

*LL 3: To recognise that this lowland landscape character area includes areas of significant landscape and ecological value, which are worthy of protection.*

*LL 4: To recognise that intact boglands are critical natural resources for ecological and environmental reasons.*

*LL 5: To recognise that cutaway and cut-over boglands represent degraded landscapes and/or brownfield sites and thus are potentially robust to absorb a variety of appropriate developments<sup>14</sup>.*

Due to its size, design and location adjacent to a permitted waste management facility at Drehid, it is clear that the proposed development will not have an undue impact on the Landscape Character of the area.

It is worth noting that the existing Waste Management Facility at Drehid has been evaluated by Kildare County Council and An Bord Pleanála on appeal and that both authorities previously noted that the development and operation of a waste management facility in this location is compliant with the policies relating to landscape character areas.

In summary, it is clear from the preceding sections of this report that the proposed development has had full regard to and is in full compliance with all relevant Kildare County Development Plan policies relating to the development of an additional waste management facility in the medium sensitivity Western Boglands landscape character area.

#### **1.3.1.4 Regional Waste Management Plan for County Kildare**

As was highlighted in the previous section, it is a key waste management policy of the Kildare County Development Plan to have regard, in the assessment of planning applications for waste management facilities, to the Waste Management Plan for County Kildare (2005-2010).

In addition to Development Plan policies, Section 22 of the Waste Management Act 1996 (as amended by Section 4 of the Waste Management (Amendment) Act 2001)

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<sup>14</sup> Section 14.8.2, Kildare County Development Plan, Kildare County Council, 2011

also provides a statutory link between a Development Plan under the Planning and Development Act 2000 and the Waste Management Plan.

The County Waste Management Plan (WMP) is a four volume document which sets out the overall waste management objectives for a period of five years and includes details on waste production with specific objectives for infrastructure. The structure of the document is as follows:

- Volume 1 - Executive Summary
- Volume 2 - Waste Management Plan for County Kildare
- Volume 3 - Waste Policy and Legislation and Developments in Waste Management Techniques
- Volume 4 - Appendices

For the sake of brevity, this review of the WMP will focus primarily on Volume 2 which contains the full Waste Management Plan for County Kildare. It will also focus primarily on sections and policies of the Plan which are of relevance for the consideration of this application for a Mechanical Biological Treatment Facility.

The opening sections of Volume 2 of the WMP provide detailed information regarding the volumes of different types of waste produced in County Kildare, the implementation of the previous waste management plan, waste management arrangements in the County, as well as waste generation forecasts.

It is important to note that the data used in these sections of the WMP was compiled from a number of sources which are now out of date including:

- the National Waste Database Report 2001
- the National Waste Database Interim Report 2002
- data provided by Kildare County Council (at the time of drafting in 2005); and
- AERs from licensed waste facilities within the County (as of the time of drafting)

Furthermore, it should be noted that the year 2009 was chosen as the design year of the 2005 - 2010 Plan. In light of the dated nature of this information, the applicant has recently carried out an up to date review of volumes of waste generation in County Kildare and in the surrounding Waste Management Regions.

The results of this review are included in the Need Assessment Report in Appendix 1.2 and summarised in Section 1.3.3 below which also provides a quantitative analysis of the role of the proposed development in providing needed additional waste treatment capacity.

The data formed the basis for the development of specific policies and objectives for the County which are in turn also based upon a thorough examination of a number of generic waste management scenarios for the County. The outcome of this analysis, which is presented in outline in the Executive Summary of the WMP and in detail in Section 7 of the Plan is for an integrated scenario including (amongst other measures):

- biological treatment facility(s) for the treatment of organic waste (food and garden) to form compost which can be re-used beneficially;
- dry material recovery facility(s) for the recycling/recovery of recyclable material in a dry material recovery facility - sorting and picking lines separate the waste into paper, cardboard, metals and plastic fractions;
- mechanical-biological treatment facility(s) for the treatment of the residual bin, which is a mixture of organic waste and recyclable materials - recyclables can be recovered/recycled from sorting and picking lines, and the remaining waste is then composted; and
- residual landfills(s) for material that cannot be recycled, and for material which is rejected from a biological treatment facility, dry material recovery facility or mechanical-biological treatment facility<sup>15</sup>.

Section 7 of the main WMP document summarises the reason that such an approach focused on mechanical biological treatment of the residual waste stream prior to disposal was “clearly preferred” as a result of the following factors:

- improved environmental performance over a range of parameters (although not all);
- exceeds policy and target requirements; and
- improved financial performance”<sup>16</sup>.

The adoption of mechanical-biological treatment as a key element of the approach to waste management in the County is carried through into specific policy actions as set out in Section 8 of the WMP. For example, a key policy in relation to Waste Recovery and Recycling as set out in Section 8.4 of the Plan is that “*the provision of biological treatment by the private sector is promoted for biodegradable waste*”<sup>17</sup>.

Section 8.6 is also relevant in this case as it sets out specific policies of the Council with regard to primary waste fractions. With regard to the proposed development, this section states that the Council will “*promote the provision of biological treatment*

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<sup>15</sup> Section 3.1, page 10, Executive Summary, Kildare WMP, Kildare County Council, 2005

<sup>16</sup> Section 7.4, page 85, Kildare WMP, Kildare County Council, 2005

<sup>17</sup> Section 8.4, page 90, Kildare WMP, Kildare County Council, 2005

*facilities by the private sector<sup>18</sup>” and that it will also “promote materials recovery facilities for dry recyclables by the private sector<sup>19</sup>,”*

Section 8.7 ‘Final Disposal’ is also relevant in the case of the proposed development. This section states that:

*in accordance with the Landfill Directive, wastes for landfilling will be pre-treated as required by the Directive” and furthermore that “in the medium to long term, Kildare County Council, where necessary, will consider alternative arrangements for the disposal of residual waste in cooperation with neighbouring regions and/or the private sector<sup>20</sup>.*

A key policy in terms of the consideration of the proposed development in planning and development terms is contained in Section 8.14 of the WMP which deals with the ‘Location of Waste Management Facilities’. This section starts by stating that

*To provide adequately for waste management facilities, notwithstanding the zoning of land for the use solely or primarily of particular areas for particular purposes in development plans, or the absence of zoning provisions, approval for waste management facilities necessary for the proper implementation of the Plan will be considered open for consideration in all areas<sup>21</sup>.*

After addressing the issue of the provision of additional public infrastructure, this section of the WMP lists the environmental protection areas which are to be taken into account in the consideration of the siting of future waste facilities.

In the case of the proposed development it is important to note that there are no outstanding issues in relation to the provision of additional public infrastructure and that full regard has been had to all relevant designated sites and species in the vicinity of the proposed facility.

Section 9 of the WMP describes the Roles and Responsibilities of various stakeholders in the successful implementation of the Plan. Section 9.1.4 addresses the role of the waste management industry stating that

*The waste contracting industry will play an essential role in the provision of new infrastructure. It is crucial that proposals for new waste facilities are*

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<sup>18</sup> Section 8.6.1, page 91, Kildare WMP, Kildare County Council, 2005

<sup>19</sup> Section 8.6.3, page 92, Kildare WMP, Kildare County Council, 2005

<sup>20</sup> Section 8.7, page 92, Kildare WMP, Kildare County Council, 2005

<sup>21</sup> Section 8.14, page 101, Kildare WMP, Kildare County Council, 2005



*considered positively, where they are environmentally appropriate, and where land use considerations are favourable<sup>22</sup>.*

Finally, Section 11 of the Plan ‘Procurement’ is also relevant to the consideration of the proposed development in that it states that

*Kildare County Council’s preference for the implementation of this Plan is that the major infrastructural requirements of the Plan will be provided by independent private sector companies, without direct procurement involvement from the County Council unless required.*

This section goes on to list existing and proposed private sector facilities in the County as of 2005, the date of publication of the WMP. Once again, it is worth noting that the information and timelines provided in the WMP are now out of date. As a result, details as to the status of existing and proposed facilities in the area are set out in Appendix 1.2.

Section 11 also provides an indicative timeline for the delivery of key waste management infrastructure within the County which indicates that Mechanical Biological Treatment Facilities were to be provided by 2008<sup>23</sup>. As Table 1-1 overleaf illustrates, this timeline was drafted having regard to the need for the Council to increase levels of material recovery, biological treatment and residual waste treatment in particular in order to meet specific legislative and policy targets.

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<sup>22</sup> Section 9.1.4, page 104, Kildare Waste Management Plan, 2005-2010

<sup>23</sup> Section 11, page 109, Kildare Waste Management Plan, 2005-2010

**Table 1-1 Infrastructure Required within County Kildare to meet Targets***Source: Table 1.1, page 2, Executive Summary, Kildare County Waste Management Plan, 2005-2010*

Target	Deadline	Infrastructure Required to Meet Targets
Landfill Directive: compliance with 25% target 2006	2006	three bin collection system material recovery facility(s) biological treatment facility(s) residual landfill
Landfill Directive: compliance with 50% target 2009	2009	three bin collection system material recovery facility(s) biological treatment facility(s) residual landfill
Landfill Directive: compliance with 65% target 2016	2013	three bin collection system material recovery facility(s) biological treatment facility(s) residual landfill
Changing Our Ways 35% recycling of municipal waste	2013	three bin collection system material recovery facility(s) biological treatment facility(s) residual landfill
Changing Our Ways a diversion of 50% of overall household waste away from landfill	2013	three bin collection system material recovery facility(s) biological treatment facility(s) residual landfill
Changing Our Ways a minimum of 65% reduction in biodegradable waste consigned to landfill	2013	three bin collection system material recovery facility(s) biological treatment facility(s) residual waste treatment facility(s) residual landfill

The high level review of the Kildare County Waste Management Plan presented in the previous sections indicates that the proposed development fully accords with the waste treatment scenario adopted in the Plan which seeks to minimise waste being sent directly to landfill through the provision of mechanical biological treatment infrastructure.

As a privately operated facility, adjacent to the site of the existing Drehid Waste Management Facility, the proposed development also complies with the overall approach to the procurement and provision of private waste management facilities in locations which are environmentally favourable where land use considerations are suitable.

#### **1.3.1.5 Overall Compliance with Planning and Development Policies**

In conclusion, it can be seen that the proposed development of an MBT Facility adjacent to the existing Drehid Waste Management Facility accords with the development principles set out in the relevant planning policy documents in that it will:

- play an important role in addressing infrastructural requirements highlighted in the NSS and NDP by ensuring the provision of more efficient, effective and cost competitive waste management infrastructure in the Greater Dublin Area;

- help to achieve the objectives set out in the RPGs by providing additional options for the treatment of waste in the region including increased levels of diversion of biodegradable waste from landfill;
- have full regard to and be in full compliance with all relevant Kildare County Development Plan polices relating to the development of an additional waste management facility in the medium sensitivity Western Boglands landscape character area; and
- support the waste management scenario adopted in the Kildare County Waste Management Plan which seeks to minimise waste being sent directly to landfill through the provision of additional mechanical biological treatment infrastructure.

Finally, it can be seen that the proposed development has been designed and sited, and will be built in accordance with best practice for the protection of human health and the natural environment as demonstrated in this EIS.

### *1.3.2 Relevant Sectoral Strategies and Guidance*

In addition to all relevant planning policies, the proposed development of a Mechanical Biological Treatment facility adjacent to the existing Drehid Waste Management Facility has been assessed in the context of relevant sectoral policies and guidance including:

- Government policies (including recent draft policies) on the management and treatment of waste, as issued by the Department of the Environment, Community and Local Government;
- Sectoral policies set out by other relevant agencies such as the Environmental Protection Agency (EPA); and
- Policies set out in the Regional Waste Management Plans for the Waste Planning Regions adjacent to Kildare, which will be served by the proposal.

#### **1.3.2.1 Government Waste Management Policies and Guidance**

There has been a significant evolution in National Waste Management Policies as issued by the Department of Environment, Community and Local Government (DoECLG) (previously the Department of Environment, Heritage and Local Government - DoEHLG) since the mid to late 1990s.

Government policy documents have moved from an initial focus on the development of modern, engineered landfill capacity and the promotion of recycling to fiscal measures to influence environmental performance as well as policies promoting and directing the emerging technologies in this sector such as the development of commercial composting and biological treatment facilities.

In addition, government waste management guidance has been based on a regional approach to waste management and planning as embodied by the various regional waste management plans. Key waste management policy statements published by the now DoECLG since the late 1990s include:

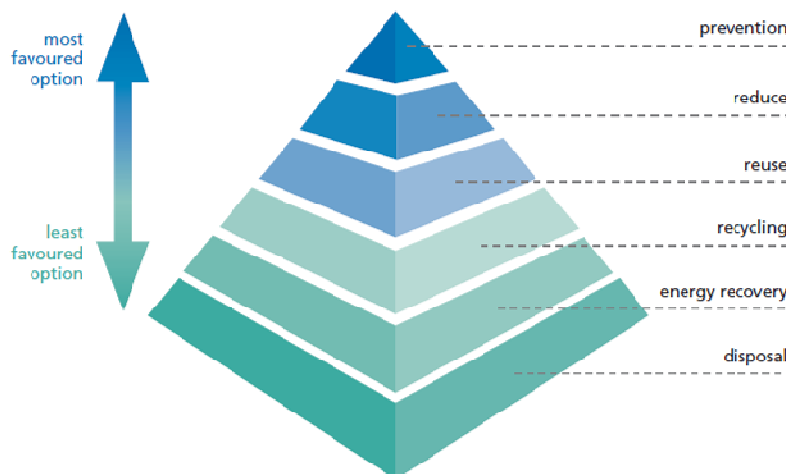
1. Waste Management: Changing Our Ways – DoEHLG (1998);
2. Preventing and Recycling Waste: Delivering Change (March 2002);
3. Waste Management: Taking Stock and Moving Forward (April 2004);
4. National Overview of Waste Management Plans (2004)
5. Policy Guidance Notes under Section 60 of the Waste Management Act, 1996 (May 2005);
6. National Strategy on Biodegradable Waste (April 2006);
7. International Review of Waste Management Policy (September 2009);
8. Draft Statement of Waste Policy (July 2010);
9. Towards a New National Waste Policy - Discussion Document (August 2011).

The following sections of this report will provide a brief overview of each of these policy documents to demonstrate that the proposal accords with the Government's overall approach to waste management in Ireland.

#### 1. “Waste Management: Changing Our Ways” - DoEHLG (1998)

The policy statement ‘*Waste Management: Changing Our Ways*’ was published by the Minister for the Environment and Local Government in October 1998. The policy approach adopted in ‘*Changing Our Ways*’ was one of integrated waste management based on the hierarchy of options officially adopted by the European Union.

The illustration in Figure 1.6 below indicates that this approach places greatest emphasis on waste prevention, followed by minimisation, re-use, recycling, energy recovery and, finally, the environmentally sustainable disposal of residual waste.



**Figure 1-6** European Union Waste Hierarchy

Source: Page 5, *Municipal Solid Waste: Pre Treatment and Residuals Management*, EPA, 2009

The Government's '*Changing our Ways*' policy document highlighted the need for a new approach to the delivery of waste infrastructure and services, challenging the older model of stand-alone provision of waste services by individual local authorities. It also emphasised the need for co-operation with neighbouring local authorities and the utilisation of the potential of the private sector to contribute to the delivery of services.

Local authorities were encouraged to adopt a regional approach to waste management planning in order to secure a level of scale and activity which would provide a sound basis for the development of integrated and innovative waste management solutions.

Significantly '*Changing Our Ways*' also sought to secure and progress rationalisation of the municipal landfill network, the ultimate target being an integrated network of ca. 20 state-of-the-art facilities incorporating energy recovery and high standards of environmental protection <sup>24</sup>.

## **2. Preventing and Recycling Waste: Delivering Change - DoEHLG (2002)**

'*Preventing and Recycling Waste: Delivering Change*' evolved from, and was grounded in the '*Changing Our Ways*' document which established a national policy framework for the adoption and implementation of strategic waste management planning.

'*Delivering Change*' addressed the factors and practical considerations that are relevant to the achievement of Government policy objectives and for the prevention and recovery of waste. This policy statement established a series of objectives in terms of the implementation of the waste hierarchy based on minimisation of waste generation and improving levels of recycling of generated waste.

## **3. Waste Management: Taking Stock and Moving Forward - DoEHLG (2004)**

The overall policy approach set out in '*Taking Stock and Moving Forward*' remained grounded in the concept of integrated waste management, based on the EU waste hierarchy and designed to achieve the ambitious targets set out in '*Changing Our Ways*' by 2013.

While '*Taking Stock and Moving Forward*' acknowledged the considerable progress made in improving waste management, it made it clear that further work remained to be done to put the full range and scale of waste infrastructure in place.

## **4. DoEHLG (2004) National Overview of Waste Management Plans**

The '*National Overview of Waste Management Plans*' which was published in tandem with '*Taking Stock and Moving Forward*' set out on a region by region basis the

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<sup>24</sup> As stated in Para. 4.1, *Changing our Ways*, DoEHLG, 1998

progress made (up to end-2003) in providing the principal pieces of waste infrastructure envisaged in local authority waste management plans.

In terms of the Kildare Region, the '*National Overview*' concluded that the estimated landfill capacity in the County in 2001 was 2 years (based on the EPA National Waste Database Report, 2001); but that this had increased to 6 years in 2004 based largely on the EPA decision to issue a waste licence for a private municipal facility at Usk (which ultimately was never developed).

**5. Policy Guidance Notes Under Section 60 of the Waste Management Act, 1996 - DoEHLG (2005)**

Policy Guidance Notes pursuant to Section 60 of the Waste Management Act, 1996 (as amended), (circular WIR 04-05) were issued by the Minister in May 2005 to address the issue of actions against illegal waste activity as well as the movement of waste between waste management plan areas.

With specific regard to the movement of waste, the '*Policy Guidance Notes*' addressed what it termed the "*unnecessarily restrictive*" approach to limiting waste management facilities to dealing only with wastes arising in the area to which the relevant Waste Management Plan applied.

According to these '*Policy Guidance Notes*', such an unnecessarily restrictive approach "*may not be in keeping with the philosophy underpinning the regional approach to waste management planning and, by implication, the rational use of waste management infrastructure*<sup>25</sup>".

**6. National Strategy on Biodegradable Waste - DoEHLG (2006)** The '*National Strategy on Biodegradable Waste*' set out Government policy for the diversion of biodegradable municipal waste (BMW) from landfill, building upon the key objectives established in preceding policy documents. The primary focus of the policy therefore was tackling the challenge of meeting the limits set for the quantity of biodegradable municipal waste which is permitted to be sent to landfill under the EU Landfill Directive (1999/31/EC).

In order to meet the targets set out in the various Waste Management Plans, the '*National Strategy on Biodegradable Waste*' highlighted that a "*several-fold increase in recycling capacity and biological treatment capacity is required*" and that "*there is therefore an urgent need to procure the necessary alternative waste treatment capacity which will facilitate diversion of biodegradable municipal waste away from landfill*<sup>26</sup>".

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<sup>25</sup> Page 4, Circular WIR: 04/05, DoEHLG, May 2005

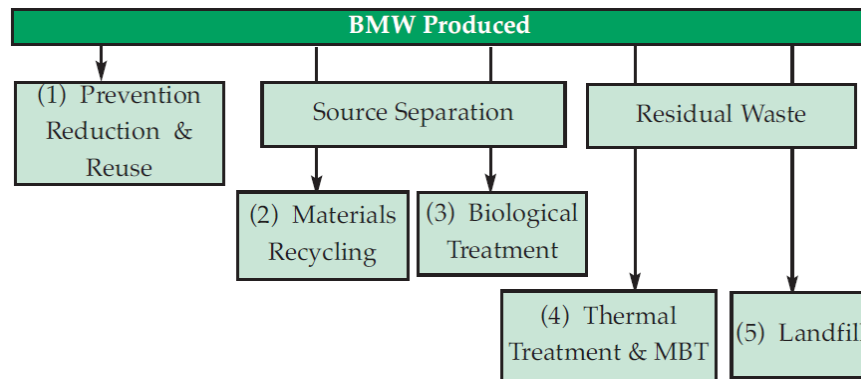
<sup>26</sup> Section 2.2.7, Page 25, National Strategy on Biodegradable Waste', DoEHLG, 2006



One of the ways the ‘*National Strategy on Biodegradable Waste*’ envisages this happening is through the increased use of Mechanical Biological Treatment (MBT):

*MBT can provide an outlet to limit the quantity of biodegradable municipal waste which ultimately needs to be sent to landfill<sup>27</sup>.*

The ‘*National Strategy on Biodegradable Waste*’ goes on to specifically refer to Mechanical Biological Treatment as part of an overall strategy to reduce the environmental impacts of landfilling and meet the targets set in the EU Landfill Directive. This approach is illustrated in Figure 1.7 below.



**Figure 1-7** *Summary of National Strategy on Biodegradable Waste Approach*

Source: Section 5.1, Page 40, *National Strategy on Biodegradable Waste*, DoEHLG, 2006

## 7. International Review of Waste Management Policy (2009)

An International Review of Waste Management Policy was commissioned by the DoEHLG in 2008 and published in 2009. Prepared by Eunomia Research and Consulting (and Partners) the objective of the study was to identify possible challenges to policy at a national level in order to assist Ireland to move towards a sustainable resource and waste policy; and examine the prevailing legal, institutional and organisational arrangements and analyse potential changes which could assist in achieving policy goals, as well as national and international obligations.

The report makes a number of significant recommendations and emphasises the importance of waste minimisation and prevention with only the smallest volumes of waste then requiring treatment and/or disposal. Ultimately it concludes that the impact of waste policies should increase recycling and composting / digestion at the expense of other forms of residual waste treatment, including incineration and possibly also, MBT. Key to the development of those residual facilities that are then necessary, it supports the imposition of the Residual Waste Levies at a rate which favours MBT over both thermal treatment and disposal to landfill – i.e. per tonne

<sup>27</sup> Section 2.2.7, Page 25, *National Strategy on Biodegradable Waste*, DoEHLG, 2006

levies for disposal to MBT are lower than the levies on thermal treatment which are, in turn, lower than the levies associated with disposal to landfill.

#### **8. Draft Statement of Waste Policy - DoEHLG (2009)**

The Department of the Environment's 2009 '*Draft Statement of Waste Policy*' outlined the key principles and actions which it is envisaged will inform Irish waste policy for the coming decade and beyond. A key stated aim set out in the '*Draft Statement*' was to use "*all appropriate legislative and fiscal measures... to move away from traditional landfill and mass burn incineration, towards higher levels of recycling and mechanical/biological treatment*"<sup>28</sup>.

This Draft Statement was thereby intended to build on the commitments in the Programme for Government agreed in 2007 which "*clearly flagged a future for waste management that would seek to take advantage of the development of technologies such as Mechanical Biological Treatment (MBT), to ensure the achievement of maximum environmental performance*"<sup>29</sup>.

According to the Draft Statement these commitments were reinforced in the Renewed Programme for Government agreed in 2009 which "*undertook to use a resource management approach to waste and embed resource recovery and sustainable production and consumption systems in waste policy, leading to increased employment and new opportunities for business*"<sup>30</sup>.

Due to the fact that a new Government (with its own Programme for Government) was elected shortly after the publication of the '*Draft Statement*', the recommendations set out in the report have yet to be fully adopted. Despite this, the document is still relevant in that it highlights the need to consider the increased use of technologies such as Mechanical Biological Treatment to ensure that all relevant waste management targets are met.

#### **9. Towards a New National Waste Policy - DoECLG (2011)**

In August 2011, the current government published its own consultation document on waste management in Ireland entitled '*Toward a New National Waste Policy*'. This document is not intended to be prescriptive, but rather puts forward an outline of possible policy initiatives for consultation and takes on board submissions made to the previous government's '*Draft Statement of Waste Policy*'.

'*Towards a New National Waste Policy*' was prepared in light of the transposition of the Waste Framework Directive (2008/98/EC) into Irish law in March 2011. The substantive changes in the Directive are aimed at encouraging the greater reuse and

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<sup>28</sup> Section 1, Page 3, Draft Statement of Waste Policy, DoEHLG, 2009

<sup>29</sup> Section 1, Page 3, Draft Statement of Waste Policy, DoEHLG, 2009

<sup>30</sup> Section 1, Page 3, Draft Statement of Waste Policy, DoEHLG, 2009

recycling of waste, whilst it also sets out to simplify the fragmented legal framework that has regulated the waste sector to date. The Directive also requires Member States to apply the waste hierarchy as a priority order in waste prevention and management legislation and policy.

*‘Towards a New National Waste Policy’* was also prepared having regard to commitments set out in the 2011-2016 Programme for Government entitled *‘Government for National Recovery 2011-2016’* in relation to the development of a sustainable waste policy. A key objective of this Programme for Government is to *“develop a national waste policy that will adhere to the EU waste hierarchy and favours a coherent approach to waste management that minimises waste going to landfill, and that maximises the resources that can be recovered from it”<sup>31</sup>*.

According to *‘Towards a New National Waste Policy’*, the development of a new waste policy is to be guided by a set of principles which, taken together with our obligations as an EU Member State, will inform how Ireland deals with its waste in the coming decade and beyond. One such principle is that *“the policy will be sufficiently flexible to respond to emerging developments in relation to technology, operational practice and wider thinking in the waste management policy realm”*. The document goes on to state that:

*Waste, just like many other sectors, has developed a range of technologies and practices in recent decades and will develop newer, more efficient and effective technologies and practices in the years ahead. The policy will allow for flexibility to take advantage of new thinking and advances once such approaches are proven<sup>32</sup>.*

*‘Towards a New National Waste Policy’* highlights the use of such technologies in the recovery of waste. Processes which the policy document classes as being on the recovery tier include *“the use of Solid Recovered Fuel from a mechanical-biological treatment plant as a source of energy in industry”*. Such processes were identified by the Government as having an important role to play *“as Ireland develops a range of alternatives to landfill and seeks to maximise the value of material which has previously been discarded”<sup>33</sup>*.

In relation to the overall operation of the waste management planning system, *‘Towards a New National Waste Policy’* continues to emphasise the need for flexibility in relation to inter-regional movements of waste. According to the policy document this is to ensure *“that regional boundaries do not operate in a rigid*

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<sup>31</sup> Section 2, Page 4, *Towards a New National Waste Policy*, DoECLG, 2011

<sup>32</sup> Section 3, Page 7, *Towards a New National Waste Policy*, DoECLG, 2011

<sup>33</sup> Section 7.4, Page 20, *Towards a New National Waste Policy*, DoECLG, 2011

*manner, preventing the most efficient use of infrastructure in pursuit of overall national targets/obligations<sup>34</sup>.*

### **Summary of Government Waste Management Policy**

The brief review of government waste management policy presented in the preceding pages indicates a growing emphasis on the need to meet ambitious landfill diversion targets set out in various EU Directives by improving Ireland's waste management system as a whole.

This approach includes adopting a more flexible approach to the regional treatment of waste flows which must be seen in the national context of Ireland's commitments to meeting its waste management policy objectives. It also entails a growing emphasis on the use of new technologies such as mechanical biological treatment to reduce the overall volume of waste being sent directly to landfill as well as to meet targets with respect to the biodegradable fraction within that residual waste stream.

It can be seen therefore, that in both of these respects, the proposed development of a Mechanical Biological Treatment Facility fully accords with this approach and would make a significant contribution in helping Ireland meet its national waste policy management objectives.

#### **1.3.2.2 Sectoral Guidance and Reports from Other Relevant Bodies**

In addition to the policy documents dealt with in the preceding pages of this Chapter, the proposed development has also been considered in light of general sectoral guidance and reports from the Environmental Protection Agency (EPA) and Forfás.

The Environmental Protection Agency is responsible for the licensing and environmental enforcement of major waste facilities in Ireland. In addition, it is also responsible for producing national statistics on waste generation and management in Ireland, including information on waste exports and imports.

Forfás is Ireland's policy advisory board for enterprise, trade, science, technology and innovation, operating under the auspices of the Department of Enterprise, Trade and Employment. Since 2006, the organisation has prepared annual Waste Benchmarking Studies in order to assess Ireland's waste management performance.

A number of relevant documents from these organisations will be dealt with in the following sections of this Chapter including the following:

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<sup>34</sup> Section 8.1, Page 25, Towards a New National Waste Policy, DoECLG, 2011

1. Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management - EPA (2008)
2. Municipal Solid Waste: Pre Treatment and Residuals Management - EPA (2009)
3. National Waste Report 2010 - EPA (2012)
4. Waste Management Benchmarking Updates - Forfás (2009 and 2010)

### **1. Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management - EPA (2008)**

As part of the EPA research programme for the period 2007-2013, a consultancy team was contracted to produce a report investigating the potential role that mechanical biological treatment of waste can play within the Irish waste management sector.

The overall aims of this project were to provide information in relation to MBT that may inform future government policy and to identify issues that require addressing in order to establish conditions that are suitable to the development of MBT facilities in Ireland<sup>35</sup>.

The report describes the growth of MBT in Europe in the face of changing legislative requirements to develop a method for treating residual municipal solid waste (MSW) material, and thereby reduce the need for traditional landfill disposal. It goes on to explain that the MBT industry in Ireland can be considered to be in its infancy with no facilities of the scale or complexity of those seen in countries with an established MBT industry, such as Germany or Austria<sup>36</sup>.

Significantly however, the report also points out that there are a number of operators in Ireland that are striving to develop dedicated MBT facilities and that there are various configurations of technologies in operation that could be termed MBT. This growth can be seen to be linked to ongoing developments in European legislation, particularly Council Directive 99/31/EC of 26 April 1999 on the landfill of waste, which requires alternative treatment methods to be employed to pre-treat all waste prior to landfilling<sup>37</sup>.

As part of the research project, the current Waste Management Plans for each of the ten Waste Management Regions were assessed to fully determine the role that MBT

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<sup>35</sup> Page 1, Volume 1 'Summary of Findings', Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management, EPA, 2008

<sup>36</sup> Section 1.3, Pages 8 and 9, Volume 2 'Research Report', Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management, EPA, 2008

<sup>37</sup> Page XIII, Volume 2 Research Report, Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management, EPA, 2008

could play in each region, in line with the stated objectives of the Plans. A key finding of the report in relation to this assessment was that:

*while seven of the ten waste management regions indicate a preference for thermal treatment as the primary residual waste management solution, eight regions also indicate that MBT can play a role in the treatment of residual waste, particularly in the short term where thermal capacity may not be available<sup>38</sup>.*

Table 1-2 below (which is taken from Section 3.2 of the report) summarises the preferred residual treatment techniques for each of the Waste Management Regions.

**Table 1-2 Summary of National Biodegradable Waste Strategy Approach**

Region	Thermal Treatment Recommended	MBT Recommended	2 or 3-bin collection system recommended
Connacht	Y	Y	3 bin
Cork	Y	Y	3 bin
Donegal	N*	Y	3 bin
Dublin	Y	N	3 bin
Kildare	N*	Y	3 bin
Limerick / Clare / Kerry	Y	Y	3 bin
Midlands	Y	Y	3 bin
North East	Y	Y	3 bin
South East	Y	N	3 bin
Wicklow	N*	Y	3 bin

\* will look at developments in neighbouring regions

Source: Table 3.6, Page 56, Volume 2 Research Report, Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management, EPA, 2008

The overall findings of the EPA's Critical Analysis Report in relation to the approach to Mechanical Biological Treatment adopted in regional Waste Management Plans is succinctly summed up in the following passage from the report:

*All of the Waste Management Plans demonstrate a commitment to the integrated approach to waste management which has been elaborated in Government policy and, in particular, to meeting the targets established in the National Strategy on Biodegradable Waste. All regions have accepted the importance of an appropriate 3-bin collection system and recognise that residual biodegradable waste will arise that will require pre-treatment before landfilling. Where thermal treatment of residual waste is the preferred policy, those Regions also recognise that MBT may play a role in integrated waste management, particularly in the short term where the required diversion rates*

<sup>38</sup> Page 3, Volume 2 Research Report, Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management, EPA, 2008



*are lower and where thermal treatment facilities may not be available. This is due to the acknowledgement that the establishment of a thermal treatment facility is a lengthy process and that some form of pre-treatment is required in order to achieve the diversion targets laid down in Council Decision 99/31/EC on the landfill of waste.<sup>39</sup>*

## **2. Municipal Solid Waste: Pre Treatment and Residuals Management - EPA (2009)**

The EPA technical guidance document ‘*Municipal Solid Waste - Pre-treatment and Residuals Management*’ set out the Environmental Protection Agency (EPA) standard for minimum acceptable pre-treatment for Municipal Solid Waste (MSW) accepted for landfilling or incineration at EPA licensed waste facilities.

This document is of particular relevance to the proposed development as it deals with the pre-treatment of waste which includes processes such as source separation, manual sorting and mechanical treatment, composting and anaerobic digestion. The document refers to the ‘*National Strategy on Biodegradable Waste*’ which pointed out that meeting landfill diversion targets will require that a certain proportion of residual biowaste is pre-treated prior to landfill.

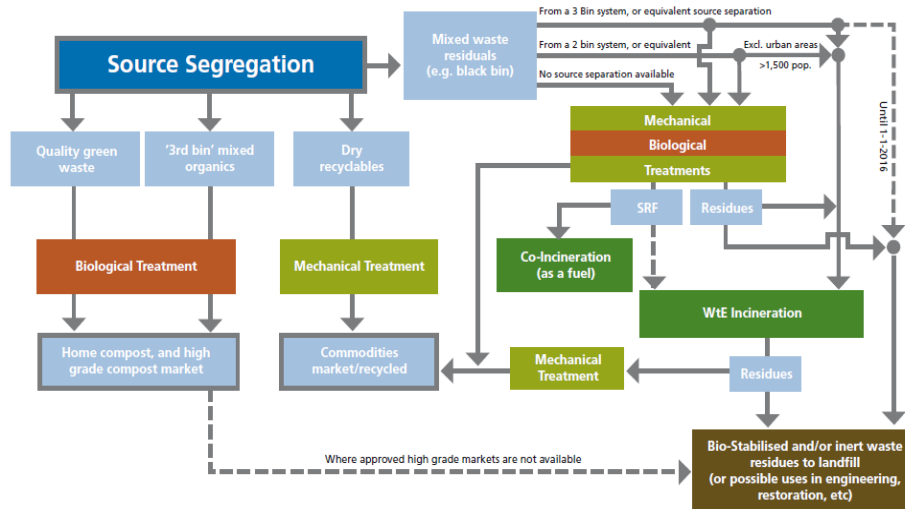
The technical guidance document goes on to state that Article 5(2) of the Waste Management (Facility Permit & Registration) Regulations, 2008 defines MBT as “*the treatment of residual municipal waste through a combination of mechanical processing and biological stabilisation, in order to stabilise and reduce the volume of waste which requires disposal<sup>40</sup>*”.

**Figure 1.8** below, illustrates the central role the EPA envisages MBT playing in the waste management process as one of the main pre-treatment / diversion options upstream of the final incineration and landfill of residual waste.

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<sup>39</sup> Page 56, Volume 2 Research Report, Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management, EPA, 2008

<sup>40</sup> Page 14, Municipal Solid Waste: Pre Treatment and Residuals Management, EPA, 2009



**Figure 1-8 EPA Waste Pre-Treatment / Diversion Flow Path**

Source: Page 17, Municipal Solid Waste: Pre Treatment and Residuals Management, EPA, 2009

A key overall conclusion of the EPA's 2009 Municipal Solid Waste document is that more needs to be done to ensure that less waste is sent directly to landfill by making greater use of other waste treatment facilities. As the concluding comments to the document state:

*Ireland will not meet its National Strategy on Biodegradable Waste and EU obligations in relation to pre-treatment of municipal solid waste prior to landfilling or incineration if action is not taken to provide the waste source-separation and treatment infrastructure necessary. Accordingly, any new landfill or incinerator proposal will have to be planned in the context of the availability of appropriate waste pre-treatment facilities (including diversion infrastructure)<sup>41</sup>.*

### 3. National Waste Report 2010 - EPA (2012)

The objective of the EPA's *National Waste Report* is to present the most up to date information available on waste generation and management in Ireland, as reported to the EPA. The most recent report is for the calendar year 2010 and deals with municipal solid wastes, waste streams subject to producer responsibility initiatives as well as construction & demolition and hazardous wastes.

According to the report, the economic downturn is having a marked influence on waste generation, which has decreased by 16% since it peaked in 2007. Household waste generation is decreasing in line with decreasing personal consumption and despite a population increase.

<sup>41</sup> Page 20, Municipal Solid Waste: Pre Treatment and Residuals Management, EPA, 2009

The economic downturn (and consequent reduction in waste generation) has resulted in Ireland moving towards achievement of the EU Landfill Directive targets for biodegradable waste diversion. There remains some risk that Ireland will fail to meet the July 2013 and 2016 Landfill Directive targets for diversion of biodegradable municipal waste from landfill (a further 250,000 t of biodegradable municipal waste will need to be diverted from landfill in order to meet the 2013 target and 433,000t diverted to meet the 2016 target). In relation to achievement of nationally expressed waste management targets Ireland has been less successful. Of note is the report's reference to Ireland remaining underdeveloped with respect to the sophistication of essential waste infrastructure for the pre-treatment of municipal waste prior to disposal (e.g. anaerobic digestion, waste to energy, mechanical biological treatment etc.)<sup>42</sup>. The Report states that it will be a challenge to meet waste diversion and waste recovery targets if municipal waste generation increases with economic recovery and the necessary waste infrastructure is not in place.

The Report notes that the EU Waste Framework Directive (2008/98/EC), transposed into Irish legislation by the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) will be a significant influence and driver of change in waste management practices and governance in Ireland and elsewhere over the coming decade, particularly with the legal obligation to ensure that waste is managed in accordance with the waste hierarchy (with prevention at the top)<sup>43</sup>.

The Report concludes that the diversion of very large quantities of biodegradable waste from landfill remains a priority that must be addressed, as does the improvement in recycling rates for municipal wastes. In addition the priority actions for biodegradable municipal waste management in Ireland for the foreseeable future are similar to those identified in previous National Waste Reports, and include the need to (amongst others):

*“Ensure there is adequate infrastructure for the bio-stabilisation of waste treatment residuals destined for landfill. Whilst much of the effort to date in relation to biodegradable waste has been around the source separation and treatment of the collected fraction, the waste characterisation surveys undertaken for the EPA demonstrate that a residual bin from a 3-bin collection service will still contain a considerable fraction of biodegradable materials (up to 47% for household collections). If Ireland is to meet the 2013 and 2016 EU Landfill Directive diversion targets, then infrastructure will have to be developed that will treat this residual fraction;”*

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<sup>42</sup> Page xii, National Waste Report 2010, EPA, 2012

<sup>43</sup> Page xii, National Waste Report 2010, EPA, 2012

Additionally, the EPA Report goes on to provide details of the levels of different types of waste produced and treated through the various regional waste management areas. This information is dealt with in detail in Appendix 1.2 which sets out the quantitative rationale (the ‘need’) for the proposed development of additional waste treatment capacity of the type proposed.

#### **4. Waste Management Benchmarking Updates - Forfás (2009 and 2010)**

In its role as Ireland's policy advisory board for enterprise and science, Forfás publishes regular reports on the state of the country's waste management infrastructure which is seen as having a key role to play in the overall competitiveness of the national economy. Key findings set out in the previous two such reports state that:

- *Ireland continues to have a relatively high reliance on landfill for waste treatment and Irish companies continue to have a limited choice of waste treatment solutions compared to their competitors<sup>44</sup>*
- *Waste management infrastructure rollout in Ireland remains slow. A range of infrastructures necessary to meet Ireland's waste management requirements need to be accelerated including: thermal treatment capacity to recover energy from municipal and industrial waste; thermal treatment or landfill capacity for hazardous waste; biological treatment (composting, anaerobic digestion) and reprocessing capacity for recovered materials (e.g. paper, glass, plastic, metal recycled materials)<sup>45</sup>.*
- *Although still remaining high, Irish municipal waste generation per capita decreased in 2008 (most recent data available) in line with the slowdown in economic activity and increased waste prevention measures. Future volumes of municipal waste are expected to increase within the coming decade, necessitating investment in waste management infrastructure<sup>46</sup>.*

The most recent 2010 Forfás Waste Management Benchmarking Report sets out a number of specific policy objectives which should be put in place to avoid impacting on the competitiveness of Irish enterprise one of which entitled, ‘*Delivering necessary waste infrastructure*’ states that

- *There is an urgent need to accelerate the delivery of waste infrastructure projects along the waste hierarchy to deal with future projected increases in waste. Specific infrastructures that need to be prioritised include:*
  - *Thermal treatment capacity to recover energy from municipal and industrial waste.*

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<sup>44</sup> Press Release, Waste Management Benchmarking Update, Forfás, 2009

<sup>45</sup> Page 2, Press Release for the Waste Management Benchmarking Update, Forfás, 2009

<sup>46</sup> Page 4, Waste Management Benchmarking Update, Forfás, 2010

- *Thermal treatment or landfill capacity for hazardous waste.*
- *Biological treatment capacity (composting, anaerobic digestion).*
- *Reprocessing capacity for recovered materials<sup>47</sup>.*

### **Summary of Relevant Sectoral Policy Guidance**

In summary, the EPA and Forfás sectoral policy guidance documents reviewed in the previous sections all emphasise the challenges facing Ireland in meeting its obligations under the latest EU Waste Management Directives and in particular the EU Landfill Directive.

They also point out that despite improvements in the country's waste management system (including the introduction of three bin municipal waste collection in many areas) not enough is being done to make use of new waste management technologies such as MBT to reduce the amount of waste being sent directly to landfill.

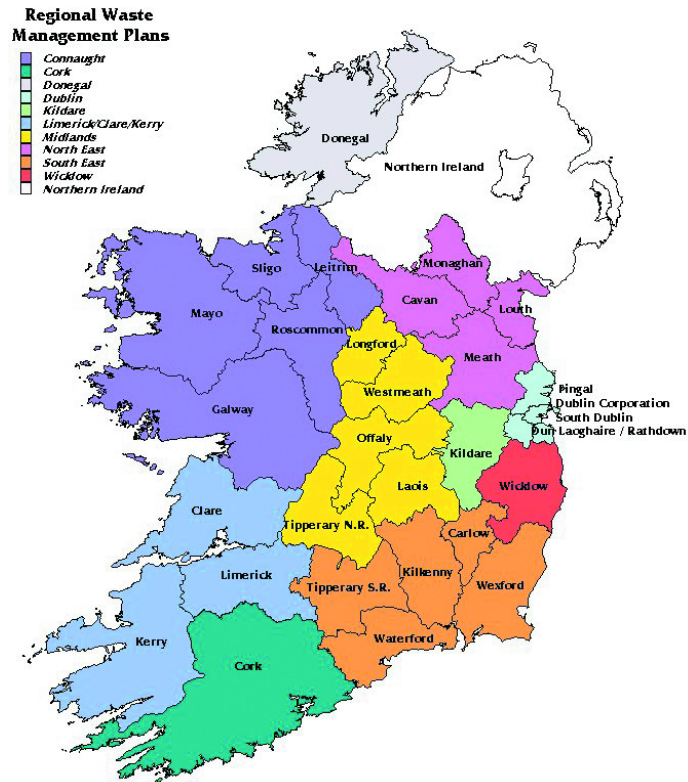
It is clear therefore that the proposed development of a 250,000 TPA MBT Facility would represent a significant step forward in the use of this technology and would make a considerable contribution to ongoing efforts to meet national targets relating to the diversion of biodegradable municipal waste from landfill.

#### **1.3.2.3 Regional Waste Management Plans**

Since the mid 1990s waste in Ireland has been managed and planned for, on a regional basis. The Waste Management Act, 1996 introduced the requirement for Local Authorities to make and implement detailed Waste Management Plans (WMPs). Nationally, there are ten Waste Management Regions (as illustrated in **Figure 1.9**).

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<sup>47</sup> Page 7, Waste Management Benchmarking Update, Forfás, 2010



**Figure 1-9** *Map of Regional Waste Management Plans*

Source: Page 57, *Waste Management: Taking Stock and Moving Forward*, DoEHLG, 2004

The following section of this Chapter will briefly outline the overall approach to the provision of additional waste management infrastructure set out in the Regional Waste Management Plans (WMPs) for the following Waste Planning Regions adjacent to Kildare:

- the County Wicklow Waste Management Region
- the Midlands Waste Management Region
- the Southeast Waste Management Region
- the Dublin Waste Management Region
- the Northeast Waste Management Region

It should be noted that the following section does not address the detailed quantitative need assessment for the proposed Drehid MBT Facility *as* this issue has been dealt with in the ‘Need Assessment Report’ included in Appendix 1.2 and summarised in Section 1.3.3 below.

#### ***Wicklow County Council (2006) - Wicklow WMP 2006-2011***

The County Wicklow (Replacement) Waste Management Plan 2006-2011 was adopted by the Wicklow County Manager in July 2006. The principal aim of the Plan was stated as being “*to ensure compliance with both European and National waste management policies, in particular, the recovery and diversion targets outlined in the*



*EU Landfill and Packaging Directives*<sup>48</sup> and that compliance with these recovery and diversion targets involves the provision and implementation of various waste management techniques and infrastructure.

In order to identify the most suitable and appropriate waste management techniques to meet the requirements of the County, a number of different waste treatment scenarios were considered for the management of municipal solid waste arisings in Wicklow including:

- Landfill only (Scenario 1)
- MBT and Landfill (Scenario 2a)
- MBT and Thermal (Scenario 2b)
- Thermal (Scenario 3)<sup>49</sup>.

This analysis found that from an environmental perspective any waste management scenario with a thermal treatment element has the lowest relative environmental impact potential (Scenarios 2b or 3). Scenarios 2a and 3 were said to perform best at meeting the recovery and diversion targets set out in European and National waste policy and legislation. The thermal treatment option (Scenario 3) was said to be the most cost effective provided that access is gained to a thermal treatment facility outside of the County.

However, due to the fact that County Wicklow does not have the overall waste quantities to generate the economies of scale required to make thermal treatment a realistic option, mechanical biological treatment of the residual waste stream prior to disposal to landfill was selected as the preferred option by Wicklow County Council for the following reasons:

- *improved environmental performance over a range of parameters*
- *exceeds policy and target requirements*
- *improved financial performance*<sup>50</sup>.

The assessment outlined above is significant in the context of the proposed application as it demonstrates that mechanical biological treatment technology has been recognised as having an important role to play in the overall approach to the treatment and management of waste into the future.

### ***Offaly County Council (2006) - Midlands WMP 2005-2010***

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<sup>48</sup> Page 98, Wicklow Regional Waste Management Plan, Wicklow County Council, 2006

<sup>49</sup> Page 118, Wicklow Regional Waste Management Plan, Wicklow County Council, 2006

<sup>50</sup> Page 119, Wicklow Regional Waste Management Plan, Wicklow County Council, 2006

The Waste Management Plan for the Midlands Region was adopted in 2006 following a statutory review of the previous Waste Management Plan for the five Local Authority areas of Offaly, Laois, Longford, Westmeath and North Tipperary.

A stated goal of the Midlands Regional WMP is to reduce the level of biodegradable content of the residual waste stream being disposed to landfill. To do so, the Plan stated that it will be necessary to progress quickly the integrated infrastructure in the Region including:

- *sustained promotion of waste prevention and minimisation*
- *expansion of the dry recyclable collection*
- *introducing separate collection of the biodegradable waste in the Region*
- *developing Biological and Thermal Treatment capacity options for the Region*
- *developing alternative pre-treatments in the Region such as Mechanical Biological Treatment (MBT) or Mechanical Separation<sup>51</sup>.*

Similar to other Regional WMPs, the Midlands WMP allowed for a flexible approach to the inter-regional movement of waste, explaining that “*the capacity of waste facilities in the Region should, as far as possible, satisfy the needs of the Region whilst allowing some element of flexibility of movement of waste into and out of the Region*”<sup>52</sup>.

The favourable approach to Mechanical Biological Treatment technologies and the relatively flexible approach to inter-regional waste transfers set out in the Midlands Regional Waste Management Plan would seem to indicate a broad acceptance by the five Local Authorities who make up the region of the principal of the proposed development.

#### ***South Tipperary County Council (2006) – Southeast WMP 2006-2011***

South Tipperary County Council acted as Lead Authority for the preparation of the Joint Waste Management Plan for the South East 2006 - 2011. The constituent local authorities participating in the plan and which form the Region are Carlow County Council, Waterford City Council, Kilkenny County Council, Waterford County Council, South Tipperary County Council and Wexford County Council.

Similar to the Wicklow Waste Management Plan, the Southeast WMP included an overall assessment of different waste management scenarios/strategies to establish which would be most appropriate for the region<sup>53</sup>. The four scenarios for the treatment of waste from residual bins tested included:

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<sup>51</sup> Page 80, Midlands Regional Waste Management Plan, Offaly County Council, 2006

<sup>52</sup> Executive Summary, Midlands Regional Waste Management Plan, Offaly County Council, 2006

<sup>53</sup> Page 23, Southeast Regional Waste Management Plan, South Tipperary County Council, 2006

- Landfill only
- Mechanical & Biological Treatment (MBT) and Landfill
- MBT and Thermal Treatment
- Thermal Treatment.

When the environmental, policy and cost implications of each of the scenarios were compared in detail, approaches which included MBT technology scored well, placing it second behind the thermal treatment of waste as the preferred option to form part of an integrated waste management approach in the South East Region. It should be noted that no significant steps have been taken to develop thermal treatment capacity in the Southeast Region.

***Dublin Local Authorities (2005) - Dublin WMP 2005-2010***

The Waste Management Plan for the Dublin Region has been developed jointly by Dublin City Council, South Dublin County Council, Fingal County Council and Dun Laoghaire-Rathdown County Council. The first Regional Waste Management Plan for Dublin became effective in 2001. This plan was subsequently reviewed in 2004-2005 culminating in the current Plan which was due for review in 2010.

Despite the dated nature of the 2005 Dublin WMP (especially given the current economic climate), a number of the policies set out in the Plan can be still seen to be relevant with regard to the waste management policy rational for the proposed development<sup>54</sup>.

Firstly, the 2005 WMP stated in relation to landfill policy that a critical shortage of municipal landfill capacity was imminent with the closure of Ballyogan Landfill in 2005, Arthurstown Landfill in 2007, and the planned closure of Balleally Landfill. As a result, the Plan emphasised the importance of the timely delivery of the proposed Fingal Landfill to replace these facilities and provide adequate safe disposal for residual waste in accordance with the Plan.

Another central policy aim of the plan which relates to Energy Recovery specified that a Waste to Energy (Incineration) plant be developed at the preferred location in the Poolbeg Peninsula, Dublin with a capacity of between 400,000 and 600,000 tonnes/annum. According to the Plan, by using this facility to treat non-hazardous municipal waste, the Region could ensure that the obligations of the EU Landfill Directive are met.

A third key policy which is of relevance to the consideration of the proposed development is for the Regional Co-operation and Movement of Waste. Under this

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<sup>54</sup> Page xvii, Dublin Regional Waste Management Plan, Dublin Local Authorities, 2005

Policy, the Plan confirmed that as the Dublin Region lies within the Greater Dublin Area (GDA) for the purpose of spatial and strategic planning, that the Dublin Local Authorities would be supportive of co-operation with neighbouring counties to enable efficient development of infrastructural capacity for waste management.

Currently, neither the Fingal (Nevitt Tooman) Landfill nor the Poolbeg Waste to Energy plant has been developed. The landfill option has been abandoned by Fingal County Council completely and there is no construction start date for Poolbeg as yet.

***Meath County Council (2006) – Northeast WMP 2005-2010***

The current Northeast Regional Waste Management Plan sets out the waste management policy for the North East Region for the period of 2005 – 2010. For the purpose of the Waste Management Plan, the North East Region consists of the administrative areas of the counties of Cavan, Louth, Meath and Monaghan.

While the Northeast WMP does not include specific policies relating to the provision of additional MBT infrastructure, similar to other Plans it does recognise the need for flexibility with respect to the movement of waste across regional boundaries<sup>55</sup>.

**Summary of Regional Waste Management Plans**

The outline of key policies presented above is significant as it highlights a growing acceptance of MBT technology as an important part of the waste management system in Ireland.

Furthermore, the review highlighted the flexible approach to the inter-regional movement of waste adopted in the relevant Regional Waste Management Plans. This approach is significant as it enables the development of appropriately sized waste management facilities at suitable locations which can take advantage of the inter-regional economies of scale required to ensure the most efficient treatment of waste.

It is clear therefore that the proposed development fully complies with the approach to waste management set out in the various Regional WMPs by providing a state of the art Mechanical Biological Treatment Facility within the same landholding as an existing Waste Management Treatment Facility in County Kildare.

***1.3.3 The Quantitative Need for the Facility***

In support of this application, Bord na Móna has commissioned a ‘Need Assessment Report’, attached as Appendix 1.2.

The purpose of this ‘Need Assessment Report’ is to provide a clear and concise scrutiny of available data and trends to assist in the forming of a definitive opinion of

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<sup>55</sup> Page ix, Northeast Regional Waste Management Plan, Meath County Council, 2006

the potential to develop the Drehid MBT Facility. The Report has been compiled, having regard to:

- a) Current Waste Policy and Legislative Drivers;
- b) Current waste disposal and recovery facilities in the Kildare, Wicklow, Midlands<sup>56</sup> and South Eastern<sup>57</sup> Waste Management Regions; and,
- c) Trends evident from recently published data on waste statistics.

This Report examined a number of scenarios to demonstrate the need for the development of an MBT Facility to service the four subject waste management regions with the needs assessment carried out on the basis of 3 separate scenarios, each of which take into account current pre-treatment capacity and rates of recycling:

- Scenario 1 – Waste projections based on the current volume of waste landfilled in the 4 No. regions;
- Scenario 2 - Waste projections based on the current volume of waste arisings in the 4 No. regions; and
- Scenario 3 – Waste projections based on a pro-rata estimation of regional waste arisings based on overall national population and waste volumes and regional population statistics.

All of the need assessments carried out for the 3 No. scenarios, have clearly demonstrated that surplus biodegradable municipal waste (BMW) will exist as a percentage of the overall municipal solid waste (MSW) within the subject waste management regions by 2016 and beyond and that there is a clear need for waste treatment infrastructure to deal with this waste. The Drehid MBT at a capacity of 250,000 TPA of MSW, with the potential to divert 145,000 TPA of biowaste from landfill, is also shown to be a conservative capacity to serve the regions.

The need assessment presented in Appendix 1.2 should also be considered in light of the fact that it is desirable that as much BMW as possible is diverted from landfill and that Ireland strives to:

- achieve the landfill directive targets by surpassing them in some regions in order to compensate for under-achievement in others, or (and preferably); and
- surpass them state-wide.

Clearly the Drehid MBT Facility will provide a valuable contribution to the achievement of the above objectives.

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<sup>56</sup> The Midlands Waste Management Region includes Offaly, Laois, Longford, Westmeath and North Tipperary.

<sup>57</sup> The South Eastern Waste Management Region includes Kilkenny, Waterford (City and County), South Tipperary, Wexford and Carlow.

In addition, a significant volume of waste is also available outside of the boundaries of the four waste management regions and this waste will also need to be diverted from landfill. The waste arising outside of the subject regions may be diverted to other facilities in the future, such as the Poolbeg Energy from Waste (EfW) Facility, but the proposed Drehid MBT Facility will be well positioned to accept this municipal waste for pre-treatment, if required.

In summary, as shown in the ‘Need Assessment Report’ included in Appendix 1.2 there is a proven need for the proposed Bord na Móna Drehid MBT Facility in order to contribute to the achievement of Ireland’s BMW diversion targets as set by the EU Landfill Directive and to provide a more sustainable solution to the management of increasing volumes of municipal waste within the Kildare Waste Management Region, the Wicklow Waste Management Region, the Midlands Waste Management Region and the South East Waste Management Region.

#### *1.3.4 Overall Compliance with Waste Management Strategies and Guidance*

In conclusion, it can be seen that the proposed development of an MBT Facility on this site, accords with the waste management principles set out in the relevant strategy and guidance documents in that it will:

- Contribute to the national effort to meet targets set out in Government Waste Management Policy aimed at reducing the overall volume of waste sent to landfills in Ireland
- Result in a significant step forward in the use of the Mechanical Biological Treatment technology in line with the more integrated approach to waste management as favoured by sectoral policy guidance
- Provide an appropriately sized waste management facility at a suitable location which is positioned to take advantage of the inter-regional economies of scale required to ensure the most efficient treatment of waste.

Finally, it can be seen that the proposed development has been designed and sited and will be built in accordance with best practice for the protection of human health and the natural environment (as demonstrated by this EIS).

## **1.4 SITE LOCATION, CONTEXT AND PLANNING HISTORY**

### *1.4.1 Location of the Proposed Development Site*

The 29ha site accommodating the proposed development is located within the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare. The site lies to the immediate east of the access road serving the existing Drehid Waste Management Facility.



The site is immediately adjacent to the Drehid Waste Management Facility which is currently being operated in accordance with the relevant planning permissions and waste licence. The largest concentration of houses in the vicinity is to the west in the village of Derrinturn, some 3km north west of the proposed MBT Facility footprint, while both Allenwood and Coill Dubh are in excess of 3km to the southeast and east of the proposed MBT Facility respectively. There are no significant residential/commercial developments planned within close proximity of the site.

The R403 lies south, southwest and west of the site. The R403 joins the R402 at Carbury to the northwest of the site. The R402 connects to the M4 while the R403 connects to central and south County Kildare. The M4 (Dublin to Sligo/Galway) Motorway is located approximately 9km to the north of the site, while the M7 (Dublin to Limerick/Cork) Motorway is located approximately 17km to the south of the site.

Access to the MBT Facility will be via the existing, permitted site entrance at the R403 regional road and the existing facility access road. It will be accessible via a network of regional routes which in turn link with the National Motorway network. These routes have been previously approved for the existing and operational Drehid Waste Management Facility.

The site is located within a more extensive Bord na Móna landholding of some 2,544 hectares. That landholding is located within the townlands of 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.

#### *1.4.2 Planning History for the Site*

This application relates to a 29ha site located within the larger Bord na Móna owned landholding. There is no record of any planning applications within the subject site. The application boundary however immediately abuts the boundary of previous applications – namely those relating to the development of the adjacent Drehid Waste Management Facility.

#### *1.4.3 Relevant Planning History for the Bord na Móna Landholding*

Within the broader landholding, the Drehid Waste Management Facility has been developed and is operational. The key planning files associated with the development of that Facility are set out in Table 1-3 below.

**Table 1-3 Key Planning Applications within the Bord na Móna Landholding**  
(associated with the Drehid Waste Management Facility Site)

BRIEF DESCRIPTION OF PREVIOUS APPLICATIONS	REG. NO.	GRANT DATE
Construction of Drehid Waste Management Facility consisting of an engineered landfill site for an operational lifespan of 20 years	04/371 / PL.09. 212059	13/04/05 / 21/11/05
Proposed extension and intensification of the Drehid Waste Management Facility	PL.09. PA0004	31/10/08
Extension of the appropriate period of the planning permission granted in 2005 under KCC reg. ref. 04/371 and ABP ref. PL09 212059	10/1172	25/02/11
Development of a landfill gas utilisation plant which will be phased and will generate up to 4.99MW of electricity for input into the national grid.	11/537	19/10/11
An extension (with a gross floor space of approximately 383 square meters) to the previously permitted composting facility.	11/902	02/11/11

The following sections provide outline descriptions of all relevant planning applications submitted in respect of the Drehid Waste Management Facility site. It also provides details of waste licenses issued by the Environmental Protection Agency in relation to the operation of that existing facility.

#### ***Grant of Planning Permission and EPA Waste Licence in November 2005***

The Drehid Waste Management facility was granted permission by Kildare County Council (KCC) in April 2005, under *KCC Reg. Ref No. 04/371* subject to a number of conditions. In November 2005 An Bord Pleanála (ABP) upheld that planning decision with revised conditions (*ABP Ref No. PL.09.212059*), following an appeal and an Oral Hearing. The Environmental Protection Agency (EPA) issued a Waste Licence for the facility in August 2005 (*EPA Ref No. W0201-01*).

Under the aforementioned planning permission and in accordance with the aforementioned Waste Licence, 120,000 TPA (tonnes per annum) of waste can be disposed of to the engineered landfill site with an additional 25,000 TPA permitted for treatment at a composting facility. The operational life of this facility is 20 years.

This planning permission also provided for all associated site development works including the development of an access road from the R403 regional road to the location of the landfill and composting facility. Construction of the facility commenced in August 2006 and it commenced accepting waste in February 2008.

***Grant of Planning Permission, October 2008 and EPA Waste Licence, April 2009***

In April 2008 a Planning Application was lodged directly with An Bord Pleanála (under the provisions of the Planning and Development (Strategic Infrastructure) Act 2006) to intensify waste acceptance and to extend the landfill footprint of the facility.

The Planning Application proposed the disposal of an additional 240,000 TPA of waste (over and above that previously permitted) for 7 years, with the development reverting back to receiving the previously permitted 120,000 TPA thereafter.

In October 2008, following an Oral Hearing, An Bord Pleanála granted planning permission (*ABP Ref No. PL09 .PA0004*) to intensify waste acceptance (for disposal to landfill) to 360,000 TPA until December 2013, with tonnage for disposal at the landfill element of the facility, thereafter, to be restricted to the 120,000 TPA maximum previously permitted.

The permission also included for a landfill facility extension which involves the construction of additional landfill capacity in the form of lined and contained cells to ensure that the previously permitted overall life span and/or annual capacity of the landfill element of the facility is not reduced as a consequence of the temporary intensification (*ABP Ref No. PL.09.212059*). The Environmental Protection Agency issued a revised Waste Licence for the facility in April 2009 (*EPA Ref No. W0201-02*).

***Grant of Revised Waste Licence, March 2010***

In June 2009 the EPA initiated a Waste Licence review for the Drehid Waste Management Facility. The grounds for the review related to the introduction of limits on the acceptance of biodegradable municipal waste at landfill following the publishing of a technical guidance document on Municipal Solid Waste Pre-treatment and Residuals Management. The Environmental Protection Agency issued a revised Waste Licence for the facility in March 2010 (*EPA Ref No. W0201-03*).

***Extension of Duration of Planning Permission, February 2011***

In November 2010, Bord na Móna applied under Section 42 of the Planning and Development Act, 2000 (as amended) for the extension of the appropriate period of the Planning Permission granted in 2005 (*KCC Reg. Ref No. 04/371, An Bord Pleanála Ref No. PL09.212059*) by an additional two years.

In its February 2011 decision (*KCC Reg. Ref No. 10/1172*), Kildare County Council granted an extension of the duration of the aforementioned Planning Permission for construction of the Drehid Waste Management Facility for a period of two years from the 14th of January 2011.

***Grant of Planning Permission for Landfill Gas Utilisation Plant, October 2011***

In May 2011, Bord na Móna lodged a Planning Application with Kildare County Council (KCC Reg. Ref No. 11/537) for the development of a landfill gas utilisation plant. The proposed development of the landfill gas utilisation plant will be phased and will generate up to 4.99 MW of electricity for input into the national grid. Planning permission was granted for this application in October 2011.

***Planning Permission Granted for a Composting Facility Extension, November 2011***

Most recently, a planning application was lodged for an extension, with a gross floor space of approximately 383 square metres, to the previously permitted composting facility. No increase to the previously permitted waste acceptance of 25,000 tonnes per annum at the composting facility was proposed, rather, an extension to provide additional floor space. Planning permission was granted for this development by Kildare County Council in November 2011.

***1.4.4 Planning History for Area Surrounding the Bord na Móna Landholding***

As the proposed development is situated in a rural part of County Kildare, a thorough search of Kildare County Council's website indicated that the majority of planning applications made in recent years in the vicinity of the proposed development have been for small developments such as single dwellings.

For a detailed list of planning applications made in the area surrounding the subject site and the Drehid Waste Management Facility please refer to Appendix 1.3 of this EIS.

***1.4.5 Overall Characteristics of the Proposed Development Site***

The proposed development is characteristic of an industrial facility which manages and treats waste. The specific site of the proposed MBT Facility is currently a cutover bog and it will be located adjacent to the Drehid Waste Management facility. There is no conflict between this proposed land use and current land uses within the Bord na Móna landholding, at the adjacent Waste Management Facility, or in the surrounding area. Moreover, there is no precedent in the planning history of the site, or of the adjacent Drehid Waste Management Facility, that precludes the granting of planning permission for the proposed development.

***1.4.6 Concluding Remarks –Strategic Planning Considerations***

This section briefly summarises the findings of previous sections of this Chapter which demonstrated that the proposed development of an MBT Facility on this site is in full compliance with all relevant planning and development, sectoral policy and environmental assessment requirements.

As set out above, the proposed development fully accords with the principles set out in the relevant planning policy documents in that it will:

- Have full regard to and be in full compliance with all relevant Kildare County Development Plan policies relating to the development of an additional waste management facility in the medium sensitivity Western Boglands landscape character area;
- Support the waste treatment scenario adopted in the Kildare County Waste Management Plan which seeks to minimise waste being sent directly to landfill through the provision of additional mechanical biological treatment infrastructure;
- Help to achieve the objectives set out in the RPGs by providing additional options for the treatment of waste in the region including increased levels of diversion of biodegradable waste from landfill; and
- Play an important role in addressing infrastructural requirements highlighted in the NSS and NDP by ensuring the provision of more efficient, effective and cost effective waste management infrastructure in the Greater Dublin Area.

As also demonstrated above, the proposed development is in accordance with the waste management principles set out in the relevant sectoral policy documents in that it will:

- Contribute to the national effort to meet targets set out in Government Waste Management Policy aimed at reducing the overall volume of waste sent to landfills in Ireland;
- Result in a significant step forward in the use of the Mechanical Biological Treatment technology in line with the more integrated approach to waste management as favoured by sectoral policy guidance; and
- Provide an appropriately sized waste management facility at a suitable location which is positioned to take advantage of the inter-regional economies of scale required to ensure the most efficient treatment of waste.

## 1.5 ALTERNATIVES

Schedule 6 of the Planning and Development Regulations (2001) specify that the EIS should include *‘An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment’*.

The EPA publication, Guidelines on the information to be contained in Environmental Impact Statements, states *‘The consideration of alternatives also needs to be set within the parameters of the availability of land (it may be the only suitable land available to the developer) or the need for the project to accommodate demands or opportunities which are site specific. Such considerations should be on the basis of alternatives within the site, e.g. design, layout’*.

### 1.5.1 *Alternative Processes*

Waste management in Ireland and across the EU is based on the internationally adopted waste management hierarchy, with the emphasis on waste prevention, minimisation, re-use, recycling, recovery and disposal - in decreasing order of preference.

The National Strategy on Biodegradable Waste was published in April 2006 and sets out measures to progressively divert biodegradable municipal waste from landfill in accordance with the agreed targets in EU Directive 1999/31/EC on the landfill of waste i.e. the achievement of the targets for diversion of BMW from landfill.

The profile of the activities proposed for the Drehid MBT Facility, including the optional Dry Anaerobic Digestion element, means that the proposed development can be classified as a recycling and energy recovery facility as per the Waste Hierarchy.

#### **1.5.1.1 Alternative Mechanical Treatment Processes**

Alternatives for the mechanical treatment process were considered. Consideration was afforded to the level of technology and automated equipment to be deployed.

Extraction of recyclables can be undertaken by means of picking stations or automated equipment.

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

Automated equipment for the extraction of recyclables includes ballistic separators and Near Infra Red (NIR) sorting machines. Typically, a ballistic separator comprises of a series of paddles which are positioned on an incline. A rotating eccentric shaft arrangement connected to the paddles causes the paddles to have an upwards and forwards cyclical motion. The throwing action, generated by the paddles, is such that flat items (two dimensional items – e.g. papers and cardboard) continue to move up the incline of the paddles while three dimensional items (e.g. metals cans and plastic bottles) eventually move down the incline of the paddles (due to the tendency for three dimensional items to roll). NIR sorting machines utilise the near infrared part of the electromagnetic spectrum. NIR sorters operate by measuring the electromagnetic spectrum of NIR wavelengths reflected and absorbed by a material. Individual polymer types absorb and reflect different spectra under infrared light. The intensity



of infrared light reflected off the surface of the material at a range of frequencies is measured and the results compared against known polymer signals to determine the resin type for each piece of material. In this way, chosen recyclables can be positively extracted from the waste stream.

It was decided to propose a mechanical treatment process which involved a high level of technology and automated equipment on the following basis:

- Higher quality recyclables are extracted by automated equipment in comparison to picking stations. An automated process is considered inherently consistent unlike manual picking which is prone to the variability of human behaviour;
- Higher recycling rates are achieved by automated equipment in comparison to picking stations. Again, higher recycling rates are a function of the consistency of automated equipment; and
- The use of automated equipment is considered more favourable than picking stations from an operational health and safety perspective.

#### **1.5.1.2 Alternative Biological Treatment Processes**

Alternatives for the biological treatment process were considered as outlined herein. 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 and heat. The electricity can be exported to the national grid, while the heat can be used in the MBT process (e.g. in the drying of solid recovered fuel).

As discussed in Section 1.2, in contemplating the inclusion of Anaerobic Digestion (AD) in the MBT process, consideration was had of the fiscal incentives for the development of AD – namely the Renewable Energy Feed in Tariff (REFIT). Regrettably, the current fiscal incentives in the Republic of Ireland make it difficult to create a compelling or indeed viable, economic argument for the development of AD. The current REFIT for AD in the Republic of Ireland is significantly inferior to its equivalents in Northern Ireland and Italy (for example).

Therefore, Bord na Móna proposes the preparation of the Planning Application and Waste Licence Application for the proposed Drehid MBT Facility such that it provides for the development of an optional AD step as part of the biological treatment stage.

### Anaerobic Digestion Processes

AD can be developed in the form of a wet AD process or a dry AD process. A wet AD process generally requires a feedstock with a maximum dry solids content of 20%, while a dry AD process can process feedstock with a higher dry solids content.

The wet AD process involves the pumping of liquid substrate into large digester vessels where anaerobic conditions are maintained. The feedstock within the digester vessels is continually agitated to promote its uniform degradation into biogas. Wet AD is ideally suited for slurries (cattle manures/pig manures with low solids content – less than 20%) as opposed to solid waste organic fines with high solids content (typically greater than 40%). Wet AD of solid waste organic fines typically requires the conversion of feedstock into a “pumpable” liquid substrate.

Unlike the wet AD process, the biomass substrate in dry AD does not need to be mechanically stirred or pumped through pipes, and therefore the process is not susceptible to problems of blockage in the system. The digestion process is not affected by any undigestible pieces of inert material in the substrate as they can be easily removed from the digestate in a subsequent process. In comparison to wet AD, dry AD typically involves the placement of the feedstock into horizontal concrete vessels by means of a loading shovel. When the vessel is filled, a gas tight door is closed and the anaerobic digestion process commences.

It was decided to propose a dry AD process on the following basis:

- Dry AD is relatively contamination tolerant in comparison to wet AD. Organic fines will contain undigestible items such as plastics, textiles and glass. In a wet AD process it is necessary to remove such items in order to allow the feedstock to be pumped into the digester vessels. The removal of undigestible items, particularly plastic, is considered to be significantly challenging at wet AD facilities. Equipment associated with removal of undesirable items is considered to be prone to high maintenance and downtime;
- Typically, a wet AD process will produce significant volumes of waste water which would require treatment on site or transport to a licensed waste water treatment plant. In comparison, the volumes of waste water produced by a dry AD process are not considered significant; and
- The post composting of digestate from a wet AD plant is considered to pose process difficulties due to its higher moisture content in comparison to dryer digestate from a dry AD process.

### Composting Processes

The most obvious and simple form of composting is the straightforward compost heap, where organic waste is simply left in a pile where natural processes take their course and compost is produced. The development of different, more industrialised forms of compost production systems has been driven by a desire to manipulate one or more of the process parameters in order to optimise the composting process in

terms of emissions control (particularly odour), quality, production time or space requirements.

The classification of every composting system is beyond the scope of this assessment; hence for the purpose of this section, composting systems have been classified into four categories as follows:

- Outdoor Systems;
- Indoor Windrow Systems;
- Tunnel Systems;
- 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.

#### Outdoor Systems

Outdoor systems are generally simple in design and construction. The two main types of system applied are the windrow system and the static pile system. In the windrow system, feedstock is placed in rows and turned periodically, usually by mechanical equipment. Oxygen is supplied primarily by natural ventilation resulting from the buoyancy of hot gases in the windrow, and by gas exchange during turning. In the static pile system no agitation or turning of the static bed occurs during the composting cycle. An air distribution system is applied underneath the composting material to allow either forced (blown air) or induced aeration (sucked air). In practice, intermediate systems, e.g. aerated windrows or periodically turned static piles, are common.

Process and emission control possibilities for outdoor systems are limited, apart from induced static pile systems, where the process air might be transported through a biofilter. Since prevailing weather conditions directly affects operations, the composting process usually takes several months.

Of particular relevance is the fact that outdoor systems do not comply with the requirements of the Department of Agriculture, Food and the Marine for the processing of Animal By-Products. An enclosed system is required to achieve the requirements imposed by Animal By-Products Regulations.

#### Indoor Windrow Systems

Indoor windrow systems can be very simple in design and construction. In this arrangement, the feedstock is formed into windrows within an enclosed building. In addition, air control systems and machinery for the turning and movement of the composting mass can be utilised, which make indoor windrow systems more

sophisticated and provide for significantly more process control. The indoor windrow system therefore allows for the flexibility to begin operations at a relatively low process control level and eventually to modify the system to provide for a higher level of process control.

The operational capacity of an indoor windrow system is quite flexible, within a specific range, as the height and length of the windrow and rate of aeration can be adjusted according to the required throughput.

Indoor windrow systems require the odour abatement system to process all the air space within the building in comparison to enclosed tunnel systems where only the process air within the tunnel requires intensive treatment.

#### Tunnel Composting Systems

Tunnel composting involves the composting of organic waste in fully enclosed concrete tunnels. Each composting tunnel typically comprises of a sealed concrete structure provided with an insulated loading door on the roof and an insulated unloading door on the front. The concrete floor includes a piped aeration system. Air is forced, from the floor, vertically upwards and through the composting mass. Process air is collected in the headspace between the roof of the tunnel and the composting mass. This collected air is either re-circulated within the composting mass or directed to the odour abatement system for treatment.

The enclosed nature of the tunnel composting system facilitates optimum and focused use of aerated air thereby facilitating extensive process control. As the tunnels are fully enclosed, optimum temperatures and levels of humidity can be maintained throughout the entire composting mass. High rates of aeration are typically a feature of tunnel composting systems. The abovementioned attributes facilitate high rates of biological stabilisation.

Various process parameters including aeration rates, air moisture and oxygen levels can be controlled from a central process computer. In addition, due to the modular layout of tunnel systems, several units can be operated independently, which provides for significant flexibility in the operational phase.

#### Continuous Flow Composting Systems

In continuous flow composting systems the organic waste flows horizontally or vertically through a reactor while the forced aerated composting process occurs. As fresh feedstock is loaded into one end of the system, processed material is discharged out the far end. Continuous flow composting systems allow adequate control of the process conditions. However, since the retention time in the reactor is relatively short (typically 12-14 days) an extensive post-composting step is required.

Continuous flow systems are typically produced in a manufacturing environment prior to being transported to a waste management facility. Continuous flow systems are typically manufactured from metals, plastics and composites and are therefore considered to be less robust than other composting systems that comprise of concrete. Continuous flow systems are typically suited to small scale applications where the system can be delivered to site in modular form thereby facilitating a relatively short construction phase.

#### Selected Composting Technologies

In deciding on the composting technologies to be proposed for the biological treatment stage, cognisance was had of the EPA's stabilisation requirement (as set out in waste licences for landfill facilities) for biodegradable municipal waste, where stabilisation means the reduction of decomposition properties of the waste to such an extent that offensive odours are minimised and that the respiration activity after four days is less than 10mgO<sub>2</sub>/gDM until 1<sup>st</sup> January 2016 and less than 7mgO<sub>2</sub>/gDM thereafter.

As outlined previously, an outdoor system does not allow for the provision of process and emission control measures, which could therefore lead to odour nuisances at or near the facility. The composting process is dependent on the prevailing weather conditions leading to extended composting time requirements. In addition, it is considered that the consistency of the output can not be guaranteed using an outdoor system. As such, an outdoor system was considered not suitable.

Continuous flow systems were considered unfeasible due to the scale of the proposed MBT Facility where the biological treatment process will be required to process in excess of 100,000 tonnes of organic fines per annum.

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 for the first stage of the composting process at the Drehid MBT Facility. In addition, the first stage of the composting process is the most critical with respect to odour emissions, since easily biodegradable components (e.g. sugars, proteins and fats) are degraded at a high rate, thus causing gaseous by-products. The use of fully enclosed composting tunnels, within a fully enclosed building, for this intensive phase of the biological treatment process, provides double containment features in respect of odour abatement.

An indoor windrow system was selected for the final stage of the composting process (i.e. the maturation stage). As the intensive phase of the composting process will have been undertaken in the tunnel composting system, a lower level of aeration and process control is adequate for the maturation stage. In the indoor windrow system, the composting mass will be placed into trapezoidal windrows within dedicated

maturation bays inside a fully enclosed building. The windrows will be frequently turned (to de-compact material and to encourage optimum decomposition) by means of a diesel powered mobile windrow turner. It is envisaged that the trapezoidal windrows will be turned weekly. The under floor aeration system will be operated as a negative pressure system thereby minimising the generation of odourous compounds during the maturation stage.

#### *1.5.2 Alternative Sites*

TOBIN Consulting Engineers on behalf of Bord na Móna identified the site in the townlands of Coolcarrigan, Drummond and Kilkeaskin within the Bord na Móna landholding at Carbury, Co. Kildare, as a suitable and appropriate site for the development of an MBT Facility.

The proposed location emerged as a suitable site for an MBT Facility due to

- the large available land bank;
- the remoteness from dwellings;
- access to national/regional roads;
- natural screening;
- distance from ecologically protected areas;
- distance from archaeologically/architecturally protected sites/structures;
- the natural protection offered by the surficial deposits to the underlying bedrock aquifer. Their nature and thickness gives a low vulnerability rating, and the most favourable groundwater protection scheme response, i.e. R1; and
- the existence of an already permitted and operational Waste Management Facility within the landholding.

In addition, a baseline assessment for this project was completed prior to the design of the facility, which allowed for the optimisation of the siting of the facility, within the overall Bord na Móna landholding. In particular, sensitive areas such as natural watercourses, areas of bog-woodland and potential archaeological sites etc. were avoided. The facility is also sited at a significant distance from the local road network and residential properties, with the nearest residence being approximately 1 kilometre from the proposed MBT Facility footprint.

Also, it should be emphasised that the location of the proposed MBT Facility within the same landholding as the Drehid Waste Management Facility means that the necessary waste infrastructure for managing a significant volume of municipal waste will be within the same landholding. This represents a rational clustering of uses and an avoidance of conflicts or nuisance arising from locating such uses adjacent to sensitive receptors.



### 1.5.3 Do-Nothing Alternative

The proposed development, i.e. the Drehid MBT Facility is wholly necessary to ensure that both the immediate and future needs of the Kildare Waste Management Region, the Wicklow Waste Management Region, the Midlands Waste Management Region and the South East Waste Management Region are protected and enhanced. The facility will also be available to accept waste from other regions including the Dublin Waste Management Region, if required.

As outlined above, there are numerous waste management policies and moreover legislative requirements which necessitate the development of waste treatment facilities which specifically will allow Ireland meet its landfill diversion targets. In addition, the waste licences for the Drehid landfill and other such similar licensed landfills in adjoining waste management regions require that all waste is pre-treated prior to deposition and that the volume of biodegradable waste is progressively reduced. This proposed facility will assist in meeting the above targets and licence requirements and simply the “Do Nothing” alternative is not a real alternative.

## 1.6 BACKGROUND WORK FOR THE ENVIRONMENTAL IMPACT STATEMENT

All contributors to this EIS undertook comprehensive investigations of the site and surrounding area, during the course of the baseline studies.

The meteorological data used to determine the climatic conditions pertaining to the site are based on a rainfall station located at Lullymore. The evapotranspiration data was obtained from the synoptic station at Casement Aerodrome, County Dublin. The information supplied in this EIS is the best information available from the Meteorological Service.

## 1.7 CONSULTATION AND SCOPING

The purpose of this section is to provide an overview of the consultation process followed to date in respect of the proposed facility. In accordance with Section 4 of the *Guidelines on the Information to be Contained in Environmental Impact Statements* (EPA, 2002) and Article 213 of the Planning and Development (Strategic Infrastructure) Act 2006, the consultation process consisted of consultation with competent bodies, prescribed bodies and interested parties. The primary objective of involving competent bodies, prescribed bodies and interested parties at an early stage in the EIA process is to aid scoping of the EIA and to ensure that the EIA addresses the issues associated with the proposed development that are likely to be of significance.

The following lists the various parties consulted to-date. Copies of the Consultation Letters, as issued in January 2012, are included in Appendix 1.4.

- Kildare County Council (Water and Environmental Services)
- Kildare County Council (Planning and Economic Development)
- Kildare County Council (Transportation and Public Safety)
- Kildare County Council (Conservation Officer)
- Kildare County Council (Fire Safety Officer)
- Environmental Protection Agency (EPA)
- Development Applications Unit, Department of the Environment, Community and Local Government
- Department of the Communications, Energy and Natural Resources
- Department of the Arts, Heritage and Gaeltacht
- An Chomhairle Ealaíoin
- Department of Agriculture, Food and the Marine
- Inland Fisheries Ireland (IFI)
- An Taisce
- Commission for Energy Regulation (CER)
- Irish Peatland Conservation Council (IPCC)
- Heritage Council
- Irish Native Woodland Trust
- Geological Survey of Ireland (GSI)
- BirdWatch Ireland
- Irish Wildlife Trust
- Irish Forestry Board (Coillte Teoranta)
- Irish Farmers Association
- Fáilte Ireland
- National Roads Authority
- National Parks and Wildlife Service (NPWS)
- Teagasc
- Electricity Supply Board (ESB)
- Bord Gáis
- Health and Safety Authority (HSA)

Responses were received from Bord Gáis Networks, ESB Networks, Inland Fisheries Ireland, the Department of Agriculture, Food and the Marine, Kildare County Council, National Roads Authority, the Department of Arts, Heritage and the Gaeltacht (Development Applications Unit). These are included in Appendix 1.5.

As detailed in Section 1.1.1 herein, 3 No. pre-application consultation meetings were held with An Bord Pleanála. Pre-application consultation meetings were also held with Kildare County Council in February and March 2012, with a representative of the Health Service Executive in attendance at the February meeting. A pre-application consultation meeting was also held with the Environmental Protection Agency (EPA) in September 2011.

In addition, Bord na Móna representatives had a meeting with members of the Department of Agriculture, Food and the Marine on March 23<sup>rd</sup> 2011, at the Department's Naas office to facilitate a discussion on the proposed development of MBT infrastructure.

### 1.8 WASTE LICENCE, PLANNING AND ENVIRONMENTAL IMPACT STATEMENT

The Waste Management Act (1996) designates the Environmental Protection Agency as the sole licensing authority for landfills, above a certain threshold level of activity.

The Waste Management (Licensing) Regulations 2004 provide for the continued operation of the system of licensing by the Environmental Protection Agency of waste recovery and disposal activities under Part V of the Waste Management Act, 1996. The Regulations set out procedures for the making of waste licence applications, reviews of licences and consideration by the Agency of objections, including the holding of oral hearings.

The Waste Management (Licensing) Regulations 2000 (save for articles 3 and 4 and the First Schedule), Waste Management (Licensing)(Amendment) Regulations 2001, Waste Management (Licensing)(Amendment) Regulations 2002 and European Communities (Amendment of Waste Management (Licensing) Regulations 2000) Regulations 2002 are revoked by the 2004 Regulations.

These Regulations specify the classes of activity that are liable to licensing by the EPA and prescribes the information to be addressed in the licence applications.

The Waste Management Act (1996) as amended by the European Communities (Amendment of the Waste Management Act, 1996) Regulations, 1998, defines the *principal activity* proposed at this location as 'Recycling or reclamation of organic substances which are not used as solvents. (including composting and other biological processes)' (Class 2 of the Fourth Schedule (Waste Recovery Activities) of the Act). In compliance with the Regulations a Waste Licence must be sought by Bord na Móna, in respect of the proposed development of the MBT Facility.

An Environmental Impact Statement (EIS) is required to accompany a Waste Licence Application, where the volumes for disposal are above a certain threshold volume (greater than 25,000 tonnes per annum), as outlined at class 11(c) in Part II of the First Schedule of Article 24 in the European Communities (Environmental Impact Assessment) Regulations, 1989 (S.I. No 349 of 1989), as amended by S.I. No. 351 of 1998. These regulations have subsequently been amended by the European Communities (Environmental Impact Assessment) (Amendment) Regulations, 1999 (S.I. No. 93 of 1999). The capacity of the proposed MBT Facility is above the

threshold value and therefore an EIS will accompany the Waste Licence Application to the Environmental Protection Agency.

Under Part X, Section 176 of the Planning and Development Act, 2000, which repeals and re-enacts with amendments the Local Government (Planning and Development) Acts, 1963 to 1999, the circumstances under which an Environmental Impact Assessment may be required for certain developments are defined in Article 24 of the E.I.A. Regulations. The proposed facility is a development, which is of a class specified in Part II of the First Schedule of Article 24 of S.I. 349 of 1989. An EIS therefore accompanies the planning application to An Bord Pleanála in line with the requirements of the Planning and Development (Strategic Infrastructure) Act 2006 as discussed in more detail in Section 1.1 of this EIS.

## 1.9 PROCEDURES AND STRUCTURE OF THE EIS

The consequences of any major engineering project are generally presented in the form of an Environmental Impact Statement (EIS). This EIS contains information on the scale and nature of the proposed development, a description of the existing environment, impact assessment of the proposed development and mitigation measures to mitigate and/or reduce the impact on the receiving environment.

The structure and content of the Environmental Impact Statement has been based on the following documents, as published by the Environmental Protection Agency.

- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (2003).
- Guidelines on the information to be contained in Environmental Impact Statements (2002).

This Environmental Impact Statement provides for:

- A description of the site and the existing environment;
- A description of the proposed development;
- The impacts, if any, resulting from the proposed development;
- The measures to mitigate any adverse impacts; and
- A non-technical summary.

The minimum information that must be contained in an EIS is specified in Part X of the Planning and Development Act, 2000 and Schedule 6 of the Planning and Development Regulations, 2001. The structure and content of this EIS has been based on the legislative requirements as set out in Part X of the Planning and Development Act, 2000 and Part 10 of the Planning and Development Regulations, 2001 and the guidance documents by the Environmental Protection Agency as outlined above.

The overall EIS is arranged in four volumes, as follows:

- Volume I: Non Technical Summary;
- Volume II: Environmental Impact Statement;
- Volume III: Drawings; and
- Volume IV: Appendices.

Volume II of the EIS contains the main text body and is divided into a number of chapters. Chapters 1 and 2 include an overall Introduction and Description of the Site and the Proposed Development. The specialist chapters (Chapters 3 to 12) include:

- Section 1: Introduction;
- Section 2: Description of Site and Existing Environment;
- Section 3: Potential Impacts -  
Potential Impact of Configuration A (MBT with Composting)  
Potential Impact of Configuration B (MBT with Dry Anaerobic Digestion and Composting); and
- Section 4: Proposed Mitigation Measures -  
Mitigation Measures for Configuration A (MBT with Composting)  
Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting).

#### 1.10 STUDY TEAM AND CONTRIBUTORS TO THE EIS

This EIS has been prepared by a team of consultants co-ordinated by TOBIN Consulting Engineers. The relevant inputs of the various members of the Study Team are as follows:

**Table 1-4 Study Team and Contributors**

TOBIN Consulting Engineers	Project Management, Production, Evaluation and Reporting. Noise and Vibration, Climate, Socio-Economic, Dust, Ecology, Water, Soils & Geology and Hydrogeology, Traffic, Interaction of the Foregoing and Engineering Design.
URS (Scott Wilson)	Landscape & Visual
Arch Consultancy, Consultant Archaeologists	Archaeology and Cultural Heritage
AWN Consulting Ltd.	Air Quality and Odour Modelling
AOS Planning Ltd.	Planning

In addition to the main Study Team outlined above the following firms also made contributions to the EIS, namely:

- IGSL Ltd. Borehole Drilling/ Soil Analyses  
/ Trial Pits
- ORS Ltd. Topographical Survey
- Alcontrol Laboratories (Ireland) Dust Analysis
- Abacus Transportation Surveys Traffic Counts
- SLR Consulting and Bord na Móna MBT Process Design

In addition monitoring data for groundwater, surface water, dust and noise compiled for the adjacent Drehid Waste Management Facility was provided by Bord na Móna Environmental.

### 1.11 LIST OF DRAWINGS

Table 1-5 below contains a list of Drawings included in Volume III, which accompanies this EIS.

**Table 1-5 List of Drawings**

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
6301-2400	Regional Site Location Map	6301-2415	Standard Wheelwash Details
6301-2401	Site Location Map	6301-2416	Weighbridge General Arrangement –Plan & Sections
6301-2402	Existing Site Topography Map	6301-2417	Typical Fencing Details
6301-2403	Site Layout Plan	6301-2418	Surface, Process & Fire Water Pump Station – General Arrangement -1 of 2
6301-2404	Services –General Arrangement	6301-2419	Surface, Process & Fire Water Pump Station – General Arrangement -2 of 2
6301-2405	Surface Water –General Arrangement	6301-2420	Heat Transfer Pipes –Schematic & Details
6301-2406	Foul Water –General Arrangement	6301-2421	Landscaping Plan
6301-2407	Watermain –General Arrangement	6301-2422	Administration and Welfare Building –Plan & Elevations
6301-2408	Proposed Heat Transfer Pipes	6301-2423	Typical Biofilter/Odour Abatement Building –Plan & Elevations
6301-2409	Longitudinal Section through existing topography	6301-2424	SRF Building
6301-2410	Attenuation Lagoons (Ponds) 1 & 2 – general arrangement & section	6301-2425 & 6301-2436	Mechanical Treatment Building Plan & Elevation
6301-2411	Typical Road & Carpark Construction Details	6301-2426	Refining Building
6301-2412	Typical Manhole Details	6301-2427	Maintenance Building
6301-2413	Typical Watermain Details	6301-2428 to 6301-2435	Biological Treatment Building –Plans & Elevations (Configuration A & B)
6301-2414	Trench Bedding Details	6301-2437	Fuel Storage Area – Plan & Elevation



## 2 DESCRIPTION OF EXISTING SITE AND PROPOSED DEVELOPMENT

This section of the EIS describes the existing site and the proposed development.

The design, construction and operation of the proposed MBT Facility is outlined and a detailed description of the difference between the processes involved in both MBT Scenarios, Configuration A (an MBT Facility with Composting) and Configuration B (an MBT Facility with Dry Anaerobic Digestion and Composting), is included in this section.

### 2.1 EXISTING SITE

#### 2.1.1 Site Location

The Bord na Móna property, as outlined in blue on Figure 1.1, is located within the County Kildare townlands of Drehid, Ballynamullagh, Kilmurry, Mulgeeth, Mucklon, Timahoe East, Timahoe West, Coolcarrigan, Corduff, Coolearagh West, Allenwood North, Killinagh Upper, Killinagh Lower, Ballynakill Upper, Ballynakill Lower, Drummond, Kilkeaskin, Loughnacush, and Parsonstown.

The site boundary or the activity boundary, outlined by the red line on Figure 1.1, which is defined as the area in which all activities associated with the Drehid MBT Facility will occur, is confined to the townlands of Coolcarrigan, Drummond and Kilkeaskin. It should be noted that the activities associated with the Drehid MBT Facility will be confined to a landbank of approximately 29ha.

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

The village of Derrinturn is located approximately 3km north west of the closest edge of the site activity boundary and Timahoe crossroads is located approximately 2.5km east of the closest edge of the site activity boundary.

The MBT Facility site is located within a segment of land within the Bord na Móna landholding, which is located to the east of the existing access road and approximately 1km south of the existing Drehid Waste Management Facility. The topographic landform within the site boundary consists of flat lying to gently undulating topography of cut away peatland.

Figure 1.1, an extract from the *Discovery Series Map No 49*, shows the site location relative to a number of adjacent villages including Derrinturn, Timahoe, Coill Dubh

and Allenwood at a scale of 1:100,000. The location of the site boundary relative to the R402 and R403 regional roads is also shown on Figure 1.1.

For the purposes of clarification, Table 2-1 below indicates the area of the overall Bord na Móna landholding and the extent of the site activity boundary for the Drehid MBT Facility, together with the area within the activity boundary that will be reserved for landscaping. These are also shown on Figure 1.1 and Figure 2.2. An aerial photograph of the site is shown on Figure 2.3.

**Table 2-1 Outline of Site Areas**

Item	Area hectares (ha)
Bord na Móna Ownership Boundary ('Blue Line Boundary') (South Bog – 1,745 ha and North Bog – 799 ha)	2,544ha
Drehid MBT Facility Site/Activity Boundary ('Red Line Boundary')	29ha
Area within the Activity Boundary reserved for landscaping and maintaining buffers	14.5ha

### *2.1.2 Proximity of Housing and Centres of Population*

Housing in the immediate area of the proposed site comprises predominantly single dwellings with adjacent farmyards and new bungalows. Figure 2.1 shows the outline of the Drehid MBT Facility footprint, the facility activity boundary, a 500m and a 1,000m radius from the footprint.

As shown, the immediate area is reasonably sparsely populated. The nearest residential dwelling is located approximately 1km to the west of the proposed activity boundary. The largest concentration of houses close to the proposed facility is to the north west of the site in the village of Derrinturn.

### *2.1.3 Land Use*

The existing Bord na Móna operated Drehid Waste Management Facility is located approximately 1km north of the location of the proposed MBT Facility within the Bord na Móna landholding. Land use on and adjacent to the MBT Facility site is primarily disused cutaway bogland used up to approximately twenty two years ago for production of sod peat for energy generation. Immediately adjacent to the MBT Facility site there are areas of land where turbary, commercial forestry and agricultural usage are evident.

#### 2.1.4 Infrastructure

As part of the background information necessary to comply with the requirements of the EIS, an assessment of the existing traffic and infrastructure was undertaken and the findings of the study are outlined herein.

##### 2.1.4.1 Location of the Drehid MBT Facility (traffic and access)

The Drehid MBT Facility will be located within the confines of the Bord na Móna landholding in the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare.

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

Given that access to the proposed MBT Facility will be by means of the already permitted and existing site entrance at the R403 regional road, it will be ultimately accessible via a network of regional routes which in turn link with the National Motorway network. The R403 lies south, and southwest and west of the site. The R403 joins the R402 at Carbury to the northwest of the site. The R402 connects to the M4 while the R403 connects to central and south County Kildare. The M4 (Dublin to Sligo/Galway) motorway is located approximately 9km to the north of the proposed MBT Facility location, while the M7 (Dublin to Limerick/Cork) motorway is located approximately 17km to the south of the proposed MBT Facility location.

The speed limit along the R403 regional road, in approaching this site access, is 80km/h. The R403 has an approximate carriageway width of 6.0m in the vicinity of the site access, which is an adequate width for two Heavy Goods Vehicles (HGVs) to pass one another with 1.0m clearance. A ghost island right turn lane junction has been provided at the site access and includes road markings. Through lanes have been constructed in each direction 3.0m wide and a right turning lane 3.0m wide has also been provided. Visibility of 4.5m x 160m is available at the site access junction.

Figure 11.1 in Chapter 11 of this EIS shows the proposed Drehid MBT Facility in relation to the adjoining road network, including the national primary roads, regional and county roads and also the main towns and villages in the area.

##### 2.1.4.2 Existing Traffic Flows on the Adjoining Road Network

A series of traffic counts were carried out in the area in 2012, along the haul routes proposed to be used by vehicles associated with the MBT Facility. The locations of these counts are shown on Figure 11.1.

The estimated AADT on the R403 was 8,291 at location ATC9, 6,236 at location ATC7, 4,171 at location ATC4, 4,378 at the Bord na Móna landholding site entrance

and 5,017 at location ATC3. The HGV content at these locations ranged between 2.9% and 9.5% with the HGV content at the existing site entrance was approximately 10%.

The estimated AADT on the R402 was 3,354 at location ATC1 and 5,595 at location ATC2 with a HGV content of approximately 4.4% and 3.5% at these locations respectively. The estimated AADT on the R407 was 12,404 at location ATC10 with a HGV content of 3.9%. The estimated AADT on the R409 was 3,298 at location ATC8 with a HGV content of 4.3%. The estimated AADT on the R415 was 3,217 at location ATC6 with a HGV content of 4%.

#### **2.1.4.3 Drehid Waste Management Facility**

As detailed in Chapter 1, the permitted and operational Bord na Móna Drehid Waste Management Facility is located approximately 1km north of the proposed MBT Facility site within the confines of the Bord na Móna landholding. This waste management facility includes a permitted landfill, composting facility, administration area, car park, access roads, weighbridge, settlement lagoons and ancillary infrastructure. The potential impacts arising from the operation of the proposed Drehid MBT Facility and the existing Drehid Waste Management Facility are assessed cumulatively where relevant within this EIS.

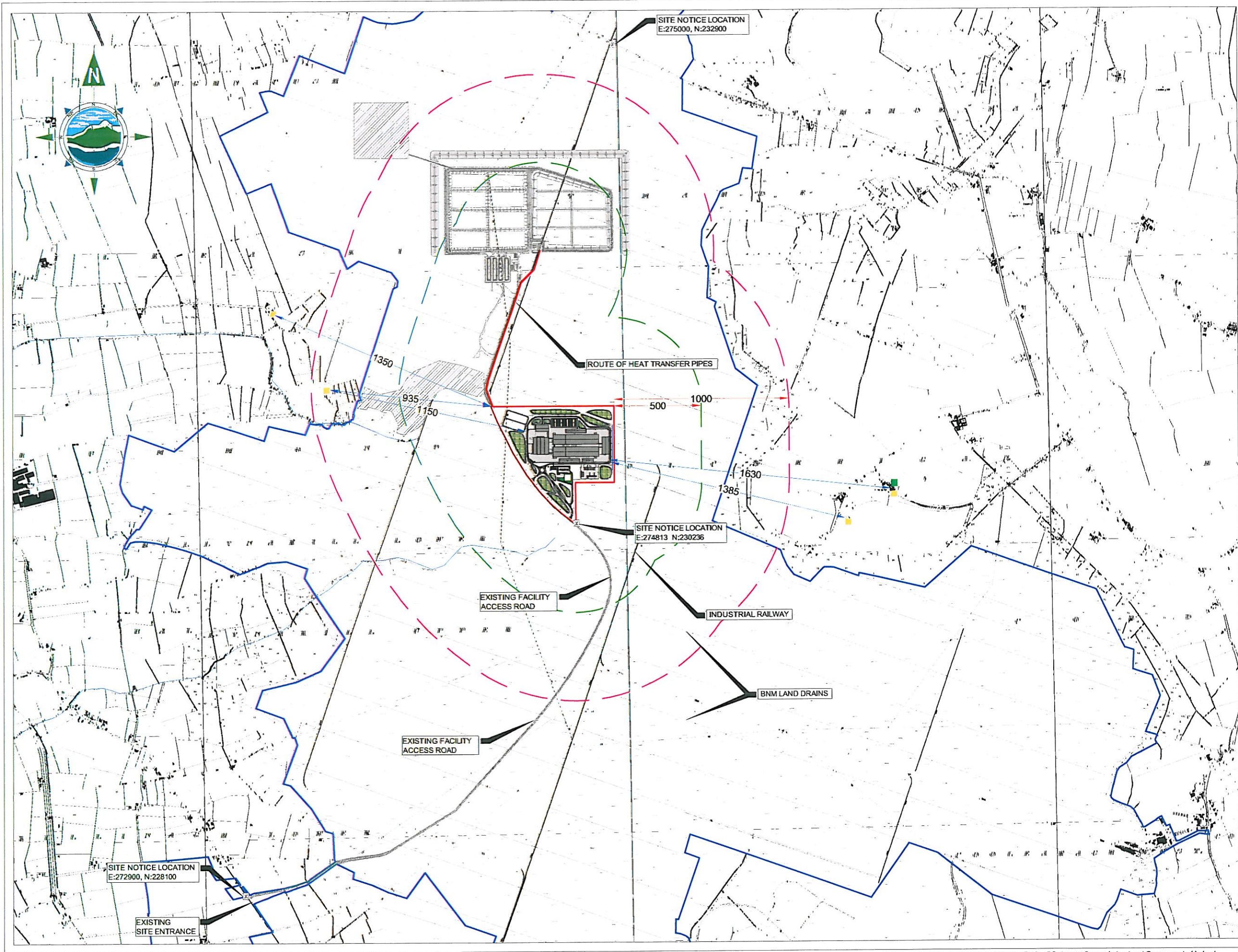
#### **2.1.5 Topography**

A detailed topographical survey was carried out at the site in February 2012 by ORS Ltd. The final output of this survey of the proposed site is presented as a topographic contour map on Figure 2.4.

The proposed site is situated in low-lying cutaway bogland with levels ranging from 83m to 86mOD. Whilst the topography throughout the overall landholding is relatively flat at 80 to 90mOD, screening of the site operations from the adjoining roads will be provided by existing hedgerows and tree lines, which will be augmented by additional planting surrounding the MBT Facility. The remote nature of the location of the facility footprint, lying approximately 2km south of county road L5025, 2.4km from county road L1910 and 2.8km from regional road R403, provides considerable separation distances between the proposed MBT facility and adjacent roads.

These separation distances are enhanced by the growth of bog willow tree stands over several parts of the cutaway bogland and by dense hedge lines and commercial forestry to the east, south and west of the site.





GENERAL LEGEND	
OWNERSHIP BOUNDARY	ACTIVITY BOUNDARY
500m BUFFER ZONE	1000m BUFFER ZONE
BUILDINGS LEGEND	
FARM BUILDINGS AND SHEDS	DWELLING HOUSE

- NOTES
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
  2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
  3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
  4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	05.05.12	ISSUED FOR REPORT	LN	ST

Client:

**BORD NA MÓNA**

Project:

**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:

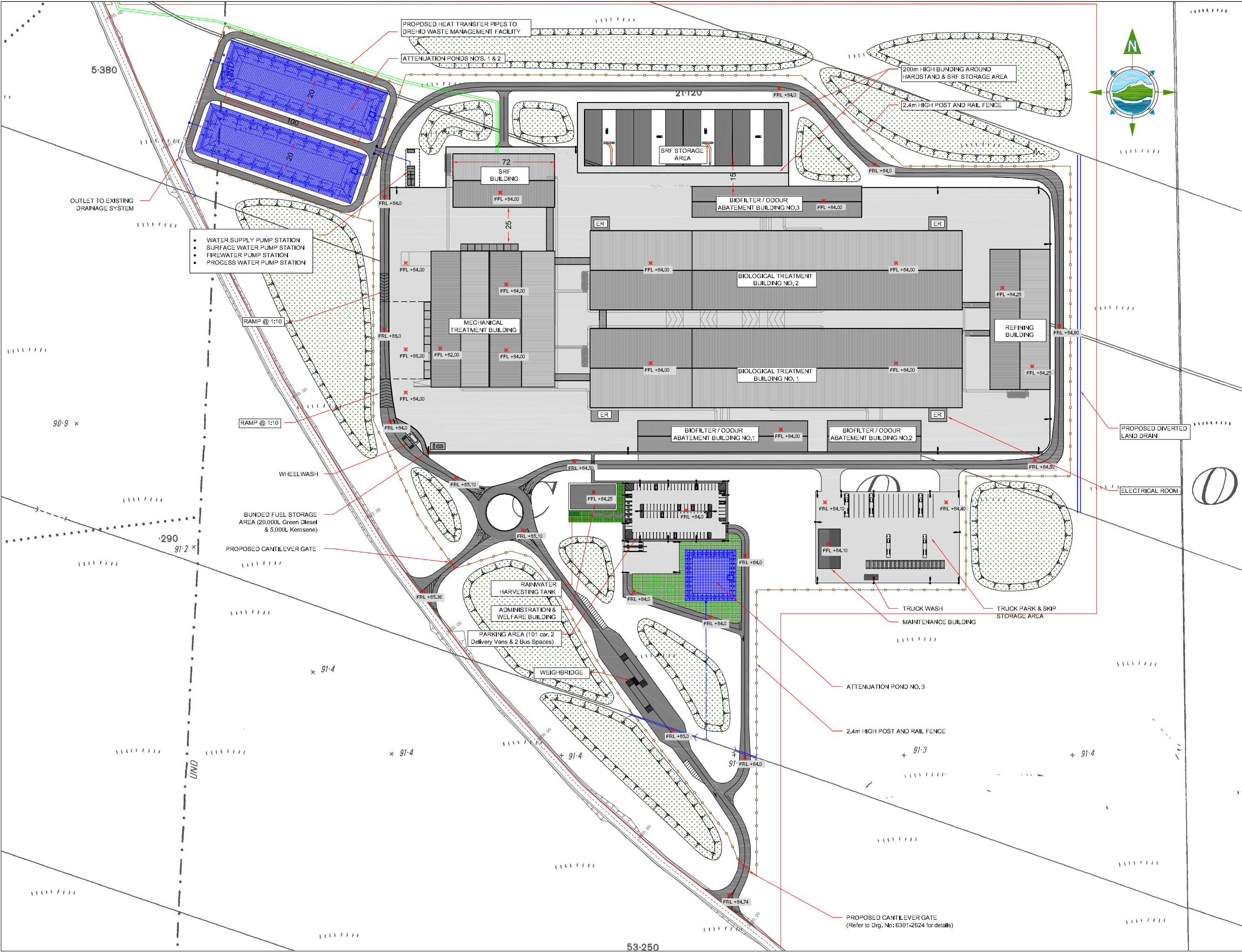
**SITE LOCATION MAP**

Scale @ A3:	1:15,000	
Prepared by:	Checked:	Date:
M. Nolan	S. Tinnolly	February 2012
Project Director:	D. Grehan	

**TOBIN**  
Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

Drawing No.:	FIGURE 2.1	Issue:	A
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GENERAL LEGEND

- ACTIVITY BOUNDARY
- PROPOSED CHAINLINK FENCE
- PROPOSED ROAD
- PROPOSED HARDSTAND
- PROPOSED ATTENUATION POND
- PROPOSED GREEN AREA
- PROPOSED BUILDINGS
- FINISHED ROAD LEVEL
- FINISHED FLOOR LEVEL
- PROPOSED LANDSCAPED SCREENING BERM

NOTES:

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

Issue	Date	Description	By	Chkd.
A	05.05.12	ISSUED FOR REPORT	M.N.	D.C.

Client:

**BORD NA MÓNA**

Project:

**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:

**SITE LAYOUT  
PLAN**

Scale @ A3: 1:2,500

Prepared by: M. Nolan  
Checked: D. Conneran  
Date: May 2012  
Project Director: D. Grehan

**TOBIN**  
Patrick J. Tobin & Co. Ltd.

Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353(0)1-8030406  
fax: +353(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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Drawing No.: Figure 2.2

Issue: A





GENERAL LEGEND

BORD NA MÓNA

OWNERSHIP BOUNDARY

SITE

ACTIVITY 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 TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES

4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

5. 6" OS SHEET NO'S: KILDARE 3, 4, 8, 9 & 13

300m

0

300m

600m

900m

A	05.06.12	ISSUED FOR REPORT	M/N	ST	
Issue	Date	Description	By	Chkd.	

Client:

BORD NA MÓNA

Project:

DREHID

MECHANICAL BIOLOGICAL

TREATMENT (MBT) FACILITY

Title:

AERIAL PHOTOGRAPH

Scale @ A3:

1:25,000

Prepared by:

M. Nolan

Checked:

S. Tinnelly

Date:

May 2012

Project Director:

D. Grehan

TOBIN

Petrick J. Tobin & Co. Ltd.

Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland,  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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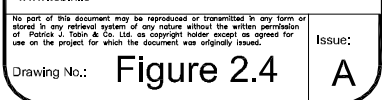
Issue:

Drawing No.:

Figure 2.3

A





## 2.2 DETAIL OF THE PROPOSED DEVELOPMENT

As outlined in Chapter 1, Bord Na Móna proposes to develop a Mechanical Biological Treatment (MBT) facility within its landholding located within the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare. No modifications to already permitted facilities, including the entrance from the R403 regional road, are envisaged.

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

Mechanical Biological Treatment through a combination of mechanical processing and biological treatment (such as composting and anaerobic digestion) reduces the volume of waste which requires treatment by disposal in landfill or incineration. By virtue of the biological process in an MBT facility, biodegradable municipal waste can be biostabilised thereby eliminating its potential to generate methane (a harmful greenhouse gas) and leachate, thus contributing to the fulfilment of Ireland's targets under the Landfill Directive (1999/31/EC). It should be noted that biostabilised waste is not considered biodegradable municipal waste if it meets the AT<sub>4</sub> requirements of the EPA.<sup>58</sup>

In deciding on the configuration of the biological process, and in particular the inclusion of Anaerobic Digestion, consideration was had of the fiscal incentives for the development of Anaerobic Digestion – namely the Renewable Energy Feed In Tariff (REFIT). Regrettably, the current fiscal incentives in the Republic of Ireland make it difficult to create a compelling or indeed viable, economic argument for the development of Anaerobic Digestion. The REFIT for Anaerobic Digestion in the Republic of Ireland is significantly inferior to its equivalents in Northern Ireland and Italy (for example).

Therefore, Bord na Móna proposes the preparation of the Planning Application and Waste Licence Application for the proposed Drehid MBT Facility such that it provides for the development of an optional Dry Anaerobic Digestion step as part of the biological treatment stage. This approach has been subject to detailed pre-application discussions with both An Bord Pleanála and the EPA.

The biological treatment stage will include a composting step in any event. The Planning Application and Waste Licence Application includes for both scenarios

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<sup>58</sup> The AT<sub>4</sub> is a static respiration index (SRI) test used to calculate the oxygen consumption of a sample over a period of time. The index determines the biological stability of compost or other organic materials.

(Configuration A (MBT with Composting), as illustrated in Flow Diagram No. 1 in section 2.3 below and Configuration B (MBT with Dry Anaerobic Digestion and Composting) as illustrated in Flow Diagram No. 2 in section 2.3 below). The potential impacts and mitigation measures for both configurations are also considered within the EIS.

The design of the MBT Facility is such that there are no significant external differences between Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting). It is proposed that the AD plant and ancillary plant will be located within the enclosure of the biological treatment buildings. The main physical difference between the two Configurations will be that Configuration B will have a standby gas flare compound and a stack associated with the CHP plant. In addition, Configuration B will require physical infrastructure (i.e. overhead power line) to facilitate the export of electricity to the electricity network. Any required planning consents to facilitate this infrastructure will be arranged in due course by ESB Networks. Bord na Móna owned switch gear and transformers associated with the export of electricity will be located in the Electrical Room.

### *2.2.1 Proposed Site Infrastructure*

This section details the site infrastructure that is proposed for the MBT Facility. Figure 2.2 includes the site layout plan for the development.

#### **2.2.1.1 Site Access**

Access to the MBT Facility will be via the permitted and existing site entrance, located on the R403 regional road. A permitted 4.8km access road links this entrance to the permitted Bord na Móna operated Drehid Waste Management Facility. This entrance and access road will also be used by vehicles travelling to and from the Drehid MBT Facility. A dedicated access junction and site road is proposed from the existing access road to the Drehid MBT Facility as shown on Figure 2.2. Appropriate signage will direct employees and visitors to the designated car parking areas and waste vehicles to the incoming weighbridge.

#### **2.2.1.2 Site Security**

Site security arrangements to prevent unauthorised access at the Drehid MBT Facility include the following:

- The existing main entrance from the R403 regional road has secure fencing, stonewalls and pillars (2.4m high fencing and a 7m wide electric drive cantilever security gate that is closed outside normal operating times). This gate is located as shown on Figure 2.1.
- Fencing around the entire boundary of the Drehid MBT Facility footprint, with the exception of the MBT Facility site entrance, will comprise of post and chain link fencing. The fencing layout is shown on Figure 2.2, with fencing details presented

in Drawing 6301-2417 (Volume 3 of this EIS).

- Palisade type anti-intruder security fencing, 2.4m in height, will be erected at the MBT Facility site entrance.
- A CCTV system monitors the existing access from the R403 regional road and the infrastructure associated with the existing Drehid Waste Management Facility. A CCTV system will also monitor the entrance to the Drehid MBT Facility.
- Anti-intruder alarms will be located in all lockable MBT Facility buildings.

In addition to the above, site signage relating to the Drehid Waste Management Facility indicating opening times and contact details is currently maintained at the main site entrance. Additional signage will be provided, at the entrance from the R403 regional road, for the proposed MBT Facility. 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.

#### **2.2.1.3 Administration and Welfare Building**

An Administration and Welfare Building is proposed to form part of the proposed MBT Facility and will be comprised of two floors. The building will provide all necessary welfare facilities for the personnel required for the operation and maintenance of the MBT Facility. It is envisaged that this will be a steel framed building, incorporating precast concrete floors and an insulated cladding system including a high quality insulated window system.

It is envisaged that the MBT Administration and Welfare Building will comprise of a ground floor and a first floor, and will include the following areas as shown on Drawing 6301-2422 (Volume 3 of this EIS):

- Canteen (Operational and maintenance personnel)
- Canteen (Supervisory and office personnel)
- Changing room
- Washing/Drying Room (washing and drying of clothing)
- Toilets and showers (Operational and maintenance personnel)
- Toilets and showers (Supervisory and office personnel)
- 2 No. Meeting Rooms (to accommodate the seating of 8 personnel)
- Plant Manager's office
- 2 No. Plant Supervisor offices
- 2 No. offices (to facilitate a person and the storage of files)
- Open plan office (to accommodate 10 No. people)
- Server Room
- SCADA Room
- Records Room
- Laboratory
- Educational/training room



The design of the MBT Administration and Welfare Building includes all necessary provisions required for the operation and maintenance of the MBT Facility in accordance with safety, health and welfare at work legislation and other legal requirements.

Air conditioning will be provided in all areas of this building. Fire and intruder alarm systems will also be installed in this building.

The design of this building has sustainability at its core. To this end, the building is designed to include rain water harvesting from roofed areas, solar panels and geothermal heating.

The building will comply with the latest version of the Building Regulations (including access for disabled people).

It is the intention of Bord na Móna to utilise the educational room in the Administration and Welfare Building for environmental education needs. Poster presentations and literature on waste management and on the workings of the Drehid MBT Facility will be available in this room. Provision will also be made for the inspection of the EPA waste licence and Annual Environmental Reports (AERs) in this room.

#### **2.2.1.4 Laboratory Facilities**

A small laboratory is proposed to be established on site in the Administration and Welfare Building which will allow for the carrying out of the routine monitoring requirements at the site. Groundwater and surface water analyses will be carried out on a periodic basis in compliance with licence requirements. 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 or surface water will not be carried out at the site laboratory. An external, accredited laboratory will carry out the analysis of samples as required under EPA waste licence conditions.

#### **2.2.1.5 Mechanical Treatment Building**

The Mechanical Treatment Building will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding. Details of the structure and dimensions of the Mechanical Treatment Building are included in Drawing 6301-2425 (Volume 3 of this EIS). The building will be supplied with 3-phase power and will include both security and fire



alarm systems. Doors at the waste reception area will be rapid closing doors, with an opening or closing time of approximately 20 seconds. Doors for the acceptance of waste will be fitted with air curtains to minimise the escape of potentially odourous emissions when a door is opened. All processes proposed to take place in this building are detailed in Section 2.3 below. In addition, Section 2.3 describes the features and equipment proposed within this building.

#### **2.2.1.6 Biological Treatment Buildings**

The Biological Treatment Buildings (including Biological Treatment Building No. 1 and Biological Treatment Building No. 2) will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. Plan and elevation details of the Biological Treatment Buildings are included in Drawing 6301-2428 to Drawing 6301-2435 (Volume 3 of this EIS). The buildings will be supplied with 3-phase power and will include both security and fire alarm systems. All processes proposed to take place in these buildings are detailed in Section 2.3 below, which includes a description of the processes for both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) In addition, Section 2.3 describes the features and equipment proposed within these buildings.

#### **2.2.1.7 Refining Building**

The Refining Building will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. Details of the structure and dimensions of the Refining Building are included in Drawing 6301-2426 (Volume 3 of this EIS). The building will be supplied with 3-phase power and will include both security and fire alarm systems. All processes proposed to take place in this building are detailed in Section 2.3 below. In addition, Section 2.3 describes the features and equipment proposed within this building.

#### **2.2.1.8 SRF Building**

The SRF Building will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. The SRF thermal dryer will be located in this building. Details of the structure and dimensions of the SRF Building are shown on Drawing 6301-2424 (Volume 3 of this EIS). The buildings will be supplied with 3-phase power and will include both security and fire alarm systems. All processes proposed to take place in this building are detailed in Section 2.3 below. In addition, Section 2.3 describes the features and equipment proposed within this building.

#### **2.2.1.9 Maintenance Building**

The Maintenance Building will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and

with roller shutter doors. Details of the structure and dimensions of this building are included in Drawing 6301-2427 (Volume 3 of this EIS). This building will be fitted with secure storage areas to accommodate power tools, other small plant and equipment. A proprietary bunded container to EPA requirements will be provided for the storage of hydraulic oil. The building will be supplied by 3-phase power and will include both security and fire alarm systems.

#### **2.2.1.10 SRF Storage Area**

It is proposed that baled and plastic wrapped SRF will be stored in an outdoor storage area as shown on Figure 2.2. This storage area will comprise of a bunded concrete area and the SRF will be stored in wrapped bales approximately 1m<sup>3</sup> in size and four bales high.

#### **2.2.1.11 Biofilter/Odour Abatement Buildings**

As shown on Figure 2.2, there will be three separate Biofilter/Odour Abatement Buildings at the MBT Facility. The Biofilter/Odour Abatement Buildings will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. Details of the structure and dimensions of these buildings are included in Drawing 6301-2423 (Volume 3 of this EIS). An odour abatement system plant room will be located in the centre of each Biofilter/Odour Abatement Building. Plant rooms will be supplied with 3-phase power and will include both security and fire alarm systems. A storage tank for MBT process waste water and a storage tank for clean water will be located within each plant room.

Within each Biofilter/Odour Abatement Building, a biofilter section will be located at each side of the odour abatement system plant room as shown on Drawing 6301-2423 (Volume 3 of this EIS).

Each biofilter section will consist of a concrete basin. The biofilter floor will consist of perforated concrete slabs supported by walls which will allow the air to flow evenly under the complete biofilter field. The air discharged from the acid scrubbers and air humidifiers will be blown into air plenums before being forced through the biofilter material. Treated air emissions, from each biofilter section, will be vented to atmosphere by a 20m high stack.

A detailed description of the odour abatement systems is included in Appendix 2.1.

#### **2.2.1.12 Weighbridge and Weighbridge Kiosk**

Two proprietary weighbridges, each capable of weighing up to 60 tonnes, will be provided at the MBT Facility entrance at the locations outlined on Figure 2.2. Each weighbridge will be linked 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
- Empty weight

Two weighbridges will be constructed, one to weigh incoming vehicles and the second to weigh outgoing vehicles. The two weighbridges are considered necessary to allow for the free-flow of vehicular traffic and to ensure efficient turn around times at the facility.

Entry control barriers will be provided at each of these weighbridges.

A weighbridge kiosk as shown on Figure 2.2 will be constructed between the two weighbridges and will include toilet facilities. Details of the weighbridge kiosk are presented on Drawing 6301-2416 (Volume 3 of this EIS).

#### **2.2.1.13 Wheel wash**

A wheel wash will be provided at the site, at the location shown on Figure 2.2. Details of the wheelwash are shown on Drawing 6301-2415 (Volume 3 of this EIS).

It is proposed to position the wheel wash at this location to ensure that waste vehicles leaving the waste reception area at the Mechanical Treatment Building do not carry excess waste onto the adjoining road infrastructure.

The wheel wash will have a self-contained water recirculation system. A tank will store water for washing purposes, 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.

#### **2.2.1.14 Fuel Storage**

Bunded fuel storage will be provided for the diesel fuel that will be required for the on site plant and equipment. Kerosene will also be stored on site for the backup heating system for the Administration and Welfare Building.

This bunded fuel storage area will be roofed and located to the south of the Mechanical Treatment Building at the location shown on Figure 2.2. This bunded fuel storage area will comprise of a proprietary 20,000 litre (20m<sup>3</sup>) diesel tank and a 5,000 litre (5m<sup>3</sup>) kerosene tank located in a bund with a total capacity of 30m<sup>3</sup>.

#### **2.2.1.15 Site Roads, Parking and Hardstanding**

Concrete hardstand areas will be provided at the waste reception area, fuel storage area, truck wash/parking area and skip storage area and adjacent to each MBT Facility Buildings.

Site roads are also proposed from the existing access road to the Administration and Welfare Building and around the MBT Facility. Roads and parking areas will typically be designed as bituminous macadam pavements, or where appropriate, concrete pavements. The proposed locations of these areas at the site are shown on Figure 2.2 and are detailed on Drawing 6301-2411 (Volume 3 of this EIS). Drainage from the hardstanding areas will be pumped/drained to the proposed surface water collection system, via oil interceptors. Where possible, existing trees and scrub will be retained within the MBT Facility Site.

#### **2.2.1.16 Truck Wash/ Park & Skip Storage**

It is proposed to locate a truck wash, a truck parking area and a skip storage area near the Maintenance Building as shown on Figure 2.2. This area will comprise of concrete hardstand areas and surface water drainage from this area will be connected to the overall surface water drainage network for the MBT Facility via oil interceptors. Water from the truck wash will be contained and recycled. Overflow will be treated as foul water and will be directed to an onsite holding tank, from where it will be tankered off site to a suitably licensed waste water treatment plant.

#### **2.2.1.17 Traffic Control**

All waste traffic will access the Bord na Móna landholding by turning from the R403 regional road into the existing permitted site entrance, and then travelling along the existing access road to the MBT Facility entrance. Traffic management to/from the MBT Facility site is dealt with in more detail in Chapter 11 (Traffic) of this EIS.

Given the length of the access road from the R403, there is no possibility of traffic on the R403 regional road being affected by vehicles queuing to enter the MBT Facility (or cumulative traffic associated with the Drehid Waste Management Facility).

All waste vehicles, having left the existing access road and entered the MBT Facility entrance gate, will travel to the site weighbridge/ reception kiosk at the location shown on Figure 2.2, where the weight, source, type etc. of waste will be recorded and instructions will be given as to where to proceed with the waste. Access to both the incoming and outgoing weighbridges will be controlled by the usage of security barriers.

An adequate number of signs will be positioned strategically around the site to direct users to each location within the MBT Facility in a proper manner. Access to the

weighbridge and the waste reception area at the Mechanical Treatment Building will be carried out in a queued formation, controlled by the site operatives.

A dedicated entrance to the Administration and Welfare Building will ensure that people visiting the facility, for example for deliveries or meetings, are kept removed from the main MBT Facility as shown on Figure 2.2.

Car parking is provided for 101 cars, 2 delivery vans and 2 coaches adjacent to the Administration and Welfare Building. In addition, there will be 18 spaces provided for HGV parking adjacent to the Maintenance Building.

#### **2.2.1.18 Potable Water Supply**

Potable water supply for the site is proposed to be from an on site borehole as indicated on Drawing No. 6301 - 2407 (Volume 3 of this EIS). It is proposed to pump water from this borehole to the site infrastructure, via a water treatment plant, which will treat the water to remove iron, manganese and ammonia to acceptable limits. A layout of the potable watermain is shown on Drawing 6301-2407, with details shown on Drawing No. 6301 – 2413.

The distribution main will be 100mm dia. and looped as per best practice where possible. However, where dead ends occur they will terminate in duckfoot hydrants as set out in the guidance document “Site Development Works for Housing Areas”. It is estimated that the peak water demand for the development is approximately 0.136 l/s (see potable water calculations in Appendix 2 of the Engineering Services Report for justification of this figure).

#### **2.2.1.19 Surface Water and Foul Water Infrastructure**

The layout of the surface water drainage system proposed for the site is shown on Drawing No. 6301 - 2405 (Volume 3 of this EIS).

As shown on Drawing No. 6301 – 2405, a proprietary grit interception trap and a proprietary oil interceptor 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 surface water attenuation ponds/lagoons for further treatment. These ponds are sized to provide adequate capacity for a 100-year storm event, meet facility fire-fighting water requirements and provide water to meet MBT process demands when necessary. Overflow from these attenuation ponds will be diverted to a nearby bog drainage channel. Details of the ponds (lagoons) are shown in Drawing 6301-2410 (Volume 3 of this EIS).

It is important to note that MBT process waste water will be fully contained and collected in process waste water tanks for reuse where possible. The MBT process

waste water collection system will be fully isolated from the surface water collection system during the lifetime of the facility.

The description and details of the attenuation ponds is provided in the Engineering Services Report (Appendix 2.2 of this EIS).

Potential sources of foul water at the proposed development are:

- Wastewater from sanitary facilities;
- Overflow water from the wheel wash;
- Run off from the external SRF storage area (only if contamination is detected);
- Run off from the truck wash; and
- MBT process waste water.

The foul water system has been divided into two distinct networks:

- Sanitary wastewater system, which will collect discharge from sanitary appliances within the various buildings and discharge to the onsite wastewater holding tank; and
- Process effluent system, which will collect leachate and runoff from the process buildings and discharge to the process water storage tanks, for reuse.

Sanitary wastewater (i.e. wastewater from toilets, washing facilities, kitchens etc.) will be collected in each building and directed to the onsite wastewater holding tank, via the foulwater collection network. The majority of the foul collection network will be a gravity system, however it is proposed that the weighbridge kiosk area be connected to the system via a pumping station and rising main, due to the distance from network and the flat gradient of the site.

The onsite storage tank will utilise a high level alarm which will notify the operators of the plant that the tank needs to be emptied and tankered to a suitably licensed WWTP.

Appendix 4 of the Engineering Services Report contains calculations with respect to the foul discharge loading and network characteristics.

#### **2.2.1.20 MBT Process Waste Water Infrastructure**

Waste water will be produced at various stages in the MBT process. The MBT process has been designed in order to maximise the reuse of waste water.



A collection system is proposed to collect waste water from the various processes within the proposed development. The collected process waste water shall be diverted to the process waste water storage tanks for reuse.

A flow diagram has been provided in Appendix 1 of the Engineering Services Report (Appendix 2.2 of this EIS), to further facilitate an understanding of the movement of process waste water throughout the proposed development.

To mitigate any risk of a leak from process waste water tanks it is proposed that they are constructed above ground, and located within the odour abatement system plant rooms. Thus, on the basis that there will be 3 No. odour abatement systems, there will be 3 No. waste water tanks. Each tank will have an envisaged capacity of 400 cubic metres. All pipe work used for the transport of process waste water shall be specified as fusion welded polyethylene, or similar approved.

In the case of MBT Configuration B (involving dry AD and composting), a fermentation tank will be constructed adjacent to the dry AD tunnels (between the dry AD tunnels and the composting tunnels) in Biological Treatment Building No.1 and in Biological Treatment Building No.2. Each fermentation tank will have an envisaged capacity of 900 cubic metres.

#### **2.2.1.21 Other Services**

Other services that will be provided at the MBT Facility site include:

- Telephone system;
- Water from an on-site borehole;
- 400v three phase electricity;
- Standby diesel generators;
- Standby pumps;
- Gas detection systems in the site buildings; and,
- Meteorological station.

#### **2.2.1.22 Building Ventilation and Odour Abatement System**

The proposed MBT Facility will include a building ventilation system and an odour abatement system.

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 MBT plant operators.

The odour abatement system will treat the air extracted by the building ventilation system and the process air exhausted by the biological treatment process. The core components of the odour abatement system include acid scrubbers, humidifiers and biofilters. As is commonplace in modern MBT facilities, the volumes of extracted building air requiring treatment in the odour abatement system will be optimised by the integration and cascading of air flows between buildings and operational areas.

On the basis that each facility building at the proposed MBT Facility will facilitate a specific element of the MBT process, the ventilation and odour abatement system will take account of the different process activities in each facility building. This approach will ensure the efficient and focused treatment of odours generated by the MBT process.

The layout of the building ventilation system and the odour abatement system is presented in Appendix 2.1 for Configuration A (MBT with composting) and Configuration B (MBT with Dry Anaerobic Digestion and composting). A detailed description of the building ventilation and odour abatement systems is also included in Appendix 2.1.

#### **2.2.1.23 Fire Control System**

A number of fire control features are proposed for the MBT Facility as detailed in the Engineering Services Report (included in Appendix 2.2 of this EIS). These include fire alarms, a fire water supply by way of the surface water settlement ponds, a fire water main and fire water hydrants. In addition, the following fire control measures will also be implemented:

- Control of incoming waste vehicles to ensure that no burning or smouldering loads enter the facility;
- All site operatives and employees will be trained in fire prevention, control and emergency response procedures;
- Emergency response contact numbers (Fire Service, Gardaí, Ambulance and other agencies) will be posted in prominent locations;
- Automatic communication of fire alarms to mobile phone numbers of assigned responsible individuals;
- Fire extinguishers, smoke detectors and fire alarms will be provided in all facility buildings;
- A water bowser will be available to deal with any small fires within the facility;
- SRF material will be dried within a dedicated SRF Building. The heated air to the SRF dryer will be at an envisaged temperature of 150°C. As a result, the temperature of the SRF will not exceed 55-65°C – thereby minimising the occurrence of fires;
- A rainwater harvesting tank (located next to the Administration and Welfare Building) and the surface water settlement lagoons will act as back up fire-

- fighting water sources; and
- Smoking will not be permitted at the MBT Facility.

In the event of a fire at the MBT Facility, excess firewater will be collected within the surface water ponds. This firewater will subsequently be analysed prior to possible tankering off-site to an approved wastewater treatment plant.

#### **2.2.1.24 Heat Transfer System**

Both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) will use process heat. Process heat will be used, primarily, in order to permit drying of the Solid Recovered Fuel (SRF) fraction in order to improve its fuel characteristics.

Under Configuration A (MBT with Composting), process heat will be provided by a CHP system (operating on landfill gas) at the existing Drehid Waste Management Facility.

Under Configuration B (MBT with Dry Anaerobic Digestion and Composting), process heat will be provided by a CHP system (operating on biogas generated by the dry AD process) at the MBT facility. The balance of the process heat required by the MBT Facility will be provided by a CHP system (operating on landfill gas) at the Drehid Waste Management Facility.

The transfer of heat from the CHP system at the Drehid Waste Management Facility to the MBT Facility will be by hot water, at approximately 180°C and approximately 20 bar pressure. The underground heat transfer pipe work will be installed adjacent to the existing access road between the MBT Facility site and the Drehid Waste Management Facility, as shown on Figure 2.1. and detailed on Drawing Nos. 6301 – 2408 and 6301-2420.

An inspection chamber will be located at each thermal expansion loop/joint, to permit ready inspection of the pipe work condition. The number of loops required will be calculated during the detailed design.

A detailed description of the heat transfer system between the existing Drehid Waste Management Facility and the Drehid MBT Facility is included in Appendix 2.3 of this EIS.

#### **2.2.1.25 Gas Flare**

The location for the gas flaring equipment is shown on Figure 2.2. The gas flare will be equipped with regulator valves, monitoring valves, ventilator, flame arrestor, flare and ignition equipment.

The gas flare will flare in accordance with EU standards in terms of combustion, temperature, retention times, emission levels, etc. In particular, biogas would be flared at a temperature of between 1000°C and 1200°C with a minimum combustion retention time of 0.3 seconds.

It should be noted that this is a standby gas flare which will be used in the event that the CHP Plants are unavailable and that there is insufficient volume in the biogas storage bladders. This standby gas flare will only be a feature of Configuration B (MBT with Dry Anaerobic Digestion and Composting).

### *2.2.2 Project Construction Phase*

#### **2.2.2.1 Construction Management Plan**

A Construction Management Plan will be drawn up prior to the commencement of construction activities, in order to minimise the impacts on the environment during construction. The Construction Management Plan will detail the allowable working day, construction traffic, parking arrangements and will incorporate environmental protection measures. Provisions to reduce the environmental impact of the construction activities associated with the proposed MBT Facility development will include the following:

- Contractors will be required to ensure that no pollution or obstruction of ground water and watercourses is caused by their operations;
- Contractors will be required to comply at a minimum with the provisions of BS 5228 (Noise Control on Construction and Demolition Sites), Part I & Part 2, 1997;
- Where necessary, contractors will be required to erect suitable noise barriers to minimise disturbance and avoid nuisance when operating machines at night (between 2000 hours and 0800 hours);
- Limiting vibration caused by construction plant to the maximum permitted values in the Irish NRA document: “Guidance for the Treatment of noise and vibration in National Road Schemes”
- Contractors will be required to take reasonable precautions to ensure that all wastewater discharged will not be harmful to or cause obstruction or deposit in drains and to prevent oil, grease or other objectionable matter being discharged into drains;
- Contractors will be required, during the execution of works, to keep all plant and materials and all equipment connected with the construction of the works in good working order, clean and tidy;
- Contractors will be required to remove any waste materials from the site to a licensed waste facility;
- Contractors will be required to ensure that the public roads in the vicinity of

the site are maintained free from all mud, dirt and rubbish, which may arise from or by reason of the execution of the works. To facilitate this, Contractors will be instructed to use a temporary wheel wash which will be installed at the facility;

- Disposal of excess concrete on any part of the construction site will be prohibited;
- Contractors will be required to provide a designated bin for washing down the chutes of concrete lorries on site;
- Contractors will be required to keep the construction compounds free and clear of excess dirt, rubbish piles and scrap wood etc. at all times. Contractors will be required to keep the designated parking area and other common areas clear and free of rubbish and debris;
- Contractors will be required to be responsible for the disposal of all wood, food, food packaging and paper generated during the construction phase and will be required to furnish containers and vehicles to collect and haul these items and dispose of them to a licensed waste recovery facility. Dumping of these items within the construction site will be prohibited;
- Scrap materials, rubbish, etc. will be hauled out of the work areas (daily) and disposed of by the Contractor on a daily basis to a licensed waste recovery facility;
- Contractors will be required to obtain any necessary permits from the Local Authority or Environmental Protection Agency for the disposal of waste;
- At the completion of the work, contractors will be required to leave the construction area in a neat, clean and orderly condition;
- Individual contractors will be required to provide sanitary facilities that are adequate for their construction personnel. Sanitary facilities will include proper wash down WC's with sewer connections, or if this is impractical, chemical closets; and
- All temporary buildings associated with construction of the development will comply with the Safety, Health and Welfare at Work Regulations (2005). On completion of the works, contractors must remove them entirely with all slab, drains and water mains and restore the surface of the land to its original condition or other reasonable conditions.

In addition, any excavated material generated during the construction of the facility will be reused on site, where appropriate. Parking facilities for construction vehicles and private transportation will be located within the development site. Temporary site fencing will be erected and maintained to secure the site during the construction phase.

### 2.2.2.2 Waste Generated during the Construction Phase and Fill Material Requirements

The wastes/spoils likely to be generated during the construction phase are presented in Table 2-2 below. This table also includes an estimate of the volumes of suitable fill material that will be imported during the construction phase.

**Table 2-2** Construction Waste and Fill Material Estimates

Peat to be excavated for Construction (m <sup>3</sup> )	Peat to be reused on site for landscaping (m <sup>3</sup> )	Material to be imported for Construction (including hardstand, parking and storage areas) (m <sup>3</sup> )
66,567.17	66,567.17	96,779.76

All construction materials (including oils and diesel) will be managed on site according to best practice and removed from site by appropriate measures where required.

Materials will be used where possible in landscaping (as shown in Table 2-2 above) and in the construction itself.

### 2.2.2.3 Construction Scheduling

It is envisaged that the construction of the proposed development will take place over a period of 24 months. The commissioning phase will be additional to this 24 month period and is envisaged to take place over a period of 8 months.

### 2.2.2.4 Construction Quality Assurance

In order to provide assurance that the MBT Facility is constructed in accordance with intended design and technical specifications, a comprehensive Construction Quality Assurance (CQA) plan will be implemented during the construction stage. The CQA plan will include Construction Quality Control (CQC) procedures to ensure that materials and workmanship meet defined specifications.

Construction quality control procedures will include the integrity testing of all surface water, foul water, process water pipe work and underground structures in accordance with industry accepted standards and procedures. All integrity testing will be inspected and witnessed by a Bord na Móna engineer or a consultant engineer acting on its behalf. Integrity test certificates will be signed by both the contractor's engineer and the engineer representing Bord na Móna.

Following the completion of construction and testing of the MBT Facility and prior to the acceptance of waste, it is proposed that a Construction Quality Assurance (CQA) Report will be prepared by a third party in compliance with good industry practice.

### *2.2.3 Project Operational Phase*

#### **2.2.3.1 Hours of Operation**

The mechanical treatment process at the Drehid MBT Facility will operate 6 days per week (Monday to Saturday inclusive) and for 16 hours per day (on a two shift basis) as follows:

- Shift A = 08.00 to 17.00
- Shift B = 17.00 to 02.00

The SRF drying process and the biological treatment process will operate on a continuous basis (24 hours per day and 7 days per week) and will be fully automated. It is envisaged that there will be two operators required at the MBT Facility, between the hours of 02.00 and 08.00, to supervise the SRF drying process.

Waste will be accepted to and outputs will depart from the MBT Facility from 7.30am to 6.15pm. 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 waste reception area and stored overnight within the fully enclosed Mechanical Treatment Building and handled during the next working day.

#### **2.2.3.2 Plant and Equipment**

The following mobile plant and equipment will be employed on-site for the two proposed configurations:

##### Configuration A (MBT with Composting)

- 2 No. Loading Shovels (Mechanical Treatment Building)
- 2 No. Loading Shovels (Maturation Building)
- 2 No. Loading Shovels (Refining Building)
- 2 No. Forklifts
- 2 No. Mechanical Grab Machines
- 1 No. Windrow Turner
- 1 No. Road Sweeper
- 1 No. Articulated Lorry for moving trailers

##### Configuration B (MBT with Dry Anaerobic Digestion and Composting)

- 2 No. Loading Shovels (Mechanical Treatment Building)
- 2 No. Loading Shovels (Dry AD/Composting Tunnels)
- 2 No. Loading Shovels (Maturation Building)



- 2 No. Loading Shovels (Refining Building)
- 2 No. Forklifts
- 2 No. Mechanical Grab Machines
- 1 No. Windrow Turner
- 1 No. Road Sweeper
- 1 No. Articulated Lorry for moving trailers

### **2.2.3.3 Waste Acceptance Procedures**

Only household, commercial and non-hazardous industrial wastes will be accepted at the MBT Facility.

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) and amending Regulations, the Waste Management (Collection Permit) (Amendment) Regulations (S.I No. 87 of 2008). The MBT 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. 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 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:

- a) the name of the person checking the load; and
- b) 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.

Following logging of authorised vehicles at the in-weighbridge, these vehicles will be directed to the waste reception area at the Mechanical Treatment Building.

Loads suspected of being non-compliant entering the MBT Facility will be tipped into the waste reception bunker within the Mechanical Treatment Building and inspected by the mechanical treatment process supervisor. If the load is non-compliant then the waste will be reloaded and the waste contractor will be responsible for removing it off-site.

A detailed description of waste acceptance for both scenarios – Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) - is included in Section 2.3 of this EIS.

#### Waste Storage

Waste from the HGVs will be deposited into the waste reception bunker within the Mechanical Treatment Building as directed by the site operative on duty at the MBT Facility. In the event of unavailability of the mechanical processing equipment, contingency is provided by virtue of the storage available in the waste reception bunker. This bunker is designed to accommodate the storage of approximately three days of incoming waste.

#### **2.2.3.4 Site Management Structure**

The management of the MBT Facility will generally be in accordance with that outlined in Table 2.3 below. It is envisaged that these permanent on-site staff will be employed directly by Bord na Móna.

The personnel employed at the facility will be suitably experienced and qualified to fill the role for which they will be employed.

**Table 2-3 Site Management Structure**

<b>Position</b>	<b>Duties/Responsibilities</b>	<b>Qualifications/Training</b>
Facility Manager	Overall management and responsibility for the operation and maintenance MBT Facility	Engineering degree or equivalent
Environmental Engineers/Scientists	Responsibility for environmental compliance of the MBT Facility	Engineering/Science degree
Maintenance Engineers	Responsibility for overall maintenance of the MBT Facility	Engineering degree
Mechanical	Overall supervision of the	Training in waste

<b>Position</b>	<b>Duties/Responsibilities</b>	<b>Qualifications/Training</b>
Treatment Process Supervisors	mechanical treatment process	management
Biological Treatment Process Supervisors	Overall supervision of the biological treatment process	Training in waste management
Refining and ABP Hygienisation Process Supervisors	Overall supervision of the refining and ABP hygienisation process	Training in waste management
Logistics Manager	Management and organisation of the transport of outputs to end destinations	Training in waste management
Weighbridge Operator	Waste acceptance Operation of weighbridge	Training in EPA waste acceptance procedures
Machine Operators	Waste handling for the MBT Facility	Training in operation of on-site machinery
Maintenance Technicians	Execution of preventative maintenance programmes and emergency maintenance tasks	Appropriate mechanical and electrical trade qualifications
General Operatives	General maintenance and repairs, quality control, cleaning etc.	

### 2.2.3.5 Raw Materials and Energy

The volumes of wastes/spoils likely to be generated, and the volumes of suitable fill material likely to be required, during the construction stage are outlined in Section 2.2.2.2.

The envisaged usage of diesel fuel, hydraulic oil, electricity and water is outlined in Table 2.4 and Table 2.5 below for both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting).

**Table 2-4 Estimated Raw Materials and Energy Usage for Operation of the Drehid MBT Facility – Configuration A (MBT with Composting)**

Material/Resource	Annual Usage per Annum	Amount Stored On-Site
Hydraulic Oil	1,500 litres	5,000 litres
Electricity	27,696 megawatt hours per annum	Not stored
Diesel	350,000 litres	20,000 litres
Water	1,463m <sup>3</sup> (Domestic Requirement)	Water supplied from on site borehole (well)
Water	11,462m <sup>3</sup> (For all processes including washdown of buildings)	<ul style="list-style-type: none"> <li>• 4,000m<sup>3</sup> (min) held in the surface water lagoons</li> <li>• 60m<sup>3</sup> x 3 No. clean water tanks in odour abatement system plant rooms</li> </ul>

**Table 2-5 Estimated Raw Materials and Energy Usage for Operation of the Drehid MBT Facility – Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

Material/Resource	Annual Usage per Annum	Amount Stored On-Site
Hydraulic Oil	1,500 litres	5,000 litres
Electricity	28,172 megawatt hours per annum (Note: 12,091 megawatt hours per annum produced by Configuration B)	Not stored
Diesel	400,000 litres	20,000 litres
Water	1,463m <sup>3</sup> (Domestic Requirement)	Water supplied from on site borehole (well)
Water	14,097 m <sup>3</sup> (For all processes including washdown of buildings)	<ul style="list-style-type: none"> <li>• 4,000m<sup>3</sup> (min) held in the surface water lagoons</li> <li>• 60m<sup>3</sup> x 3 No. clean water tanks in odour abatement</li> </ul>

Material/Resource	Annual Usage per Annum	Amount Stored On-Site
		system plant rooms

### 2.2.3.6 MBT Outputs

The proposed MBT Facility will provide for the acceptance and treatment of 250,000 tonnes per annum of municipal solid waste. A detailed description of the MBT process is provided in Section 2.3. The mechanical treatment process and the biological treatment process will produce outputs – as outlined in Table 2.6 and Table 2.7 below.

**Table 2-6 Estimated Annual Outputs for Configuration A (MBT with Composting)**

Output Type	Estimated Tonnage (TPA)	Envisaged Destination
Recyclables Recovered	37,397	Overseas
Solid Recovered Fuel (SRF)	78,159	Approved cement kilns located in the Republic of Ireland and overseas
Biostabilised Waste	50,084	Drehid Waste Management Facility (or other destinations - beyond life of Drehid WMF)
Rejects	19,533	Drehid Waste Management Facility (or other destinations - beyond life of Drehid WMF)
Process Losses	64,827	-

**Table 2-7 Estimated Annual Outputs for Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

<b>Output Type</b>	<b>Estimated Tonnage (TPA)</b>	<b>Envisaged Destination</b>
Recyclables Recovered	37,397	Overseas
Solid Recovered Fuel (SRF)	78,159	Approved cement kilns located in the Republic of Ireland and overseas
Biostabilised Waste	50,084	Drehid Waste Management Facility (or other destinations - beyond life of Drehid WMF)
Rejects	19,533	Drehid Waste Management Facility (or other destinations - beyond life of Drehid WMF)
Process Losses	57,987	-
Biogas	6840	-

Recyclables, including metals and plastics (e.g. PET, HDPE), will be transported out of the facility in baled form. Recyclables will typically be exported to reprocessors such as plastic reprocessing plants where the material will be processed for use in other applications or processed directly into new products.

Solid Recovered Fuel (SRF) will typically comprise of high calorific items such as plastics, paper/cardboard, wood and textiles. Please refer to Section 2.3 for a description of the SRF production process. The markets for SRF include cement kilns where it displaces the use of fossil fuels in the production of cement. SRF will be transported out of the MBT Facility in the form of wrapped bales or in loose form (the latter typically referred to as SRF ‘fluff’). Loose SRF will be transported in compactor trailers. SRF will be produced to a defined standard in regard to parameters such as net calorific value, moisture content, chlorine content, mercury content and particle

size. A quality control programme will be implemented for the production of SRF which will involve the taking of regular samples for laboratory analysis. A recognised classification system for SRF is the CEN TC 343 (CEN/TS 15359:2006) standard.

Biostabilised waste will meet the EPA's stabilisation requirement (as set out in waste licences for landfill facilities) where stabilisation means the reduction of decomposition properties of the waste to such an extent that offensive odours are minimised and that the respiration activity after four days is less than 10mgO<sub>2</sub>/gDM until 1 January 2016 and less than 7mgO<sub>2</sub>/gDM thereafter. Biostabilised waste will be accepted for landfilling at the Drehid Waste Management Facility during its remaining operational life (until 2028). Thereafter, biostabilised waste will be transported to alternative destinations.

Rejects or residues produced by the MBT Facility will be landfilled at the Drehid Waste Management Facility during its remaining operational life (until 2028). Thereafter, rejects or residues will be transported to alternative destinations. Rejects or residues will typically include materials which could not be extracted as a marketable recyclable, SRF or a stabilised biowaste.

In the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), the biogas produced will be converted to renewable electricity and heat by the CHP plants. The renewable electricity produced will be exported to the electricity network. The heat produced will be used within the MBT process.

#### *2.2.4 Nuisance Controls*

##### **2.2.4.1 General**

The operation of the proposed MBT Facility will be undertaken under licence issued by the EPA. The conditions of the waste licence will include measures to minimise or prevent nuisance to the public occurring as a result of the operation of the facility. A complaints register detailing any complaint received from the general public in respect of the operation of the facility will be maintained at the site. The following sections detail the proposed nuisance control measures to be undertaken at the site. Bord na Móna also undertakes to implement any additional control measures included in the waste licence – to be granted by the EPA.

##### **2.2.4.2 Litter Control**

The following measures will be employed at the site to control litter:

- All waste entering the MBT Facility will be in covered vehicles. Bord na Móna will exclude any contractor failing to comply with this requirement from entering the site;
- All waste processing will take place in fully enclosed buildings



- The approach roads to the MBT Facility site will be monitored on at least a daily basis and in the event of litter being found on these roads, site staff will promptly remove it and deposit it in the appropriate manner at the facility;
- General clean-up and attendance work will be carried out when required by site staff around the entire perimeter of the MBT Facility footprint, on all internal access roads and on approach roads;
- There will be no external storage of waste with the exception of the baled and wrapped SRF material;
- Residues, recyclables and biostabilised waste leaving the MBT Facility will be in covered vehicles; and
- All site areas will be inspected and cleaned regularly.

Given the above litter control measures it is envisaged that there will be no nuisance associated with litter at the MBT Facility.

#### **2.2.4.3 Vermin Control**

It is recognised that badly managed waste management facilities sites have the potential to attract vermin such as rats and flies. Strict control procedures will be put in place at the MBT Facility in order to control the population of vermin.

All proposed MBT activities will take place indoors and all plant, equipment and tipping areas will be cleaned regularly. SRF will be baled and wrapped in plastic before being stored outdoors. It should be noted that SRF will typically not contain food waste and therefore will not be attractive to vermin. The biological treatment process will take place within completely enclosed buildings, including the storage of organic fines, mixing, composting/anaerobic digestion and refinement.

A detailed Vermin Control Plan has been developed by Bord na Móna as part of the Environmental Management Plan for its waste management facilities and a similar plan will be developed for the Drehid MBT Facility. This Plan will incorporate the following elements:

- A site map showing the positions and numbers of each bait point;
- A bait point monitoring routine will be established with monthly inspection records for the facility filled up by the vermin control company and signed by the facility manager;
- Inspection records for the bait points will describe any signs of vermin and highlight any vermin attractions on site;
- The facility manager will be responsible for acting on the findings of the monthly inspection records; and
- A vermin control manual containing the bait point location maps, product details/specifications for the baits used and the monthly inspection records will be maintained and kept at the facility.

A firm of professional vermin control experts will implement the Vermin Control Plan. Baiting will be undertaken in a professional manner and every precaution will be taken to avoid non-target species. In particular the bait will be placed in areas which are not accessible to non-target species and where possible dead or dying vermin will be removed as soon as possible. It should be noted however that vermin such as rats normally return to their nests to die.

#### **2.2.4.4 Odour Control**

Measures will be implemented at the MBT Facility to eliminate or minimise nuisance odour emissions. These measures include:

- All aspects of the MBT process will be undertaken in fully enclosed buildings;
- All waste delivered to the MBT facility will be in covered/enclosed vehicles. Similarly, all waste residues being removed from the MBT facility will be in covered/enclosed vehicles;
- Doors at the waste reception area of the Mechanical Treatment Building will be rapid closing doors, with an opening or closing time of approximately 20 seconds;
- Doors at the waste reception area of the Mechanical Treatment Building will be fitted with air curtains to minimise the escape of odourous emissions when a door is opened for the acceptance of waste;
- The first stage of the biological treatment process is the most critical with respect to odour emissions, since easily biodegradable components (e.g. sugars, proteins and fats) are degraded at a high rate, thus causing gaseous by-products. This intensive phase of the biological treatment process will be undertaken in fully enclosed concrete composting/dry AD tunnels located within an enclosed building - thereby providing double containment features;
- The maturation process will be undertaken by means of negative aeration. Negative aeration draws air from within the building through the trapezoidal windrows and into the aeration ductwork. This arrangement will greatly reduce emissions from the trapezoidal windrows within the building, thereby minimising the potential for nuisance odour emissions;
- Air streams with a potential for high ammonia levels will be treated in an acid scrubbers prior to biofiltration;
- An odour management plan will be developed prior to the detailed design and construction of the facility. This plan will include management strategies for the prevention of emissions and a strict preventative maintenance and management program for ensuring that all odour mitigation techniques remain operational at optimal capacity throughout all operational scenarios;
- Critical and key odour abatement system performance parameters will be continually monitored on the SCADA control system. Should any parameter deviate outside of its accepted range, an alarm will be immediately generated. Critical alarms will be texted to selected mobile phones numbers thereby ensuring the communication of critical alarms to responsible individuals on a

- 24 hour basis;
- Good housekeeping practices (internally and externally) and a closed-door management strategy will be maintained at all times;
  - 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;
  - Normal operational practices will be such that the organic fines fraction (putrescible fraction with the highest potential for odour) generated in any day by the mechanical treatment process will be loaded into the composting/dry AD tunnels on the same day;
  - Treated air from the biofilters will be emitted through 20m high stacks to facilitate appropriate residual odour dispersion;
  - The organic fines fraction will be conveyed from the Mechanical Treatment Building to the biological treatment buildings in fully covered and enclosed galleys;
  - 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; and
  - In the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), a standby gas flare will be provided to facilitate the thermal destruction of the biogas in the event of unavailability of the CHP plants and that there is insufficient volume in the biogas storage bladders.

#### 2.2.4.5 Fire Control

A number of fire control measures will be implemented at the MBT Facility. These include the following:

- Control of incoming waste vehicles to ensure that no burning or smouldering loads enter the facility;
- All site operatives and employees will be trained in fire prevention, control and emergency response procedures;
- Emergency response contact numbers (Fire Service, Gardaí, Ambulance and other agencies) will be posted in prominent locations;
- Automatic communication of fire alarms to mobile phone numbers of assigned

- responsible individuals;
- Fire extinguishers, smoke detectors and fire alarms will be provided in all facility buildings;
- A water bowser will be available to deal with any small fires within the facility;
- SRF material will be dried within a dedicated SRF Building. The heated air to the SRF dryer will be at an envisaged temperature of 150°C. As a result, the temperature of the SRF will not exceed 55-65°C – thereby minimising the occurrence of fires;
- A rainwater harvesting tank (located next to the Administration and Welfare Building) and the surface water settlement lagoons will act as back up fire-fighting water sources; and
- Smoking will not be permitted at the MBT Facility.

In the event of a fire at the MBT Facility, excess firewater will be collected within the surface water ponds. This firewater will subsequently be analysed prior to possible tankering off-site to an approved wastewater treatment plant.

#### 2.2.5 Decommissioning

There is no site life defined for the proposed MBT Facility, therefore detailed financial, administrative and technical provisions are not presented under a decommissioning plan for the development.

In the event of decommissioning, measures will be undertaken by Bord na Móna to ensure that there will be no environmental impacts from the closed facility. Such measures are outlined as follows:

- Bord na Móna will ensure that any remaining waste materials within the facility are managed and removed off site to an appropriately licensed facility;
- All oils and fuels on site at the time of closure will be collected by an approved waste contractor;
- All plant and equipment associated with the facility will be removed from the site including the equipment from the MBT Facility buildings;
- All site floor and process building walls will be power cleaned to clear all debris and dust;
- All tanks will be de-sludged and interceptors cleaned. The waste from the cleaning operations will be disposed to relevant licensed facilities;
- Where possible, all portable or removable structures will be dismantled or removed from site;
- The weighbridge, weighbridge kiosk and wheel wash will be decommissioned and removed; and
- A monitoring programme of all potential emissions including surface water and dust will be conducted after the decommissioning process in order to ensure that emissions from the facility have ceased. The monitoring

programme will consist of two monitoring rounds carried out within two months of decommissioning of the facility.

When operations have ceased, and assuming confirmation from the monitoring programme that all emissions have ceased, it is expected that there will be no requirement for long-term aftercare management at the site.

#### *2.2.6 Health & Safety*

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

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

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

Access to the MBT Facility will be via the existing permitted access road constructed to the southwest of the facility which joins the R403 regional road at Killinagh Upper. The existing entrance at the R403 regional road is already secured against unauthorised access and trespass.

All machinery will be locked during non-working hours and parked within the confines of the MBT Facility site. The limited number of houses in the general vicinity of the site, and the fact that the surrounding roads are not designated walking routes, will undoubtedly reduce opportunistic trespass.

#### *2.2.7 Environmental Monitoring*

The following sections describe the monitoring programmes that will be established at the Drehid MBT Facility. Specific elements of monitoring will also be required during the construction phase at the site and these requirements will also be addressed.

All environmental monitoring will be carried out under the conditions of an EPA waste licence for the facility. Emission Limit Values (ELV) will be set by the EPA for many of the parameters to be monitored. Exceeding these values will be considered a non-compliance with the waste licence.



The primary aims of these monitoring programmes will be to comply with legislation, the requirements of the EPA, to monitor the quality of the environment in the vicinity of the site and identify any adverse impacts from the development of the facility.

As part of the Waste Licence, it is anticipated that an Annual Environmental Report (AER) will be formulated that will collate and report all monitoring data each year. Within the AER, a comparative assessment will be made with data from previous years. An AER will be submitted to the EPA on a yearly basis.

It should also be noted that the monitoring programme as outlined below may be changed by the conditions of the Waste Licence but it is envisaged that it will be largely similar to that outlined herein.

#### 2.2.7.1 Dust Monitoring Programme

Dust will be monitored using Bergerhoff gauges, as specified in the German Engineering Institute VDI 2119 document “Measurement of Dustfall Using the Bergerhoff Instrument (Standard Method)”. It is proposed that gauges will be installed around the MBT Facility site at the locations shown on Figure 2.5 with the grid references tabulated in Table 2-8 below.

**Table 2-8 Proposed Dust Monitoring Locations**

Reference No.	Grid Reference
D2	275770, 230983
D5	273567, 230886
D8	272965, 228186
D9	274778, 230271
D10	274354, 230893
D11	275016, 230668

The limit of activity derived dust deposition measured at the above monitoring points will be 350 mg/m<sup>2</sup>/day, based on 30 day composite samples.

It is proposed that during the active life of the MBT Facility, dust monitoring will take place at least twice per annum including once between the months of May and September during which there would be a greater potential for dust generation.

At least one month prior to the commencement of construction of the MBT Facility, dust gauges will be installed at the locations outlined above and the baseline rate of dust generation prior to construction recorded. Dust monitoring will be undertaken at a frequency of every 4 months during the construction phase of the proposed development.

In addition to the above, the site and adjoining roads will be inspected on a daily basis for evidence of excessive generation of airborne dust. This inspection will be carried out by Bord na Móna personnel and by the site contractor during the construction phase. Any necessary remedial actions, such as road cleansing, will then be implemented.

#### 2.2.7.2 Groundwater Monitoring Programme

Groundwater quality will be monitored at both upgradient and downgradient sampling locations.

All groundwater sampling will be carried out by trained personnel from Bord na Móna or a suitable firm of consultants and all off-site analyses will be carried out by an accredited laboratory.

#### Proposed Monitoring Sites

For the location and reference numbers for the proposed monitoring points refer to Figure 2.5. These reference numbers and grid references are outlined in Table 2-9.

**Table 2-9 Proposed Groundwater Monitoring Locations**

Location	Reference No.	Grid Reference
<b>Upgradient</b>		
Bedrock Monitoring Borehole	GW2D	E275305 N230640
Subsoil Monitoring Borehole	GW2S	E275312 N230650
Bedrock Monitoring Borehole	GW4D	E 275180 N231248
<b>Downgradient</b>		
Bedrock Monitoring Borehole	GW3D	E274349 N230902
Subsoil Monitoring Borehole	GW3S	E274354 N230907
Bedrock Monitoring Borehole	GW11D	E274325 N230775

#### Operational Phase

The main elements of the groundwater monitoring programme during the operational phase will be as follows:

- Water levels in the monitoring wells will be measured on a monthly basis;
- The wells will be sampled in accordance with industry standard protocols and guidelines prepared by the EPA. Samples will be handled and transported in accordance with the same accepted protocols;
- The samples recovered from these wells will be analysed for the list of parameters given in Table 2.10; and
- Data will be collated, tabulated and reported, including interpretation and comparison with the previous year's data. The data will be presented within an AER, which will be submitted to the EPA.

**Table 2-10 Proposed Analyses for Groundwater Samples**

Parameter	Frequency	Unit
Visual Inspection/Odour*	Monthly	-
Groundwater Level (wells)*	Monthly	m
Electrical Conductivity *	Monthly	µS/cm(@ 20° C
Ammoniacal Nitrogen	Monthly	mg/l as N-NH <sub>4</sub>
Chloride	Monthly	mg/l as Cl
Nitrate	Annually	mg/l as N
Sulphate	Annually	mg/l as SO <sub>4</sub>
Total Phosphate/Orthophosphate	Annually	mg/l as PO <sub>4</sub>
Potassium	Annually	mg/l as K
Sodium	Annually	mg/l as Na
Calcium	Annually	mg/l as Ca
Magnesium	Annually	mg/l as Mg
Iron	Annually	mg/l as Fe
Manganese	Annually	mg/l as Mn
Zinc	Annually	mg/l as Zn
Lead	Annually	mg/l as Pb
Copper	Annually	mg/l as Cu
Mercury	Annually	mg/l as Hg
Nickel	Annually	mg/l as Ni
Chromium	Annually	mg/l as Cr
Cadmium	Annually	mg/l as Cd
List 1/11 Organic substances (Screen)**	Annually	-
Total Coliform	Annually	cfu/100ml
Faecal Coliform	Annually	cfu/100ml

\* Field and Laboratory Measurements

\*\* Screening for priority pollutant list substances (such as US EPA volatile and/or semi-volatile compounds).

No monitoring of groundwater additional to that outlined for the operational phase will be required during the construction phase at the site.

### 2.2.7.3 Meteorological Monitoring Programme

A meteorological station will be installed on-site prior to commencement of operation of the MBT Facility.

Precipitation volume, wind force and direction, evapotranspiration, temperature, and barometric pressure will be continuously monitored on-site.

Again all data will be collated, tabulated and reported in the AER, which will be submitted to the EPA on an annual basis.

#### 2.2.7.4 Noise Monitoring Programme

During the operational phase of the MBT Facility, noise monitoring will be carried out on an annual basis. The survey will be undertaken in accordance with the methodology specified in the *'Environmental Noise Survey Guidance Document'* published by the EPA and to limits which will be specified by the EPA.

Subject to waste licensing conditions imposed by the EPA there will be 6 No. noise monitoring locations. The proposed locations for noise monitoring are as outlined in Figure 2.5 and tabulated in Table 2-11 below. These are also the noise monitoring locations currently used for reporting to the EPA on the Drehid Waste Management Facility.

**Table 2-11 Proposed Noise Monitoring Points**

Reference No.	Grid Reference
N1	273059, 231480
N2	274690, 233140
N3	274909, 232667
N4	272939, 228160
N5	275563, 230357
N6	273349, 231046

An additional round of noise monitoring will take place during the construction phase of the MBT Facility. This shall be undertaken at a time so as to include for percussive piling impact should it be required during the construction phase.

Due to the distance separation of approximately one kilometre from the proposed MBT Facility location to the nearest sensitive receptor, it is not anticipated that vibration monitoring will be required.

Noise monitoring will be undertaken by suitably qualified persons employed by Bord na Móna or by consultants retained by Bord na Móna. Noise emission limits for the operational phase of the proposed MBT Facility will be set at 55 db  $L_{Aeq}$  for daytime and 45 db  $L_{Aeq}$  for the night period at the noise monitoring points. The results of the noise monitoring undertaken at the facility and an interpretation of these results will be reported in the AER submitted to the EPA.

#### 2.2.7.5 Air Monitoring Programme

In the case of Configuration B (MBT with dry Anaerobic Digestion and Composting), the standby gas flare system and the CHP plants will generate emissions to air.

Monitoring of the emissions to air will be in accordance with the conditions of the EPA Waste Licence.

In regard to emissions to air from the standby gas flare system and the CHP plants, it is proposed to monitor the following:

- carbon monoxide (continually);
- nitrogen oxides (biannually);
- sulphur dioxide (biannually); and
- particulates (annually).

In terms of the biofilter emissions, it is proposed to monitor for amines, ammonia and mercaptans using colorimetric indicator (Dräger) tubes on a frequency to be agreed with the EPA.

#### **2.2.7.6 Odour Monitoring Programme**

A daily record of the odours observed by on-site personnel will be maintained. Any odours observed and reported by members of the public off-site will also be recorded. The occurrence of odour will also be compared with climatic conditions. Control measures including the proposed building ventilation system and odour abatement system will minimise potentially nuisance causing odour emissions.

#### **2.2.7.7 Emissions to Water Monitoring Programme**

Surface water quality will be monitored downstream of the proposed MBT Facility during the operational phase of the development. A number of surface water channels originate within the property boundary.

It is intended that all surface water sampling will be carried out by trained personnel from Bord na Móna or by a suitable firm of consultants retained by Bord na Móna. All analyses, with the exception of on-site readings, will be carried out by an accredited laboratory. A visual inspection of all surface water streams on and adjacent to the site will also be carried out by site personnel on a weekly basis.

#### **Proposed Monitoring Sites**

For the location and reference numbers for the proposed monitoring points refer to Figure 2.5. These reference points and respective grid references are outlined in Table 2.12 below.

**Table 2-12 Proposed Surface Water Monitoring Points**

<b>Reference No.</b>	<b>Grid Reference</b>
SW4	E271601 N231227
SW5	E274059 N230848
SW7 (SW Pond discharge pt)	E274415 N230850
SW8 (SW Pond discharge pt.)	E274760 N230470



The need for additional monitoring locations may be recommended by the EPA. In addition, the need for further monitoring locations will be determined on an annual basis.

The elements of the surface water monitoring programme will be as follows:

- Surface water sampling locations will be identified with a permanent identification marker;
- The surface water will be sampled quarterly in accordance with industry standard protocols and guidelines prepared by the EPA. Samples will be handled and transported in accordance with accepted protocols;
- The samples recovered from monitoring points will be analysed for the list of parameters given in Table 2.13;
- The analytical programme will be carried out such that an ion balance can be computed; and
- Annual biological monitoring will be undertaken at SW4 and SW5 during the monitoring period June-September as follows. Kick samples will be taken and analysed annually, in accordance with EPA guidelines, to determine the invertebrate colony of the surface water environment. A relationship between water quality and macroinvertebrate community structure will be determined in the form of a 'Q' value, where Q1 represents poor quality water and Q5 represents good quality water. The locations at which samples will be obtained will be agreed with the EPA.

As part of this monitoring programme a range of diesel range organics, petrol range organics, mineral oils, and BTEX compounds (benzene, toluene, ethyl-benzene & xylene) will be taken once a year from one of the downstream monitoring points.

Continuous monitoring will take place at the inlet and outlet of the surface water ponds. Instrumentation linked to the SCADA system will continually monitor the following parameters:

- Dissolved Oxygen;
- pH;
- Electrical Conductivity; and
- Flow Rate.

An actuated valve at the surface water pond outlets will be controlled by the SCADA system. This valve will be programmed to close should any of the above parameters fall outside permitted levels. The volume of surface water discharged to the surrounding environment will also be controlled through the same actuated valve and SCADA system.

**Table 2-13 Proposed Analyses for Surface Water Samples**

<b>Parameter</b>	<b>Frequency (SW4 &amp; SW5)</b>	<b>Frequency (SW7 &amp; SW8)</b>	<b>Unit</b>
Visual Inspection	Weekly	Daily	
Temperature *	Quarterly	Daily	°C
Electrical Conductivity *	Quarterly	Daily	µS/cm( @20°C
Dissolved Oxygen*	Quarterly	Daily	%
Chloride	Quarterly	Weekly	mg/l as Cl
pH*	Annually	Weekly	pH Units
Ammoniacal Nitrogen	Annually	Weekly	mg/l
Total Suspended Solids	Annually	Weekly	mg/l as N- NH <sub>4</sub>
Nitrate	Annually	Annually	mg/l as N
Sulphate	Annually	Annually	mg/l as SO <sub>4</sub>
Chemical Oxygen Demand	Annually	Quarterly	mg/l as O <sub>2</sub>
Biochemical Oxygen Demand	Annually	Quarterly	mg/l as O <sub>2</sub>
Total Phosphate/Orthophosphate	Annually	Annually	mg/l as PO <sub>4</sub>
Potassium	Annually	Annually	mg/l as K
Sodium	Annually	Annually	mg/l as Na
Calcium	Annually	Annually	mg/l as Ca
Magnesium	Annually	Annually	mg/l as Mg
Iron	Annually	Annually	mg/l as Fe
Manganese	Annually	Annually	mg/l as Mn
Zinc	Annually	Annually	mg/l as Zn
Lead	Annually	Annually	mg/l as Pb
Copper	Annually	Annually	mg/l as Cu
Mercury	Annually	Annually	mg/l as Hg
Nickel	Annually	Annually	mg/l as Ni
Chromium	Annually	Annually	mg/l as Cr
Cadmium	Annually	Annually	mg/l as Cd
List 1/11 Organic substances (Screen)**	Annually	Annually	-
Total Coliform	Annually	Annually	cfu/100ml
Faecal Coliform	Annually	Annually	cfu/100ml

\* Field and Laboratory Measurements

\*\* Screening for priority pollutant list substances (such as US EPA volatile and/or semi-volatile compounds).

All other scheduled water sampling will be carried out by trained personnel from Bord na Móna or by a suitable firm of consultants retained by Bord na Móna. All analyses, with the exception of on-site readings, will be carried out by an accredited laboratory.

Data will be collated, tabulated and reported including interpretation and comparison with the previous year's data. This information will be presented in the AER, which will be submitted to the EPA.

In addition to the above a visual inspection of the surrounding surface water will be carried out on a daily basis to ensure that clay/mud/sand etc. is not impacting on the water quality during the construction phase. No additional monitoring of surface water will be required during the construction phase at the site.

#### **2.2.7.8 Ecological Monitoring Programme**

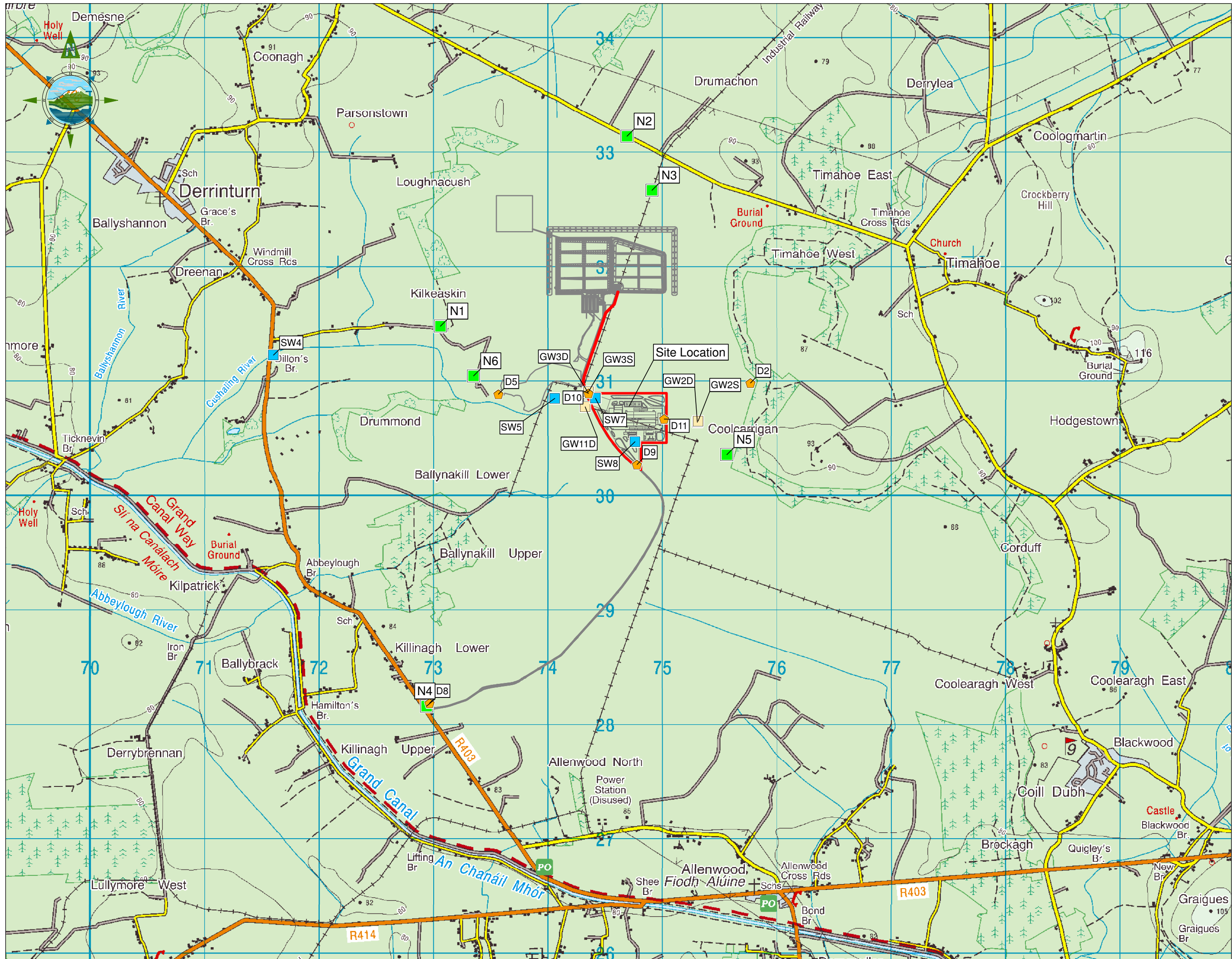
As an extended period of time may arise prior to site clearance works, it is recommended that a pre-site clearance ecological survey be conducted to update baseline ecology and determine any additional site specific recommendations for minimising impacts to potential key ecological receptors.

As frogs breed on the site it is recommended that pre-site clearance surveys of drainage ditches, in particular, be conducted to inform best practice during the site clearance phase.

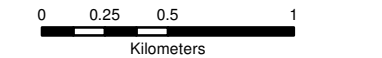
It is recommended that where vermin control measures are proposed, that an ecological expert be consulted to determine suitability and control of spread (e.g. poisons) in the context of protected species in the wider landholding.

Biological Quality kick samples will be taken and analysed, in accordance with EPA guidelines, to determine the invertebrate colony of the surface water environment. Locations will be agreed with the EPA.

The MBT Facility site will be maintained and monitored on a regular basis after commencement of the proposed landscape planting scheme to confirm that the planted trees, shrubs, grasses etc. have sufficiently established at the site.



- Legend**
- Dust Monitoring Locations
  - Surface Water Monitoring Locations
  - Groundwater Monitoring Locations
  - Noise Monitoring Locations
  - Site Boundary
  - Landownership Boundary
  - Air Monitoring Locations to be agreed with EPA



- NOTES**
- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
  - ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
  - ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
  - ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	05-06-12	Issued for Planning	G.F.	J.D.

Client:  
**BORD NA MÓNA**

Project:  
**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:  
**PROPOSED ENVIRONMENTAL  
MONITORING LOCATIONS (MBT)**

Scale @ A3: 1:30,000

Prepared by: G.Fill  
Checked: S.Tinnelly  
Date: May 2012

Project Director: D.Grehan

**TOBIN**  
Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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6301  
**Figure 2.5**  
A

### *2.2.8 Contingency Arrangements*

#### **2.2.8.1 Contingency Plans for any Emergency On-Site.**

Any accidents and other emergencies will be handled by on-site personnel in accordance with Bord na Móna emergency response procedures. Emergency response contact numbers for the relevant authorities including the Fire Service, Gardaí, and Ambulance Services will be prominently posted on-site. All site operatives and other relevant employees of Bord na Móna will be regularly trained in emergency response procedures and in fire prevention and control.

Site safety procedures will be adopted to protect any persons from injury on-site. Should injury occur, the trained site operatives, where appropriate, will be the first to administer assistance. Emergency and first-aid materials will be available in the MBT Facility site buildings. Emergency and first-aid procedures will also be prominently displayed in the site buildings, and adjacent to the surface water settlement lagoons.

#### **2.2.8.2 Contingency Plans for any Breakdowns On-Site**

The regular maintenance of all plant and equipment utilised on-site will be undertaken in accordance with the manufacturer's guidelines. This maintenance programme will help to minimise occurrences of breakdowns on-site. In the event of any breakdown, the item of plant or equipment will be promptly repaired or replaced. As previously outlined, a maintenance building will be provided on site to facilitate this maintenance programme. All plant and equipment will be checked on a daily basis.

#### **2.2.8.3 Contingency Plans in Respect of Absentee Staff**

Off roster fully trained staff will be deployed to the site in the event of sickness to key personnel. This will also apply to general site operatives and plant operators will be sourced from local plant contractors should the need arise.

#### **2.2.8.4 Contingency Procedures outside Normal Operating Hours**

In order to supervise the SRF drying process, it is envisaged that Bord na Móna staff will be present at the MBT Facility at all times, including Sundays and Bank Holidays.

Site personnel and other employees of Bord na Móna will be available in the event of any emergency at the site outside of normal working hours. An emergency contact number will be prominently posted at the existing entrance at the R403 regional road.

Local emergency services will be informed of contact numbers for key Bord na Móna personnel. Outside normal working hours security personnel will also be provided at the site who will also have the relevant contact numbers.



These security arrangements will be implemented in order to guard against unlawful trespass and vandalism. Basic routines will exist whereby any cash, records and equipment will either be taken off-site daily or secured within the Administration and Welfare Building. These procedures will be in the interest of overall security.

#### **2.2.8.5 Contingency Plans in the Event of Environmental Contamination**

It is important to note that MBT process waste water will be fully contained and collected in process waste water tanks. The MBT process waste water collection system will be fully isolated from the surface water collection system during the lifetime of the facility.

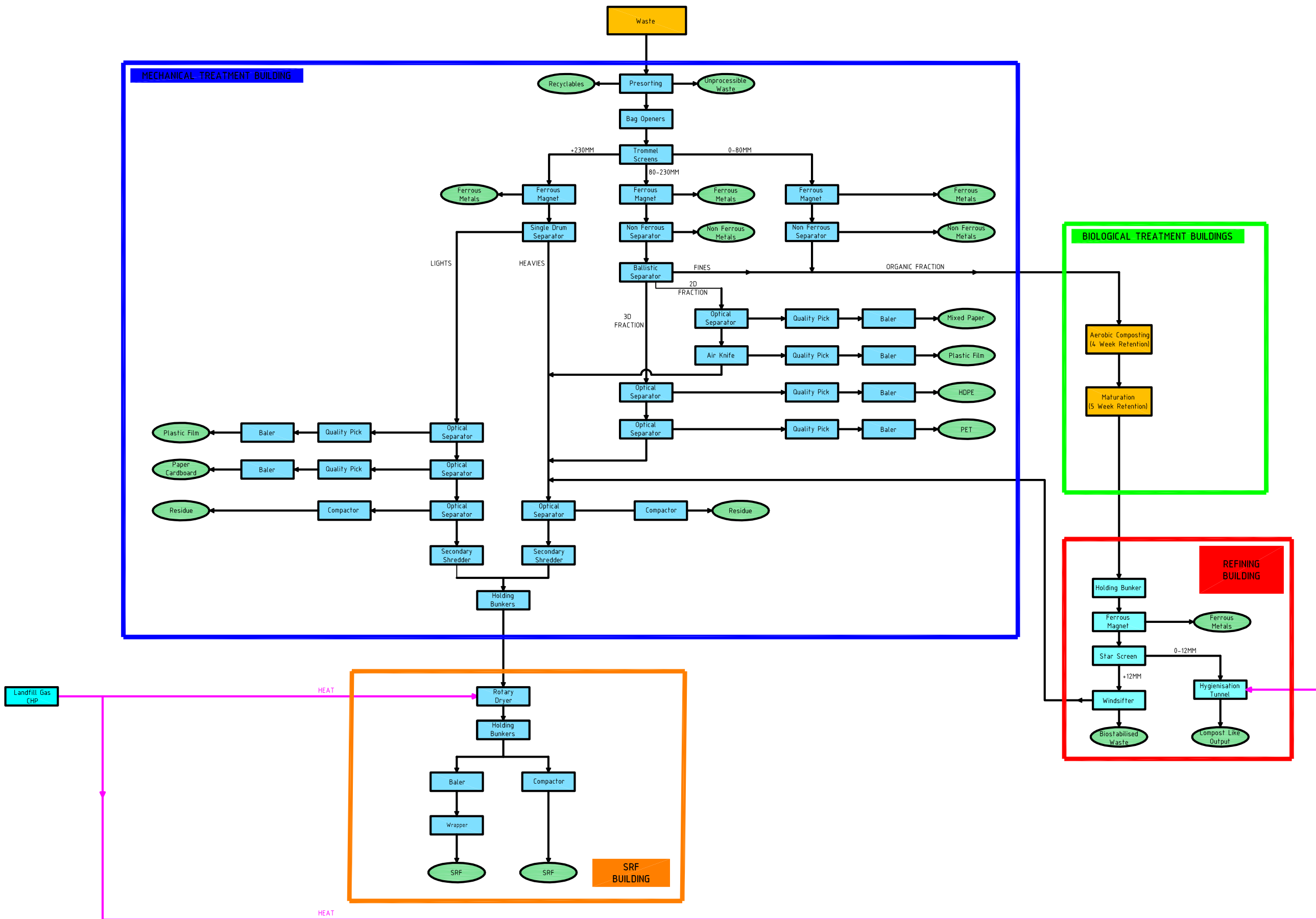
The discharge from the surface water settlement ponds to the existing surface water drainage system and eventually the Cushaling River will be monitored continuously in respect of electrical conductivity, pH, dissolved oxygen and flow rate. In the unlikely event that deterioration in the surface water quality being discharged is detected, an automated isolating valve will close. This isolating valve will allow for the retention of all surface water on-site until the contamination event is investigated and remediated.

### **2.3 OUTLINE OF THE MBT PROCESS –MBT WITH COMPOSTING (AND OPTIONAL DRY ANAEROBIC DIGESTION STEP)**

The following sections, Section 2.3.1. and Section 2.3.2 include detailed descriptions of the two proposed configurations for Mechanical and Biological Treatment. Section 2.3.1 details the envisaged processes involved in the development of a facility for Mechanical and Biological Treatment of waste with composting only (Configuration A (MBT with Composting)). Section 2.3.2 details the envisaged processes involved in the development of a facility for Mechanical and Biological Treatment of waste with composting and dry anaerobic digestion (Configuration B (MBT with Dry Anaerobic Digestion and Composting)).

The flow diagrams for both scenarios as presented in Chapter 1 (Introduction) are also included in this section for reference. The following sections should be read in conjunction with the MBT process flow diagrams shown on Figure 2.6 and Figure 2.7 respectively.

CONFIGURATION A  
(MBT WITH COMPOSTING)



A	05.06.12	ISSUED FOR REPORT	M.N.	D.C.
Issue	Date	Description	By	Chkd.

Client:

**BORD NA MÓNA**

Project:

**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:

**PROCESS FLOW DIAGRAM  
CONFIGURATION A  
(MBT WITH COMPOSTING)**

Scale @ A3:

NTS

Prepared by:

M. Nolan

Checked:

D. Conneran

Date:

May 2012

Project Director:

D. Grehan

**TOBIN**  
Patrick J. Tobin & Co. Ltd.

Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland,  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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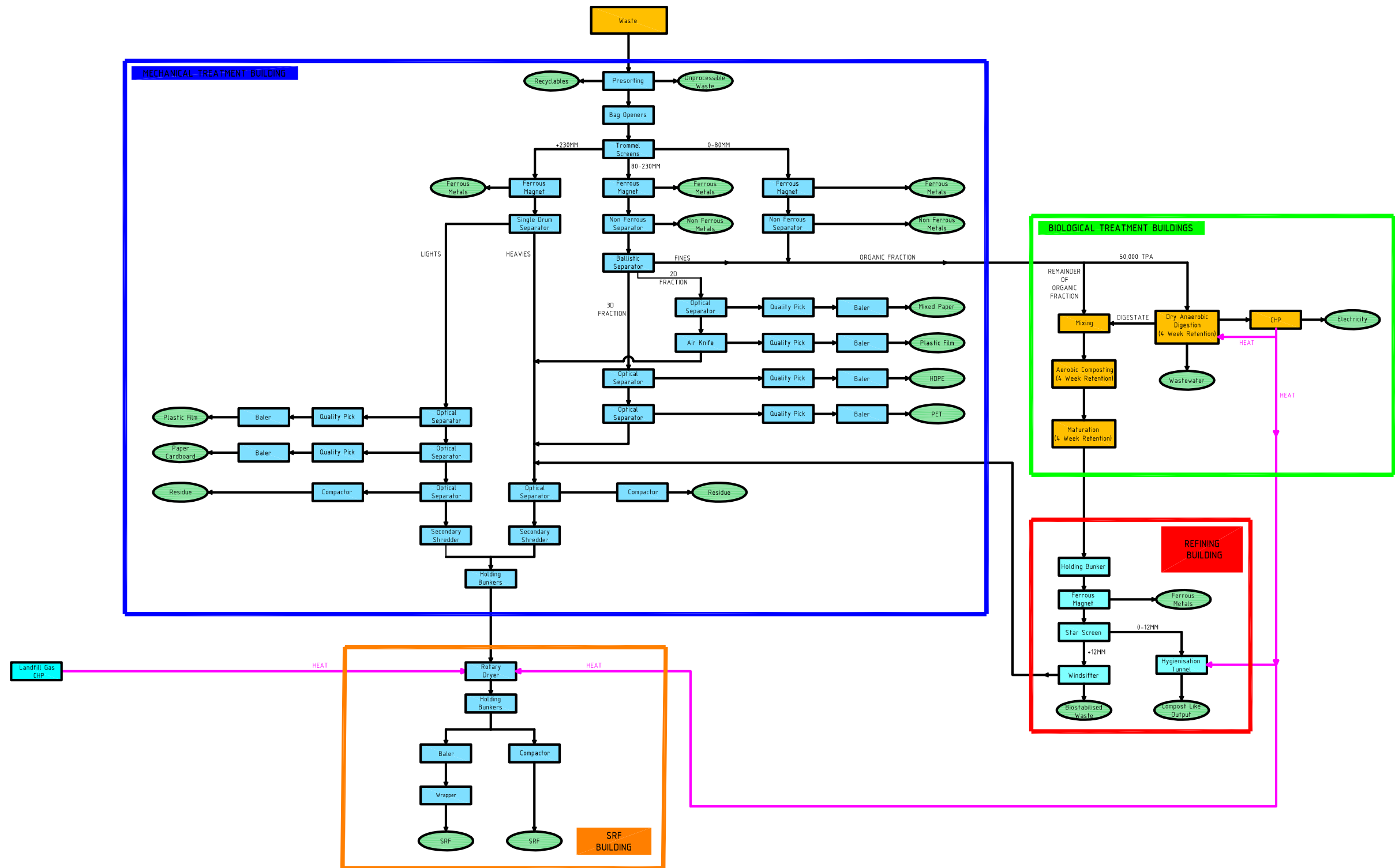
Drawing No.:

**Figure 2.6**

Issue:

**A**

CONFIGURATION B  
(MBT WITH DRY ANAEROBIC DIGESTION & COMPOSTING)



A	05.06.12	ISSUED FOR REPORT	M.N.	D.C.
Issue	Date	Description	By	Chkd.

Client:  
**BORD NA MÓNA**

Project:  
**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:  
**PROCESS FLOW DIAGRAM  
CONFIGURATION B  
(MBT WITH DRY ANAEROBIC  
DIGESTION & COMPOSTING)**

Scale @ A3: **NTS**

Prepared by: **M. Nolan** Checked: **D. Conneran** Date: **May 2012**

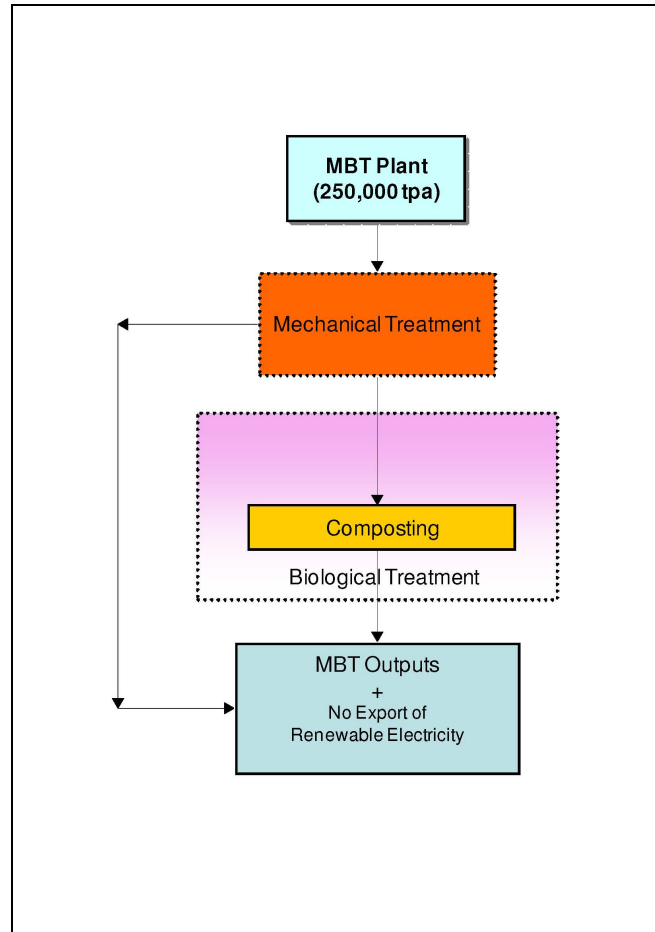
Project Director: **D. Grehan**

**TOBIN**  
Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland,  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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Drawing No.: **Figure 2.7** Issue: **A**

### 2.3.1 Configuration A (MBT with Composting)



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

#### 2.3.1.1 Waste Acceptance

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

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



**Typical Waste Receiving Doors**

#### **2.3.1.2 Waste Pre-sorting**

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

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

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





**Typical Mechanical Grab Machine in Operation  
Typical Waste Presorting**

### **2.3.1.3 Mechanical Processing of Waste**

The primary objectives of the mechanical process include the following:

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

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

#### **Bag Opening and Primary Screening**

##### **Bag Opening**

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

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

### **Bag Opener**

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



**Typical Bag Opener Installation**



**Typical Bag Opener Cutting Shaft Arrangement**

### **Primary Screening**

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

### **Trommel Screen**

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

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



**Typical Trommel Screen Installation**



**Typical Tumbling Action generated by a Trommel Screen**

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

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

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

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

### **Treatment of the Organic Fines Fraction**

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

#### **Overband Magnet**

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

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



**Typical Overband Magnet Installation**

### **Eddy Current Separator**

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

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



**Eddy Current Separator Principle**



### **Treatment of the Intermediate Fraction**

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

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

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

#### **Ballistic Separator**

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



**Typical Ballistic Separator Paddles**

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

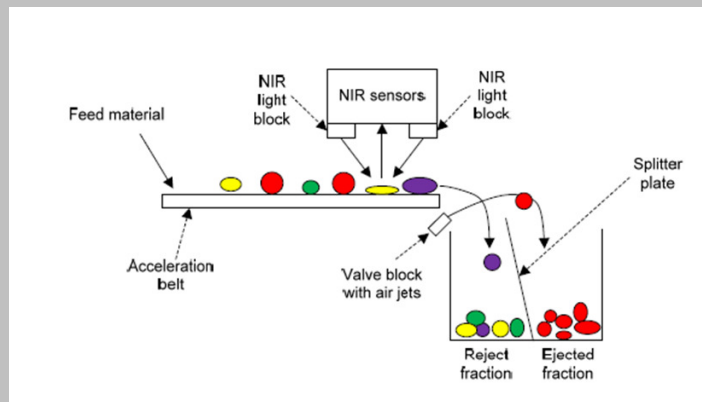
From the holding bunker, the recyclables will be conveyed for alternative baling. The bales of recyclables will be stored indoors in the bale storage area.

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

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

### **NIR Optical Sorters**

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



### **NIR Optical Sorter Principle**

The typical NIR separation process is as follows:

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

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

#### **Picking Station**

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

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



**Typical Picking Station Installation**

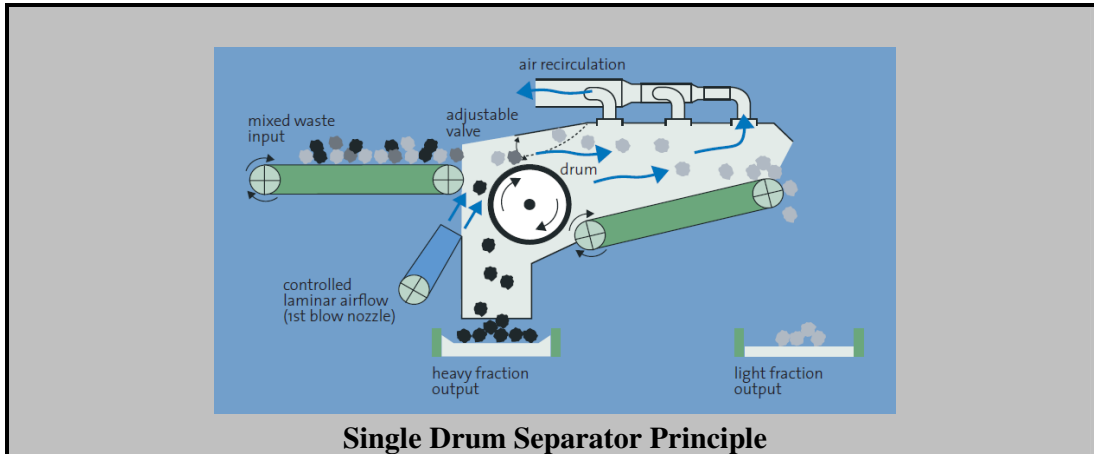
### **Treatment of the Oversize Fraction**

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

### **Single Drum Separator**

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

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



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

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

### **Baler**

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



**Typical Baler**





**Typical Baler Installation**

### **SRF production**

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

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

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

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

### **Thermal Dryer**

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

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



**Typical Thermal Drier Installation**

### **Wrapping Machine**

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



**Typical Wrapper Installation**

#### **2.3.1.4 Biological Processing of Waste**

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

##### **The Composting Process**

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

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



**Typical Automatic Tunnel Filling System Installation**

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

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



**Typical Composting Tunnel with Spigot Floor**

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



### Typical Aeration Fan and Ductwork Installation

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

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

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



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

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

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

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

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



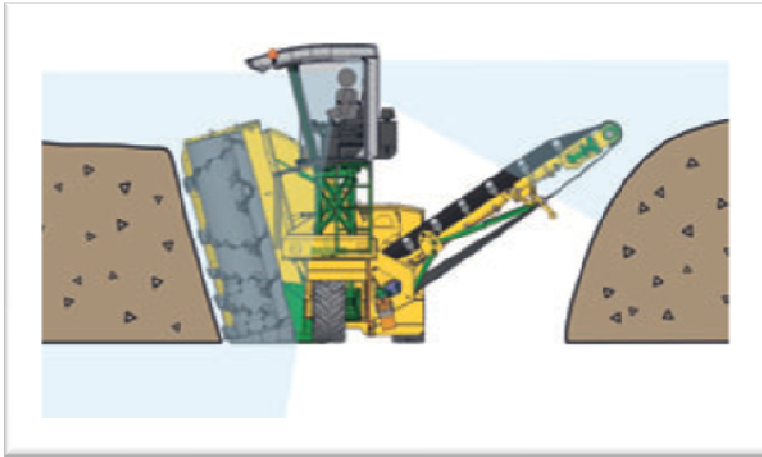
**Typical Automatic Tunnel Unloading System Installation**

### **The Maturation Process**

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

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

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



### **Trapezoidal Windrow Turner Principle**

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

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

#### **2.3.1.5 Stabilised Output Refining and Treatment**

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

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

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

The undersize fraction will be discharged from the screen into an intermediate storage bay and subsequently fed by loading shovel into the hygienisation tunnel in order to treat the material to a standard (in compliance with Animal By-Product Regulations)

that allows it to be spread on land. The material will be heated to a temperature of 70°C for a period of one hour.

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

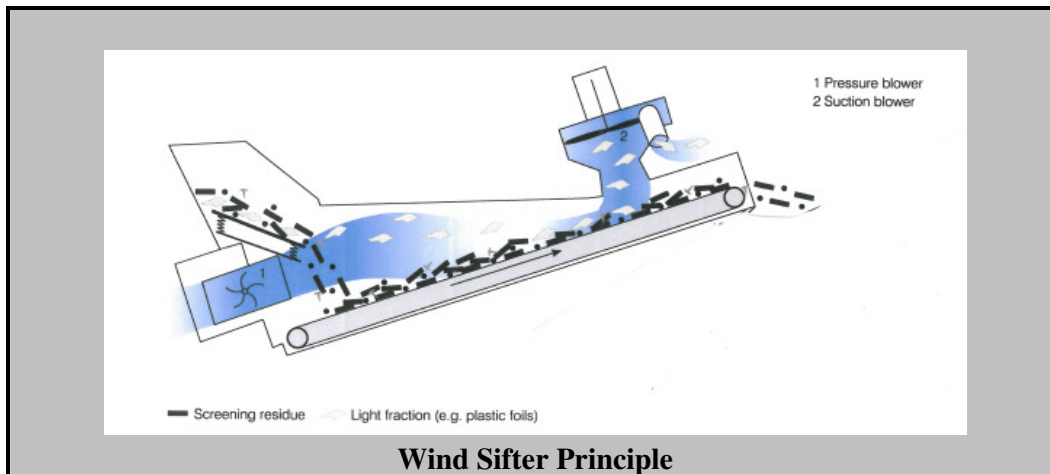
It should be noted that the design of the MBT Facility facilitates the production of CLO as a 'future proofing' measure. The ability to produce CLO will facilitate the future exploitation of more established markets that are likely to develop for the use of CLO (such as brown field restoration).

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

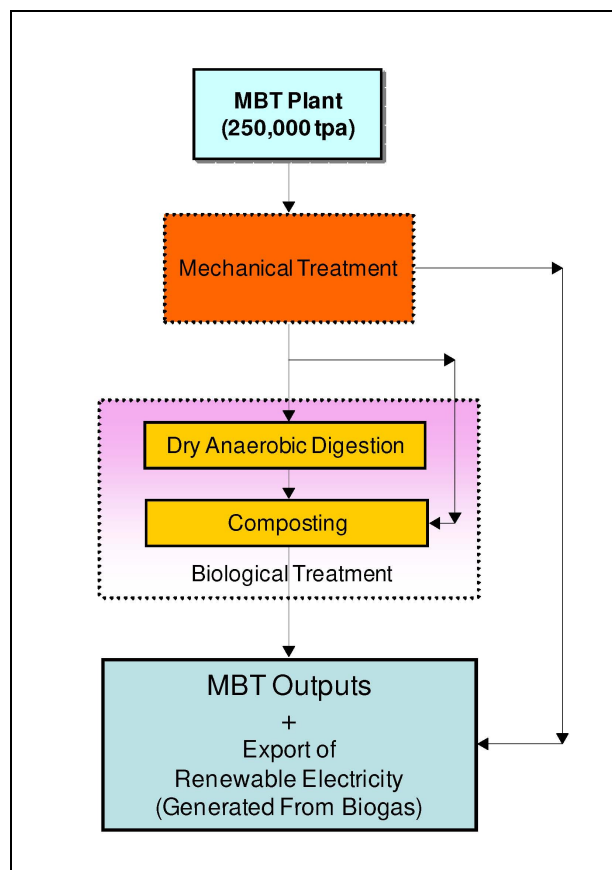
The oversize fraction (12mm to 80mm) will undergo wind sifting (air classification) to recover light and high calorific value plastics which will be diverted to the Mechanical Treatment Building for SRF production. This light combustible fraction will be automatically filled into enclosed containers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

#### **Wind Sifting Process**

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



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



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



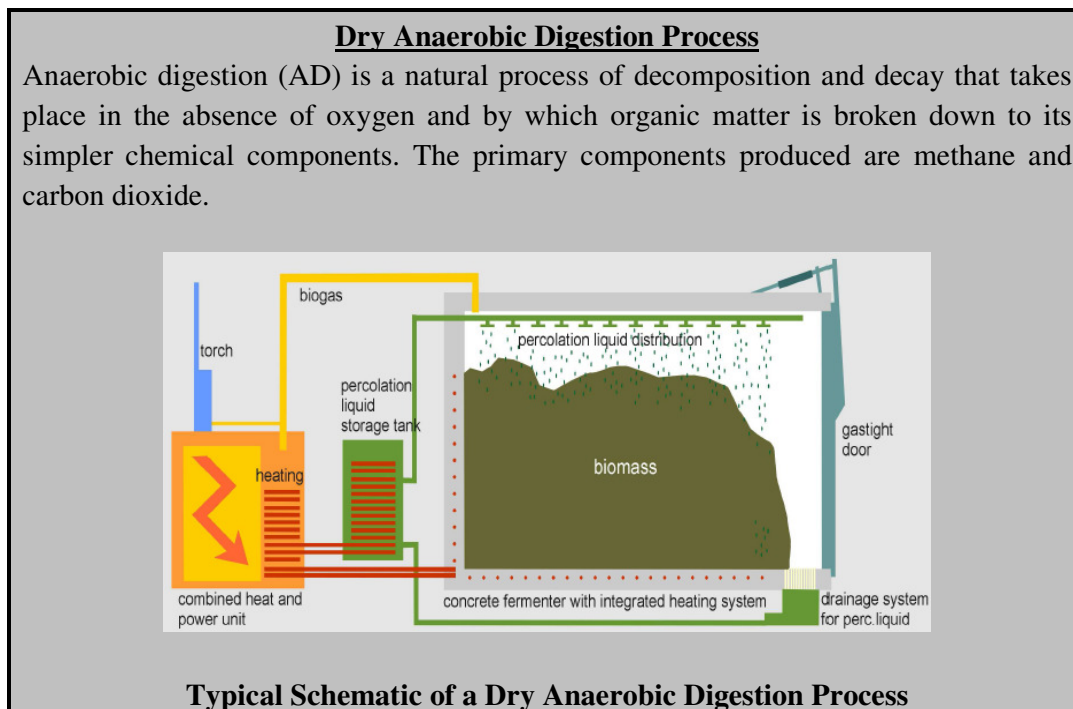
As the mechanical process and the refining and ABP hygienisation process for Configuration B is identical to that of Configuration A (MBT with Composting), only “Biological Processing of Waste” is detailed below for Configuration B.

### 2.3.2.1 Biological Processing of Waste

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

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

#### The Dry Anaerobic Digestion Process



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



**Loading of Dry AD Tunnels**

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

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

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

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

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

In the dry AD tunnels, a slightly positive pressure will be maintained throughout the process in order to prevent air entering the tunnels during the anaerobic phases. Each

tunnel will also be equipped with an over/under pressure protection valve which will activate in case of excessive under/over pressures within the tunnel.

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

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

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

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

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

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



**Typical Biogas Storage Units**

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

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

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

### **The Composting Process**

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

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



**Typical Automatic Tunnel Filling System Installation**

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

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



**Typical Composting Tunnel with Spigot Floor**

Each composting tunnel will have its own centrifugal aeration fan which will blow a mixture of fresh air and process air through an air plenum and into the PVC pipes

embedded in the floor of the composting tunnel. The spigots will distribute aeration air uniformly to the composting material within the tunnel. Pressurised air will flow through the composting material thereby ensuring intensive contact between the air and the composting material. In this way, the composting process will be closely controlled and aerobic conditions will be maintained in the complete batch of material being processed. The mixture of fresh air and process air will be set using computer controlled, pneumatically actuated valves.



### **Typical Aeration Fan and Ductwork Installation**

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

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



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

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

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

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

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

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



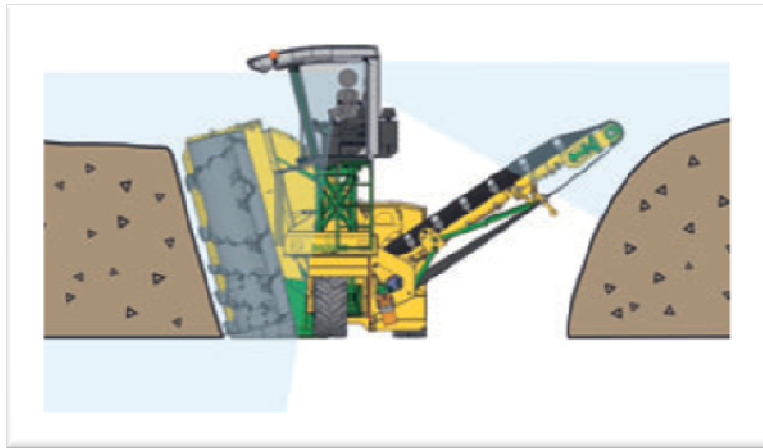
**Typical Automatic Tunnel Unloading System Installation**

### **The Maturation Process**

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

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

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



### **Trapezoidal Windrow Turner Principle**

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

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

### 3 SOCIO ECONOMIC

#### 3.1 INTRODUCTION

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

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

##### 3.1.1 Methodology

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

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

#### 3.2 EXISTING ENVIRONMENT

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

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

The site of the proposed MBT Facility is located within the same Bord na Móna landholding as the existing permitted Drehid Waste Management Facility. Access has been provided into the Drehid Waste Management Facility from the R403 via a

dedicated entrance and a 4.8km access road. This road will also provide access from the R403 to the proposed MBT Facility.

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

### 3.2.1 Land Use

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

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

### 3.2.2 Population

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

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

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

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

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

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

**Table 3-1 Population Change 2002-2011**

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

Source: Central Statistics Office (CSO) 2012

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

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

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

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

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

### 3.2.3 Employment

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

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

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

Source: CSO, 2012

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

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



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

**Table 3-3 Live Register 2010-2011**

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

Source: CSO 2012

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

### Socio-Economic Profile

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

**Table 3-4 Occupational Groups in Timahoe South**

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

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

Source: CSO, 2006.

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

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

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

### 3.2.4 Tourism and Amenities

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

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

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

**Table 3-5 Overseas Tourism 2010**

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

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

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

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

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

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

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

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

### 3.2.5 Activities

#### **Walking and Cycling Routes**

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

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

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

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

#### **Forest Parks/Woodlands & Boglands**

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

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

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

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

### **Other Activities**

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

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

## **3.3 POTENTIAL IMPACTS**

### *3.3.1 Potential Impacts of Configuration A (MBT with Composting)*

#### **Land Use**

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

#### **Population**

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

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

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

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

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

### **Employment**

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

### **Tourism and Amenities**

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

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



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

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

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

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

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

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

**Infrastructure**

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

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

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

**Community Gain**

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

**Community Liaison Committee**

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

The already established committee comprises eight members, as follows:

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

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

### MBT Facility Community Development Fund

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

### Public Education

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

### **Health and Safety**

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

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

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

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

Access to the MBT Facility will be via the private access road constructed to the south of the facility to join the R403 at Killinagh Upper. The overall Bord na Móna landholding and entrance will continue to be secured against unauthorised access and trespass and the MBT Facility will also have a dedicated secure entrance. All machinery will be locked away during non-working hours and parked within the confines of the site. The limited number of houses in the general vicinity of the site,

and the fact that the surrounding roads are not designated walking routes, will undoubtedly reduce opportunistic trespass.

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

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

## 3.4 MITIGATION MEASURES

### *3.4.1 Mitigation Measures for Configuration A (MBT with Composting)*

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

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

- Dust, air, odour, noise and surface/ground water will be monitored on site in compliance with an EPA waste licence;
- Mitigation measures in relation to the visual impact are discussed in Chapter 10 of this EIS and in Drawing 6301-2421 of Volume 3 of this EIS (Landscape Plan); and
- The Community Development fund will provide benefits for the local community through the provision of environmental improvement and recreational or community amenities in the locality.

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

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

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





## 4 ECOLOGY

### 4.1 INTRODUCTION

This chapter presents an Ecological Impact Assessment (EcIA) of the proposed development and should be read in conjunction with the site layout plans and project description section (Chapters 1 and 2) of this Environmental Impact Statement (EIS).

The MBT Facility site (29ha) is located in the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare within a larger Bord na Móna landholding, which comprises 2,544 hectares (ha) consisting largely of cutover bog. The assessment to date has been an iterative process with the aim being to minimise/ avoid ecological impacts as far as possible. The project has considered alternative site location options within the landholding as described in Chapter 1 of this EIS and detailed information available from previous EIS' and other data sources for this landholding.

Key ecological receptors have been avoided as far as possible, given other non-ecological constraints.

The site selected was determined as favourable from an ecology standpoint when compared to other alternatives as;

- It will result in less fragmentation of surrounding habitats as it is located in a centroid of development within the overall landholding;
- It will be located adjacent to the existing access road in a relatively more disturbed area than other potential sites considered; and
- It avoids relatively wetter habitat in the landholding which are more significant for breeding birds, otter, badger and developing wetland habitats.

The southern section of the overall landholding, in which the MBT Facility site is located, consists largely of former industrially cutover bog and includes a distinct linear raised area which was previously used as a railway for accessing the bog.

In general, the habitats present within the site of the MBT Facility consist of cutover bog which has been undisturbed in recent years (i.e. no peat harvesting within last 22 years). A mosaic of bare peat and re-vegetated areas occur with scrub, woodland, heath and grassland communities present. A relatively small portion of the landholding has already been developed by Bord na Móna as a waste management facility (i.e. the Drehid Waste Management Facility).

No significant aquatic habitats occur on site and in the immediate local area. Proposed mitigation measures for downstream aquatic receptors are considered in Chapter 6, Water and also in the Screening for Appropriate Assessment Statement, Appendix 4.1.

#### 4.1.1 Methodology

The following legislation has been considered for this ecological assessment:

- Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna, commonly known as the Habitats Directive;
- Council Directive 2009/147/EC on the conservation of wild birds, commonly known as the Birds Directive (codified version of Council Directive 79/409/EEC);
- European Communities (Natural Habitats) Regulations 1997, S.I. No. 94 of 1997, as amended by S.I. No. 233 of 1998 and S.I. No. 378 of 2005;
- European Communities (Birds and Natural Habitats) Regulations 2011;
- Wildlife Act, 1976 [Wildlife (Amendment) Act, 2000]; and
- Flora Protection Order 1999 (SI No. 94 of 1999).

The potential for impacts on nature conservation interests has been assessed in light of habitats and the species that are likely to be affected by the proposed development. The approach included consideration and review (as appropriate) of the following guidance:

- A Guide to Habitats in Ireland (Fossitt - The Heritage Council, 2000);
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003);
- Habitat Survey Guidelines: A Standard Methodology for Habitat Survey and Mapping in Ireland (The Heritage Council, 2005);
- Best Practice Guidelines for habitat survey and mapping in Ireland (The Heritage Council 2009);
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA, 2005);
- Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (NRA, 2006);
- Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes; (NRA, 2006);
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes; (NRA, 2006);
- Guidelines for the Treatment of Bats during the Construction of National Roads Schemes (NRA, 2006);

- Guidelines for Ecological Impact Assessment (Institute of Ecology and Environmental Management (IEEM, 2006);
- Requirement for the Protection of Fisheries Habitat During the Construction and Development Works at River Sites (Eastern Regional Fisheries Board); and
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009).

### Consultation

Consultation letters were sent to relevant authorities (including NPWS, BirdWatch Ireland, Inland Fisheries Ireland, Kildare County Council Conservation Officer, Irish Wildlife Trust, Irish Forestry Board (Coillte Teoranta), Irish Native Woodland Trust and Irish Peatland Conservation Council) on the 24<sup>th</sup> January 2012.

All project consultation is detailed in Chapter 1 of this EIS and all responses received are presented in Appendix 1.5. All relevant consultation responses are fully considered in this chapter.

### Desk Study

The ecological desk study for this project comprised of the following elements:

- Identification of all sites designated for nature conservation within 15 kilometres of the proposed development (refer to Figure 4-1 Designated Conservation Areas);
- A review of the NPWS site synopsis for designated sites within 15 kilometres of the proposed development as relevant regarding potential impacts;
- A plant species list for the Ordnance Survey National Grid 10 kilometres square N73 in which the study area is located, was generated from the CD-Rom version of the New Atlas of British and Irish Flora (Preston *et al.*, 2002). This list was then compared to the list of species protected under the Flora (Protection) Order, 1999 and those which are included in the Irish Red Data Book (Curtis and McGough, 1988) in order to determine if any rare or protected flora had been recorded in this area and its likelihood of being present on site;
- Review of Ordnance Survey maps and aerial photography in order to determine broad habitats that occur within the existing site; and

Review of relevant ecological reports, Environmental Impact Statements and literature.

### Field Survey

TOBIN Consulting Engineers undertook site visits to carry out habitat, breeding and wintering bird and general mammal assessments over the following periods:

- March 2011;
- April 2011;
- July 2011; and
- January 2012.

The habitat assessment was conducted in accordance with The Heritage Council's Draft methodology, *A Standard Methodology for Habitat Survey and Mapping in Ireland* (Natura Environmental Consultants, 2002) and habitats were classified according to The Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000). Aerial photography assisted habitat delineation and interpretation. Plant identification and nomenclature principally follows Webb *et al.* (1996). Grass and fern identification and nomenclature was further assisted by Rose (1989). The predominant plant species for each habitat type were recorded in order to accurately determine habitats present on the site. Habitats were evaluated according to the Site Evaluation Scheme contained in the Source: Guidelines for Assessment of Ecological Impacts in National Road Schemes (NRA, 2009).

Breeding and Wintering bird surveys were conducted at the MBT Facility site and in the overall Bord na Móna landholding so as to consider species with potential links to the site. While all birds were recorded; the focus was to determine species of conservation concern including species listed on Annex 1 of the EU Birds Directive; and Red and Amber listed species of High and Moderate conservation concern (Bird Watch Ireland Conservation evaluation criteria).

The general mammal survey primarily involved searching the site for evidence/signs of mammals (e.g. tracks, scats, dwellings and occasionally direct sightings). An assessment of the habitats in terms of their importance for mammals was also undertaken. Checks for protected fauna including Marsh Fritillary, Frogs and Smooth Newt were also conducted.

## 4.2 EXISTING ENVIRONMENT

### 4.2.1 *Baseline Evaluation Criteria*

The existing ecological conditions are described and evaluated in accordance with standard guidelines. Table 4.1 overleaf details the NRA evaluation scheme (NRA, 2009).

**Table 4-1 Site Evaluation Criteria**

<b>Ecological Valuation</b>	
Internationally Important	<p>Sites designated (or qualifying for designation) as an SAC or SPA under the EU Habitats or Birds Directives;</p> <p>Undesignated sites that fulfil criteria for designation as a European Site;</p> <p>Features essential to maintaining the coherence of the Natura 2000 network;</p> <p>Sites containing ‘best examples’ of the habitat types listed in Annex I of the Habitats Directive;</p> <p>Resident or regularly occurring populations of birds listed in Annex I of the Birds Directive and species listed in Annex II and/or Annex IV of the Habitats Directive;</p> <p>Ramsar Site;</p> <p>World Heritage Site;</p> <p>Biosphere Reserve;</p> <p>Site hosting significant species populations under the Bonn Convention;</p> <p>Site hosting significant populations under the Berne Convention;</p> <p>Biogenetic Reserve;</p> <p>European Diploma Site;</p> <p>Salmonid water.</p>
Nationally Important	<p>Sites or waters designated or proposed as an NHA*;</p> <p>Statutory Nature Reserve;</p> <p>Refuge for fauna and flora protected under the Wildlife Acts;</p> <p>National Park;</p> <p>Undesignated sites fulfilling criteria for designation as a NHA; Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act and/or a National Park;</p> <p>Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts and/or species listed on the relevant Red Data list;</p> <p>Site containing viable areas of the habitat types listed in Annex I of the Habitats Directive.</p>
County Importance	<p>Areas of Special Amenity;</p> <p>Area subject to a Tree Preservation Order;</p> <p>Area of High Amenity, or equivalent, designated under the County Development Plan;</p> <p>Resident or regularly occurring populations (assessed to be important at the County level) of species of birds listed in Annex I of the Birds Directive, species</p>

Ecological Valuation	<p>listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed on the relevant Red Data list;</p> <p>Site containing area(s) of the habitat types listed in Annex I of the Habitats Directive that do not fulfil criteria for valuation as of International or National Importance;</p> <p>County important populations of species, or viable area of semi-natural habitats or natural heritage features identified in the National of local BAP;</p> <p>Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county;</p> <p>Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</p>
Local Importance (higher value)	<p>Locally important populations of priority species or habitats or natural heritage features identified in the Local Biodiversity Action Plan (BAP);</p> <p>Resident or regularly occurring populations (assessed to be important at the Local level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed in the relevant Red Data list;</p> <p>Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;</p> <p>Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.</p>
Local Importance (lower value)	<p>Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;</p> <p>Sites of features containing non-native species that are of some importance in maintaining habitat links.</p>

Source: Guidelines for Assessment of Ecological Impacts in National Road Schemes (NRA, 2009)

#### 4.2.2 Designated Conservation 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 proposed MBT development. The nearest designated site is Hodgestown Bog (NHA). The Grand Canal (pNHA) is not currently designated but for planning purposes is treated as a designated site.



A Screening for Appropriate Assessment statement (as per EU Habitat Directive requirements) was completed and the report is detailed in Appendix 4.1.

Figure 4.1 Designated Conservation Areas, illustrates the location of designated conservation sites within 15 kilometres of the proposed development. Distances from each designated conservation site to the site boundary of the proposed MBT development are provided in Table 4.2.

**Table 4-2 Designated conservation areas located within 10km of the site**

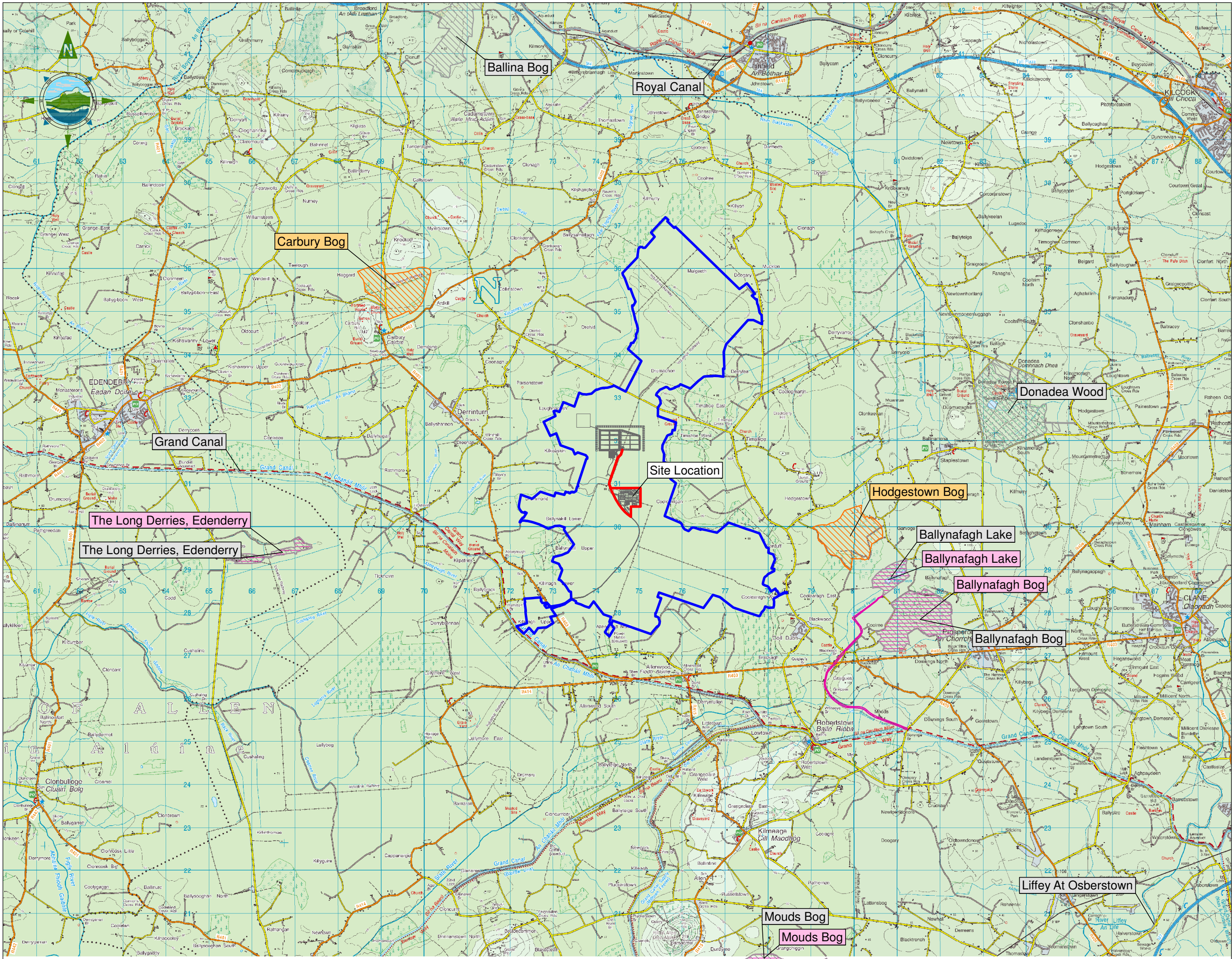
Name	Site Code	Designation	Approximate distance from site/activity boundary
Ballina Bog	000390	pNHA	10.5 km
Ballynafagh Bog	000391	pNHA/SAC	6.4 km
Ballynafagh Lake	001387	pNHA/SAC	5.8 km
Carbury Bog	001388	NHA	6.0 km
Donadea Woods	001391	pNHA	8.3 km
Grand Canal	002104	pNHA	3.3 km
Hodgestown Bog	001393	NHA	4.0 km
Long Derries, Edenderry	000925	pNHA/SAC	7.2 km
Royal Canal	0002103	pNHA	10.1 km
Mouds Bog	000395	pNHA/SAC	11 km
Pollardstown Fen	000396	SAC	13.2km
Liffey at Osberstown	001395	pNHA	14.2 km

NHA = Natural Heritage Area (Nationally Designated Site)

pNHA = proposed Natural Heritage Area (not currently designated but recognised in County Development Plans)

SAC = Special Area of Conservation (European Designated Site)





Legend

- Site Location
- Landownership Boundary
- Natural Heritage Areas
- Proposed Natural Heritage Areas
- Special Area of Conservation
- Special Protection Areas

0 0.5 1 2 3 4  
Kilometers

- NOTES
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
  2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
  3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
  4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

A	05.06.12	Issued	G.F.	S.T.
Issue	Date	Description	By	Chkd.

Client:  
**BORD NA MÓNA**

Project:  
**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:  
**DESIGNATED CONSERVATION  
AREAS**

Scale @ A3: 1:80,000

Prepared by: G.Fil Checked: S.Tinnelly Date: May 2012

Project Director: D.Grehan

**TOBIN**  
Patrick J. Tobin & Co Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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#### 4.2.3 Rare and Protected Flora

The development site is located in the Ordnance Survey National Grid 10km square N73. A plant species list for this 10km square was generated from the CD-Rom version of the “New Atlas of British and Irish Flora”(Preston *et al.*, 2002). This list was then compared to the list of species protected under the Flora (Protection) Order, 1999 and those that are included in the Irish Red Data Book (Curtis and McGough, 1988). Table 4-3 presents the protected or rare species with records occurring in this grid square.

**Table 4-3 Rare and Protected Flora present in National Grid 10km square N73.**

Species	Status	Category
Bog Orchid, ( <i>Hammarbya paludosa</i> )	Protected	Rare
Bog Rosemary, ( <i>Andromeda polifolia</i> )	Not Protected	Species not Considered Threatened in the Republic of Ireland but protected in NI
Cowslip ( <i>Primula veris</i> )	Not Protected	Species not Considered Threatened in the Republic of Ireland but protected in NI

In addition Blue fleabane *Erigeron acer* (Protected species) may possibly occur. This was checked for during an appropriate flowering period and none was noted.

Habitats on the site are not suitable for Bog Orchid and none were noted during site surveys. No other protected flora are likely to occur.

Conditions on site are possible for bog rosemary, but neither this nor any of the other species mentioned above were recorded on the proposed MBT development site during the field visits.

#### 4.2.4 Habitats within the proposed MBT development site

The proposed MBT development site comprises re-vegetating cutover bog beside an existing private access road which leads to the existing Drehid Waste Management facility located approximately 1km north of the proposed location of the MBT facility. This area was previously used by Bord na Móna up to approximately twenty two years ago for production of sod peat for energy generation. In general, the habitats present on site are typical of re-vegetating cutover bog on a relatively well drained portion of the overall Bord na Móna landholding. Habitats consist of a mosaic of habitats ranging in succession state from small areas of bare peat, scrub, immature

birch woodland, heath, more developed bog woodland and grassland communities (along a former railway embankment).

Habitats were classified in accordance with Fossitt (2000). Six habitat classes and habitat mosaics (habitat consists of a mix of habitat classes) were determined within the proposed MBT Facility site including;

- Drainage Ditches (FW4);
- Dry Meadows and Grassy Verges (GS2);
- Immature Woodland (WS2) / Bog Woodland (WN7);
- Dry siliceous heath (HH1);
- Dry siliceous heath (HH1) / Scrub (WS1) mosaic; and
- Building and Artificial Surfaces (BL3).

Habitats classes and their extents are presented in Figure 4.2 and described in subsequent sections.

#### Drainage Ditches (FW4)

There are three drainage ditches within the development site. They have relatively steep banks and little in the way of aquatic fringing vegetation, although bulrush (*Typha latifolia*) does occur at the foot of the bank at scattered locations along the ditches. The water in the ditches is turbid and does not allow much vegetation to grow although occasional patches of duckweed (*Lemna minor*) do occur.

The banks alongside these ditches have scrub development with the main species being willow (*Salix cinerea*), bramble (*Rubus fruticosus* agg.) and birch (*Betula pubescens*).

#### Dry Meadows and Grassy Verges (GS2)

This habitat type has formed on the man-made former railway line, which has subsequently been re-colonised by vegetation. It is found along the old railway line clearance that runs diagonally across the proposed MBT development site. The banks of the old railway line are dominated by rank coarse vegetation, chiefly cocksfoot grass (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), wild strawberry, willowherb, cow parsley, sweet vernal grass (*Anthoxanthum odoratum*), nettle (*Urtica dioica*), Angelica (*Angelica sylvestris*) and bramble. Plants such as hedge woundwort (*Stachys sylvatica*), selfheal (*Prunella vulgaris*) and centaury (*Centaureum erythraea*) are occasional. Some growth of birch and willow is also occurring from the adjoining woodland habitat.

Immature Woodland (WS2) / Bog Woodland (WN7)

This habitat type is scattered throughout the overall landholding including the proposed MBT development site. The tree species are dominated by birch and willow with small patches of Scot's pine (*Pinus sylvestris*).

The understorey is dominated by ling heather (*Calluna vulgaris*), bramble, raspberry, willowherb and bracken (*Pteridium aquilinum*).

The vegetation is semi-natural and shows a moderate degree of diversity.

Dry Siliceous Heath (HH1)

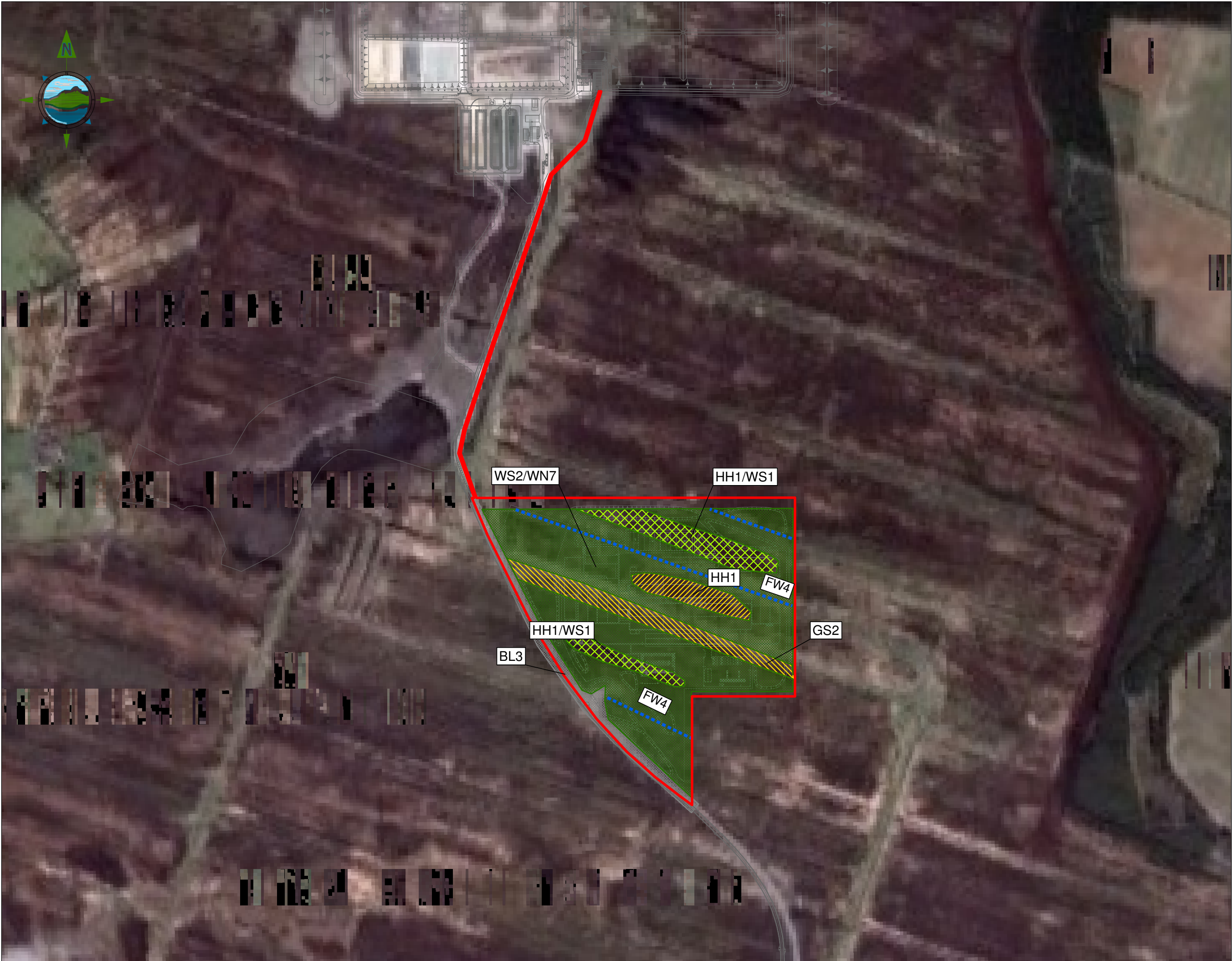
This habitat occurs to the centre of the proposed MBT development site and is dominated by ling heather with some dwarf shrubs, grasses, occasional bog cotton (*Eriophorum* spp.) and broadleaved herbs.

Dry Siliceous Heath (HH1)/ Scrub (WS1) mosaic

This habitat mosaic occurs within the proposed MBT development site on relatively dry soils. The main species is ling heather with bracken, *Molinia* (grass), bramble and occasional gorse (*Ulex sp.*).

Building and Artificial Surfaces (BL3)

This habitat is used to describe the existing access road which runs along the western site boundary. It has no ecological value.



**Legend**

Site Boundary

FW4 Drainage

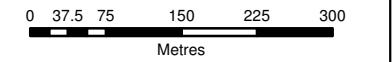
BL3 Buildings and artificial surfaces

GS2 Dry meadows and grassy verges

HH1 Dry siliceous heath

HH1/WS1 Dry siliceous heath/  
Scrub Mosaic

WS2/WN7 Immature woodland/  
Bog woodland



- NOTES**
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A	05.06.12	Issued	G.F.	S.T.
Issue	Date	Description	By	Chkd.

Client:

**BORD NA MÓNA**

Project:

DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

Title:

HABITAT MAP

Scale @ A3:

1:7,500

Prepared by:

G.Fill

Checked:

S.Tinnelly

Date:

May 2012

Project Director:

D.Grehan

**TOBIN**  
Patrick J. Tobin & Co Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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#### 4.2.5 Fauna

##### Mammals

Badger foraging signs were recorded during the survey visits at several locations around the MBT development site. They are likely to forage on the site though no signs were noted. An outlier sett was determined approximately 400m north of the MBT site boundary. This area will not be disturbed.

No evidence of otter spraints (droppings) or holts (breeding site) were noted within the development site. Otter slides were noted on existing drains and it is likely that this species ventures into the area as there is abundant suitable prey (frogs etc).

Signs of fox (*Vulpes vulpes*) and Irish hare (*Lepus timidus hibernicus*) were noted including several sightings of Irish Hare and fox territorial marking.

No evidence of the occurrence of bats was found within the study area. No mature deciduous trees (suitable roost sites) were found, nor any ruined or old buildings suitable as summer roosts for bats. As a result, it is unlikely that bats roost on the site. The extensive scrub and developing woodland areas in the wider landholding area, provide extensive suitable foraging habitat for bats.

##### Birds

No possible/ probable or confirmed breeding species listed on Annex 1 of the Birds Directive were recorded on the site. In addition none were recorded in the wider environs of the site.

No species of high (red listed) or moderate (amber listed) conservation concern were noted on the site.

The site consists of extensive suitable breeding habitat for a range of common species with minimum numbers of territorial males noted as follows:

- White throat (>3)
- Willow Warbler (>5)
- Lesser Redpoll (> 5)
- Blackcap (>2)
- Blackbird (1)
- Coal Tit (1)
- Wren (1)
- Bullfinch (1)
- Long Tailed Tit (1)

The following amber listed species were recorded in habitats in the wider landholding. It is important to note that habitats at the MBT Facility site are largely unsuitable for all of these species.

- Sand Marten – colony (> 20 apparently occupied nests) located at the sand and gravel borrow area;
- Mute Swan – Breeding Pair noted around existing settlement ponds;
- Linnet – several pairs noted in cutover bog habitat;
- House Marten - > 5 nest sites on existing buildings at Drehid Waste Management Facility;
- Snipe - > 3 males holding territory. Common wintering species on more open cutover bog (>50 noted);
- Grasshopper Warbler – several males holding territory;
- Dabchick – Pair noted;
- Water Rail. Located in wetter cutover bog > 500m north of MBT site;
- Cuckoo – A male noted over the wider cutover bog; and
- Kestrel – Several noted foraging at different times over the wider landholding area.

All birds and their nesting places are protected under the Irish Wildlife Act (1976), and under the Irish Wildlife Amendment Act, (2000) (except for excluded species).

#### Other Fauna

Numerous sightings of common frog (*Rana temporaria*) were made. Conditions for breeding in drains on site are suitable for both frog and smooth newt (*Triturus vulgaris*). Viviparous lizard (*Lacerta vivipara*) is common and is found in areas of heath.

These species are protected under the Irish Wildlife Act (1976) and under the Irish Wildlife Amendment Act, (2000). The frog is common and widespread in Ireland, but considered vulnerable in the rest of Europe (Whilde, 1993).

Marsh Fritillary surveys were conducted as possible habitat exists on the MBT Facility site edges - areas with Devils Bit Scabious (*Succisa pratensis*) food plant. This species of butterfly is listed on Annex 2 of the Habitat Directive. No signs of this species were found.

Other records of common butterfly and Odonata were observed at the MBT site. These included; Orange tip, Common Blue, Speckled Wood, Brown hawker (*Aeshna grandis*), Common darter (*Sympetrum striolatum*), Blue-tailed damselfly (*Ischnura elegans*) and other unidentified blue damselflies.

#### 4.2.6 Ecological Evaluation

No International, National or County significant habitats/ species occur at the MBT site. No protected plants were recorded and no protected mammal sites exist within the site boundary.

The proposed MBT development site consists of cutover bog habitat which includes a mosaic of six habitat types which are evaluated as a discreet unit of developing semi natural habitat. Habitats are detailed in Table 4-4 below together with their evaluation rating.

**Table 4-4 Habitat Evaluation**

Habitat Classification	Evaluation
Drainage Ditch (FW 4)	Local Importance (Higher Value)
Dry Siliceous Heath (HH1)	
Dry Siliceous Heath (HH1)/ Scrub Mosaic (WS1)	
Immature Woodland (WS2) / Bog Woodland (WN7)	
Dry Meadows and Grassy Verges (GS2)	Local Importance (Lower Value)
Buildings and Artificial Surfaces (BL3)	Not evaluated

Key ecological receptors requiring consideration of mitigation are summarised as follows;

- Site habitats listed (above) – Local Importance (Higher Value);
- Common breeding bird species; and
- Frogs, Viviparous Lizard and Common Lizard.

#### 4.3 POTENTIAL IMPACTS

##### Impact Assessment Criteria

The criteria used in the ecological impact assessment are outlined overleaf. Mitigation measures are proposed to avoid, reduce or compensate for the impacts identified and any residual impacts are discussed.

**Table 4-5 Criteria used in Ecological Impact Assessment (EPA, 2002, IEEM 2006)**

<p><b><i>Positive or Negative:</i></b></p> <p>Is the impact likely to be positive or negative? International and national policy now pushes for projects to deliver positive outcomes for biodiversity.</p>
<p><b><i>Context (Magnitude and extent):</i></b></p> <p>A scheme may effect only a small part of a site but the area of habitat affected in that location (in hectares) should be given in the context of the total area of such habitat available (e.g. 1 ha of a woodland which measures 30ha in total.)</p>
<p><b><i>Character:</i></b></p> <p>The type of habitat (e.g. natural or highly modified woodland; mature or recently established, wet or dry) is important, as is the quality of the site (e.g. undamaged active blanket bog).</p>
<p><b><i>Significance:</i></b></p> <p>State whether a site has a designation, such as a SAC or NHA, or contains a listed (Annex I) habitat. The ecological value of a site can be assigned a rating using an evaluation scheme (e.g. undesignated areas of semi - natural broadleaved woodland are normally rated as high value, locally important).</p>
<p><b><i>Sensitivity:</i></b></p> <p>Indicate changes that would significantly alter the character of an aspect of the environment (e.g. changes in hydrology of a wetland due to construction of access road).</p>
<p><b><i>Duration:</i></b></p> <p>Indicate the time for which the impact is expected to last prior to recovery or reinstatement of impacted habitats and/or species.</p> <p>The duration of an activity may differ from the duration of the resulting impact caused by the activity (e.g. short-term construction activities may cause disturbance to birds during the breeding season, however, there may be longer – term impacts due to a failure to reproduce in the disturbed area during that season).</p>
<p><b><i>Reversibility:</i></b></p> <p>Identify whether an ecological impact is permanent (non-reversible) or temporary (reversible – with or without mitigation).</p>
<p><b><i>Timing and Frequency:</i></b></p> <p>Some changes may only cause an impact if they happened to coincide with critical life-stages or seasons (for example, the bird nesting season). This may be avoided by careful scheduling of the relevant activities.</p>

#### *4.3.1 Potential Impacts of Configuration A (MBT with Composting)*

##### **4.3.1.1 Construction Phase**

###### Designated Conservation Areas

The proposed development does not lie within or adjacent to any site designated for nature conservation.

No direct or indirect impacts on any site designated for conservation will arise through the development of the facility (also refer to Screening Statement (re Natura 2000 sites) in Appendix 4.1).

No adverse impacts are likely to designated sites.

###### Rare and Protected Flora

No species of rare or protected flora were found within the proposed MBT Facility development site. There will be no direct or indirect impact to rare or protected flora by the proposed MBT Facility development.

No adverse impacts are likely to rare and protected flora

###### Key Habitat (Ecological) receptors within the proposed MBT Facility site

Key habitats of Local Importance (Higher Value) that require consideration are detailed in Table 4-4. Permanent removal of most of these habitats will be required for construction of the facility within the development site boundary. The site clearance works will involve the permanent removal of approximately 24.4ha of these habitats within the 29ha MBT Facility site. There will be scope for retaining existing habitat particularly at the site boundaries. In addition, replanting, semi natural grasslands and natural re-vegetation will occur on specific sections of the site post construction. A number of settlement ponds will also be created which will be designed with an ecological focus.

The post construction Landscape Plan (Drawing 6301-2421, Volume 3 of this EIS) will therefore reduce the overall impact as a significant proportion of the site (approximately 14.5ha or c.a. 50%) will have retained habitats or new habitats created based on ecological design.

There is potential for impacts to occur, during the construction phase, to adjacent off site intact habitats through damage and disturbance arising from vehicular activities and storage of excavated material. There is also potential for increased siltation and fuel/oil contamination of drainage ditches. Mitigation measures for minimising risks to downstream water sources and associated aquatic ecology are detailed in Chapter 6 of this EIS (Water Chapter).

Impacts should be considered in the context of the wider landholding as the MBT Facility site consists of a relatively small portion of a much larger area of discrete semi natural habitats. Impacts from the development are considered to be a permanent minor adverse impact. This impact will likely affect <5% of similar habitats within the overall Bord na Móna landholding. As detailed above, the Landscape Plan fully recognises habitats on site and replanting and retention of vegetation will reduce this impact further post construction.

#### Fauna - Mammals

No significant impacts are expected to protected mammal species e.g. badger, otter and bats as abundant alternative habitat surrounds the proposed MBT Facility site and no breeding sites were determined. Therefore, no significant impacts are expected but given the protected status of the mammals, mitigation (monitoring) is detailed below.

#### Fauna - Birds

The removal of scrub, bog woodland and cutover bog will reduce potential areas of nesting and foraging habitat for common breeding birds locally. Removal of these habitats during construction could obviously lead to a direct impact on common bird populations at a localised scale within the site boundary.

Impacts from the development are considered to be a permanent minor adverse impact as available nesting and foraging areas will be permanently reduced within a relatively small localised area.

Mitigation measures are proposed which, when fully implemented, will ensure that impacts on birds will be minimised.

#### Other Fauna

Removal of the cutover bog, scrub and drainage ditch habitats will reduce the areas available for breeding common frog, lizard and newt. Abundant alternative sites exist across the remainder of the landholding so it is unlikely that there will be a significant reduction in populations of these fauna. Given the protected status of frog breeding sites, precautionary monitoring is recommended to determine status and appropriate actions immediately prior to site clearance works as detailed in the mitigation section below.

#### **4.3.1.2 Operational Phase**

Depending on the final lighting requirements there is a potential to impact foraging bats as excessive lighting and “spill over” of light into surrounding habitats can alter foraging routes and areas utilised. Some bat species require dark conditions for effective foraging.



The nature of the materials processed at the MBT Facility may attract wildlife including pest species (e.g. rodents) to the facility which may require pest control activities. Indirect impacts from possible control procedures to predator species (e.g. birds of prey and protected mammals) will require consideration to minimise indirect impacts to species in the wider local area.

No collision or other impacts with any structures at the MBT Facility are expected to bird species of conservation significance in the wider local area including designated sites.

#### *4.3.2 Potential Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The potential impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting) are the same as for Configuration A (MBT with Composting) as detailed in section 4.3.1 above.

### **4.4 MITIGATION MEASURES**

#### *4.4.1 Mitigation Measures for Configuration A (MBT with Composting)*

Mitigation measures outlined in this Report will seek to limit and reduce the direct and indirect impacts of the proposed development on local ecology during the construction and operational phases.

#### **Site Clearance/ Construction Phase**

The following mitigation measures are recommended to limit the direct and indirect impacts of the proposed site clearance/ construction phases on the local ecological environment:

- All construction works on site will be guided by best ecological practice guidance such as those listed in Section 4.1.1 above.
- As frogs breed on the site, pre-site clearance surveys of drainage ditches will be implemented to inform best practice during the site clearance phase. If froglets are present then it is recommended that all works in the vicinity of the drainage ditch take place between August and late September before frogs go into hibernation. During site clearance an ecologist will be present to remove frogs and / or Viviparous Lizard to an alternative safe location.
- The works area will be clearly marked and fenced off to minimise impacts to any surrounding habitats of ecological significance.
- There will be no soil storage outside the site area thereby avoiding impacts to adjacent habitats.
- Where possible tree vegetation (birch and willow growth) within the site boundary will be retained for landscaping so as to reduce ecological impact, also refer to the Landscape Plan (Chapter 10).
- Adjacent tree, scrub and heath vegetation that is to be retained will be clearly marked and fenced off to avoid accidental damage during excavations and site

preparation. No materials will be stored within five metres of retained trees and scrub. Materials, especially soil and stones, can prevent air and water circulating to the roots of trees and shrubs.

- The site clearance phase of the proposed development will only take place during daylight hours to minimise potential disturbance risks to nocturnal mammal species.
- Where possible, scrub, tree or heath removal will be undertaken outside of the bird nesting period, which begins on March 1st and continues until August 31st, in order to protect nesting birds. All birds and their nesting places are protected under the Irish Wildlife Act 1976 (as amended 2000).
- As an extended period of time may arise prior to site clearance works, pre-site clearance ecological survey checks will be conducted to update baseline ecology and to determine any site specific recommendations for minimising impacts to potential key ecological receptors.
- Extensive site works such as site excavation will not take place during extended periods of heavy rain in order to minimise soil and silt water run off to silt traps.
- Soil storage will be in a manner which avoids impacts to surface waters and instability issues.
- Bund areas created will be replanted with native vegetation similar to species currently growing on the site.
- Two new ponds will be created within the site and designed based on ecological principles and having regard for species such as frog as these ponds will provide suitable breeding habitat.
- During the excavation and removal of soil for construction works, fuel / oil interceptors and silt traps or sedimentation ponds will intercept surface water run-off. The Contractor will establish a maintenance schedule and operational procedure for silt and pollution control measures during the construction period.
- Oil, petrol and other contaminants will be stored in bunded containers. Bund specification will conform to the current best practice for oil storage such as Enterprise Ireland's Best Practice Guide BPGCS005 Oil Storage Guidelines. All waste oil, empty oil containers and other hazardous wastes will be disposed of in conjunction with the requirements of the Waste Management Acts 1996 to 2008, as amended.
- Spill kits will be retained on site during the construction phase. These kits will be equipped with suitable materials for the appropriate cleanup and storage of any contaminants which are accidentally released into the environment.
- Pouring of concrete will only take place in designated areas. Washings will not be discharged to surface water and poured concrete will be allowed to cure for a minimum 48 hours in dry weather.

**Operational Phase**

- External lighting will be minimised as far as possible particularly its usage at night, so as to minimise disturbance to foraging bats. Where feasible, external lights will be cowled and limited only to areas where lighting is strictly required (as per Health and Safety minimum requirements).
- Vermin control measures will be implemented and an ecological expert will be consulted to determine suitability and control (e.g. spread of poisons) in the context of protected species in the wider landholding.

No other significant impacts are likely to arise to ecological receptors during the operational phase of the project.

#### *4.4.2 Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting) are the same as for Configuration A (MBT with Composting) as detailed in section 4.4.1.

#### **4.5 CONCLUSION**

The proposed Drehid MBT Facility will occupy a 29ha site within an overall 2,544ha Bord na Mona landholding in Co. Kildare. The proposed MBT Facility development site is located beside the existing private access road which leads to the permitted waste management facility approximately 1km north of the MBT Facility site boundary. This access road will also serve the proposed MBT Facility.

The MBT Facility site has previously been disturbed by the construction of a railway line and for the production of sod peat for energy generation. It currently consists of cutover bog and contains a mosaic of habitats unique to the local area although larger undisturbed areas of these habitats are present within the wider landholding. The majority of the site area of cutover bog / habitat mosaic will be permanently removed for the development though the final design will retain at least some of the existing site habitats. This is fully recognised and reflected in the Landscape Plan. In addition, areas will be replanted around the perimeter of the site which will further reduce overall habitat loss and allow creation of some woodland type habitat.

The proposed MBT Facility will not have any impacts on any sites designated for conservation, protected flora, scarcer breeding birds or protected mammals. In general local populations of common breeding bird species, common frog, lizard, newt and dragonflies will not be significantly impacted as larger areas of similar alternative habitat are present surrounding the proposed MBT Facility site within the local area.

Proposed mitigation measures outlined in this Report will seek to reduce any impacts of the proposed MBT Facility development during the construction and operational phases on the ecological environment within the wider landholding.

## 5 SOILS, GEOLOGY AND HYDROGEOLOGY

### 5.1 INTRODUCTION

The proposed MBT Facility site is located in a large Bord na Móna landholding in the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare. The entire Bord na Móna landholding, comprising 2,544ha, is divided into a northern portion of 799ha and a southern portion of 1,745ha. The northern portion and southern portions of the Bord na Móna property are divided by the L5025 County Road, which crosses the narrowest section of the peat deposit.

The soils and geology assessment concentrated on the characterisation of the soil and geology environment within the footprint of the proposed MBT facility. Significant information is available from the nearby Bord na Móna Drehid Waste Management Facility site (EPA Waste licence No. W0201-03), which contributed to this assessment.

The entire Bord na Móna landholding in this area has been utilised for the industrial harvesting of peat over an approximate 50 year period, therefore the soil environment is characterised at its current state, which is significantly altered from its original setting.

The baseline assessment of the soils and geology is concerned with an appraisal and description of the deposits within the MBT Facility site. The information contained in this section has been divided into sub-sections, so as to describe the various aspects pertaining to soil and geology. The sub-terrain environment is described from the surface down, to describe and conceptualise the different layers occurring under the MBT Facility site. The groundwater movement through the various sub-terrain media is also described.

### 5.2 METHODOLOGY

This report has been prepared using the recommendations set out in the Environmental Protection Agency (EPA) document ‘Guidelines on Information to be contained in Environmental Impact Statements’ (2002). The guidelines and recommendations of the Institute of Geologists of Ireland (IGI) 2002 publication ‘Geology in Environmental Impact Statements – A Guide’ was also taken into account in the preparation of this section.

In the preparation of this section, all available relevant regional and site specific information was collated and assessed. The information sources are detailed further herein.

All projects and developments that require an EIS are of a scale or nature that they have the potential to have an impact on the environment. In this section the potential impact on the geological environment resulting from development of the proposed MBT facility is assessed and mitigation measures are proposed to reduce any significant impacts. Based on the mitigation measures proposed the significance of the predicted impact on the geological environment is determined.

Various relevant datasets and information sources were used in the compilation of this section of the EIS, including:

- Reference to existing regional and site specific topography maps from the Ordnance Survey of Ireland (OSI) publications and from surveys undertaken on behalf of the Client;
- The regional soil, subsoil, geological and hydrogeological maps available from the Geological Survey of Ireland (GSI) which were used to determine the setting of the MBT Facility site, such as the 1:100,000 scale Bedrock Geology Sheet No. 16 (Geology of Kildare/Wicklow), GSI 1995;
- Previous site investigation data at the Bord na Móna landholding;
- A site investigation of ground conditions to determine site-specific ground conditions within the boundary of the proposed MBT development; and
- A site walkover undertaken in November 2011 and January 2012.

The aim of the site investigation was to determine the ground conditions at the proposed location of the MBT facility. The site investigation works helped to identify potential impacts arising from the formation of the access roads, construction of buildings and the installation of associated facilities. Based on the investigation findings discussed and the likely impacts and risks that may be anticipated, guidance is provided towards the mitigation of these impacts and minimisation of the associated risks during construction and operation.

This chapter should be regarded as being a distillation of the likely issues relating to impacts on the geological and hydrogeological environment, together with appropriate construction and operational recommendations to mitigate the impacts.

### 5.3 EXISTING ENVIRONMENT

#### 5.3.1 *Soil and Subsoil Geology*

The distribution of soil types in the vicinity of the MBT Facility site is shown on Figure 5.1, which is an extract from the Soils Map of Ireland, prepared by the National Soil Survey (1980). The soil map indicates that the principal dominant soil within the MBT Facility site comprises peat deposits.

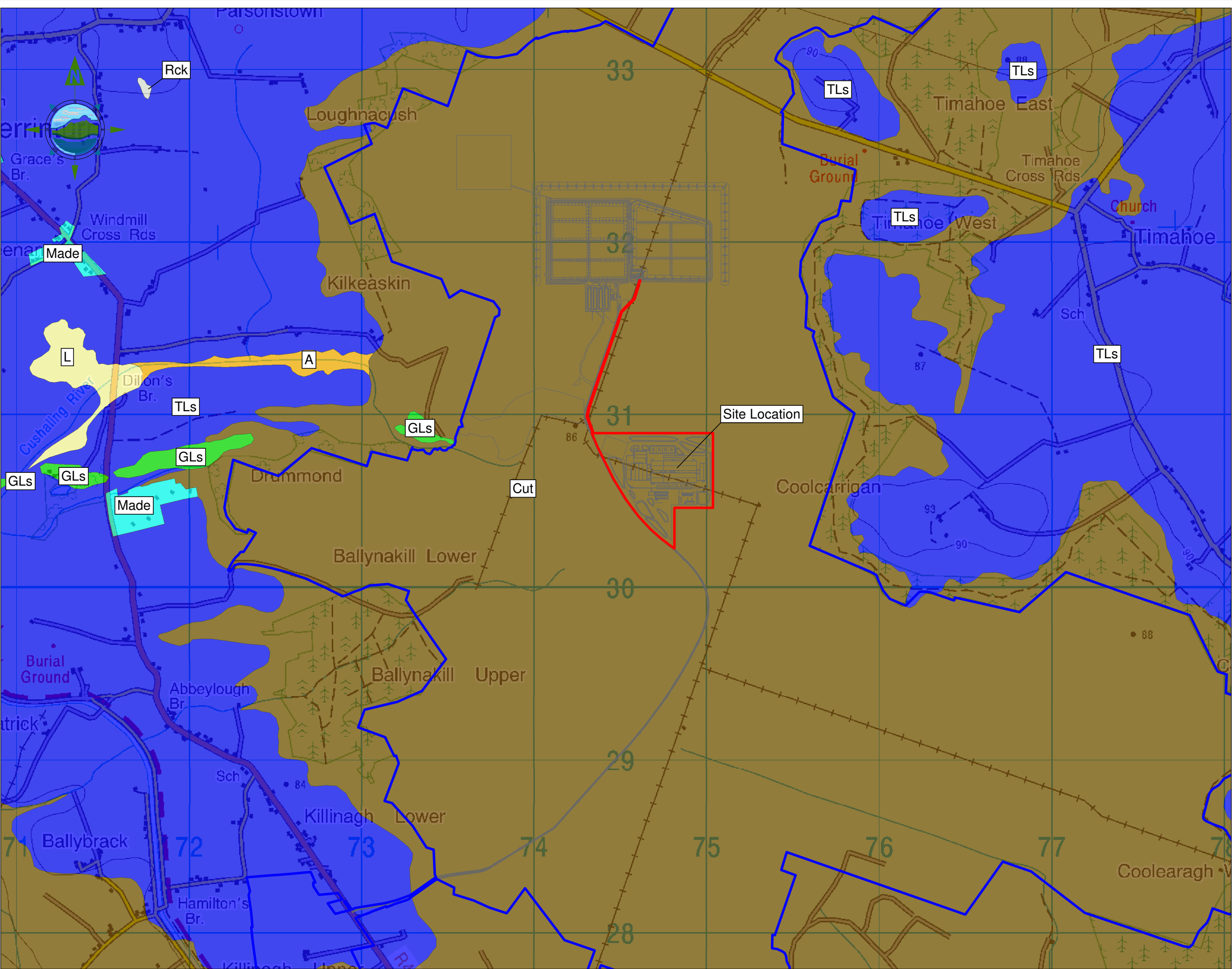


The origin of the unconsolidated materials in this area is associated with the movement and deposition from the Irish Ice Sheet during the last Ice Age. The last Ice Age occurred during the Quaternary Period (1.6 million years to 10,000 years ago), which is the most recent period in the geological timeframe.

The Quaternary map (2004), produced by the GSI as part of the Groundwater Protection Scheme for County Kildare, indicates that all lands within the MBT facility activity boundary are covered with peat deposits (Figure 5.1). This is supported by the Teagasc Subsoil (Parent Material) dataset which is available on the GSI website. The freer draining lands on the verge of Bord na Móna's landholding are underlain by '*Till chiefly derived from Limestone*' (GSI website). This limestone till is known to underlie the peat material within the MBT Facility site.

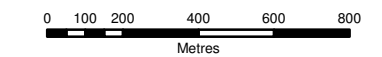
Reference to the 19<sup>th</sup> century, 6-inch to 1-mile scale, field sheets indicates that the till comprises Clay and Gravel, with sporadic isolated lenses of Sand and Gravel interbedded with the till. The field sheets do not record any rock outcrops in the vicinity of the applicant's property.

Information available from the GSI open file records indicates that a number of mineral exploration boreholes were drilled in this area and data on the depth to bedrock is available from these records. These GSI records indicate that the Quaternary deposits are quite thick in this area with the depth to bedrock varying between 10m and 35m in the vicinity of the proposed MBT facility site. Site investigation data is outlined in section 5.3.2 and supports the above findings.



**Legend**

- Site Boundary
- Landownership Boundary
- A Alluvium
- Cut Cutover Peat
- GLs Limestone sands and gravels (Carboniferous)
- L Lake sediments undifferentiated
- Made Made ground
- Rck Bedrock at surface
- TLs Limestone till (Carboniferous)



**NOTES**

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Issue	Date	Description	By	Chkd.	

Client:

**BORD NA MÓNA**

Project:

DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

Title:

SUBSOILS GEOLOGY  
MAP

Scale @ A3: 1:20,000

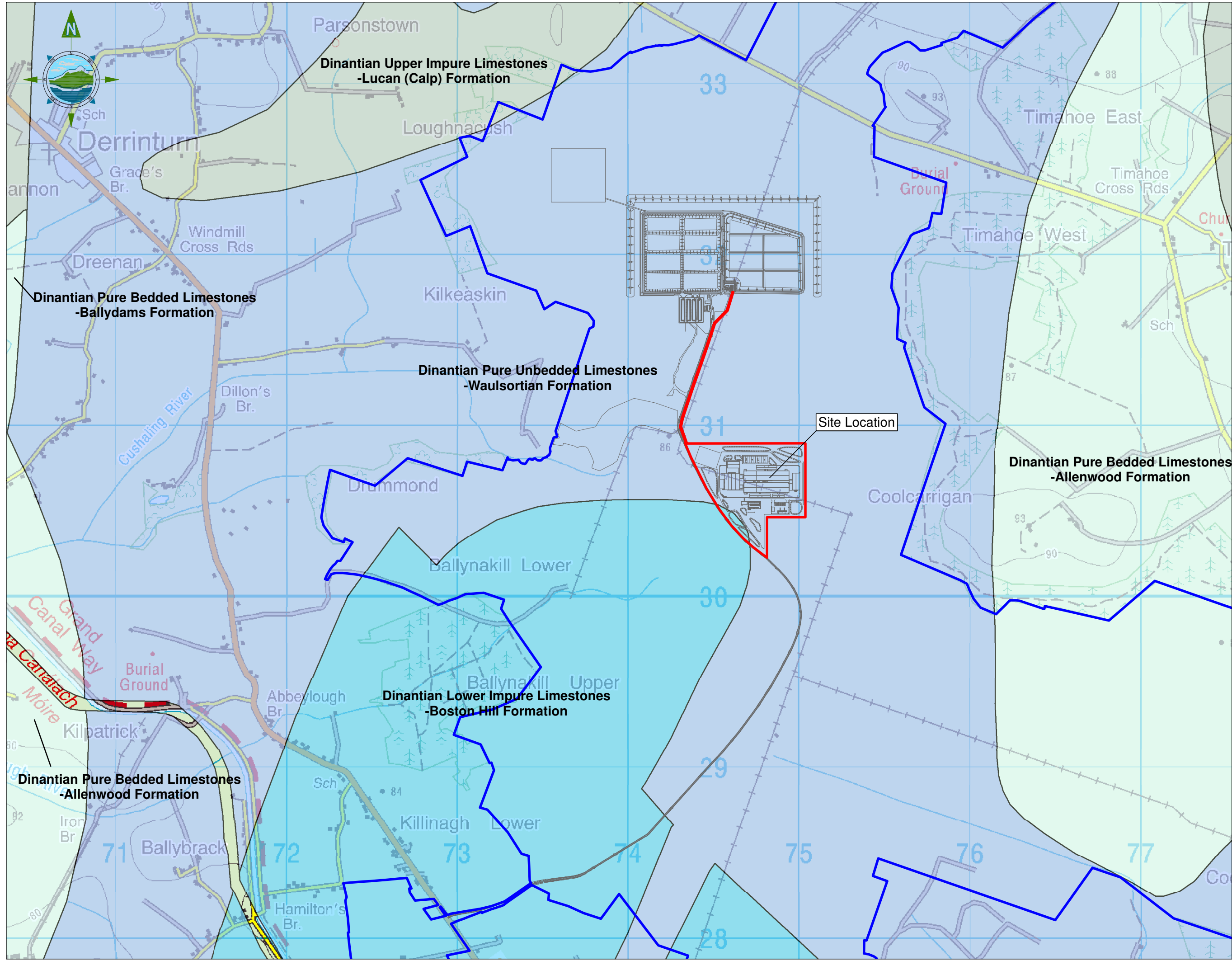
Prepared by:	Checked:	Date:
G.Fil	J.Dillon	May 2012

Project Director: D.Grehan

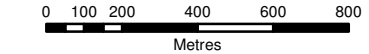
**TOBIN**  
Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
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- Legend**
- Site Boundary
  - Landownership Boundary
  - Dinantian Lower Impure Limestones
  - Dinantian Pure Bedded Limestones
  - Dinantian Pure Unbedded Limestones
  - Dinantian Upper Impure Limestones



- NOTES**
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Client:

**BORD NA MÓNA**

Project:

DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

Title:

BEDROCK GEOLOGY  
MAP

Scale @ A3: 1:20,000

Prepared by: G.Fil Checked: J.Dillon Date: May 2012

Project Director: D.Grehan

**TOBIN**  
Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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**Figure 5.2**  
A

### 5.3.2 Bedrock Geology

Reference to the most recently published geological map for this area, the 1:100,000 scale Sheet 16 – Geology of Kildare/Wicklow (GSI 1995), indicates that this area of County Kildare is underlain by Carboniferous aged (355 million years to 290 million years ago) limestone deposits.

The Carboniferous bedrock forms low elevation ground and is covered by overburden deposits. Outcrops of Carboniferous bedrock are scarce in the vicinity of the MBT facility site. The current understanding of the bedrock geology in this area is based on the extensive exploration boreholes that have been drilled within the Bord na Móna landholding and the surrounding area.

Figure 5.2 is an extract from the GSI Sheet 16 publication and shows the lithological distribution in the vicinity of the MBT Facility site and the broader succession groups, which are described below.

The Carboniferous (Dinantian) limestone succession underlying the MBT Facility was deposited in a shallow water shelf environment, which is referred to as the ‘Kildare Shelf’ succession. The ‘Kildare Shelf’ succession is bound to the west by the ‘Portarlington Trough’ succession and to the north by the ‘Dublin Basin’ succession. The Portarlington Trough and the Dublin Basin successions are described as basin successions that were deposited in a deeper marine environment following erosion of the Kildare Shelf succession. The Kildare Shelf succession in the vicinity of the MBT Facility site, based on the geological map, comprises the Boston Hill Formation, the Waulsortian Limestone Formation and the Allenwood Formation.

- The Boston Hill Formation comprises rather uniform, thick successions of nodular and diffusely bedded, Dinantian argillaceous limestones (fine grained limestone, comprising predominantly clay minerals) and subordinate thin shales. The contact with the Waulsortian Limestone Formation is gradational.
- The Waulsortian Limestone Formation consists mainly of pale grey biomicrite (a limestone consisting of skeletal debris and carbonate mud). The sediments commonly form individual and coalesced mounds with depositional dips of 30-40 degrees.
- The Allenwood Formation comprises peloidal and crinoidal limestone and minor oolite at the base with micrites, overlying minor shales and mainly pelsparite (limestone consisting of peloids and spary-calcite) at the top of the succession. The Edenderry Oolite Member, which is part of the Allenwood Formation, is not distinguished on all locations on the map due to its irregular distribution. The Ballyadams Formation comprised of pale well bedded fossiliferous Dinantian age limestone, is located 3.7km to the west of the MBT Facility site.



- The Dublin Basin depositional succession and the Portarlinton Trough depositional succession are dominated by the Calp Limestones. The term ‘Calp’ is used to refer to the various basinal limestone and shales occurring in these successions. The Calp units generally consist of dark grey, fine grained, graded Dinantian age limestones with interbedded black shales. The variation in bed thickness, grain size, colour and proportion of shale is a feature of the depositional environment in which these sediments were deposited in the basin.
- The structural geology of the Carboniferous Limestones is poorly understood and any faults shown on the geological map are considered to be very tentative, as indicated by the GSI. The poorly understood tectonics is due to the poor control of the bedrock geology as a result of the lack of outcrop exposure.

Site investigation data is outlined in section 5.3.2 below and supports the geological description of the area.

### *5.3.3 Geological information gathered from Site-Specific Investigations*

#### **Soils and Subsoils**

Visual assessment of the MBT Facility site indicates that peat deposits occur across the entire MBT Facility site. Peat is a soil that is made up of the partially decomposed remains of dead plants that have accumulated on top of each other in waterlogged conditions over thousands of years. Peat is brownish-black in colour and in its natural state is composed of 90-95% water and 5-10% solid organic material.

Industrial harvesting of the peat deposits has occurred in the past within the MBT Facility site. In order to allow for such harvesting of the peat a network of large drains was opened up across the bog to reduce the moisture content of the material, thus allowing the land to be traversed by specialist plant and machinery. The appearance of the bog is heavily influenced by the drainage network, which divides the bog into a number of compartments. The topography of the MBT Facility site is heavily influenced by the previous industrial activity, where the harvesting has resulted in a relatively flat relief across the MBT Facility site. In addition, an unused railway track (previously used by Bord na Móna for the transport of peat) traverses the northern section of the proposed MBT facility.

The remaining peat deposits within the MBT Facility site have been investigated on a number of occasions using different intrusive and non-intrusive methods. As part of the site investigation programme undertaken by TOBIN in 2011, the peat thickness was investigated by the excavation of 21 No. trial pits and 6 No. boreholes (Refer to Figure 5.4 and Appendix 5.1 for details).

The proposed MBT Facility and associated infrastructure has been positioned to, inter alia, minimise the volume of peat that is required to be removed. Peat has already been removed largely by the industrial harvesting of peat and the presence of a former peat railway track to the north of the proposed MBT Facility site. The locations of all trial pits and boreholes, are shown on Figure 5.3 and 5.4, with the descriptive logs contained in Appendix 5.1. The trial pit depths varied within the range of 3.0 m to 3.5 m below ground level (bgl). Most trial pits were terminated at 3.5 m bgl or when collapsing side walls or obstructions were encountered at depth. Bedrock was not encountered in any trial pits excavated within the MBT Facility site. The thickness of peat within the MBT site varies from 0.4 m to a maximum of 2.6m based on trial pit and borehole site investigation information. The average thickness across the proposed MBT facility footprint is 1.2m.

The contact between the peat deposits and the underlying glacial subsoil is very pronounced, with a sharp change between the two materials. The subsoils, which underlie the MBT Facility site, are predominantly fine grained. The composition of the subsoil, recorded from each trial pit, was relatively consistent across the MBT Facility site, with some notable exceptions. In a number of trial pits, a thin horizon of shell marl was evident. Underlying the peat, the subsoils encountered in the trial pits are comprised of grey to blue grey, silts, clays and silt/clay with occasional to frequent sub-angular to sub-rounded gravels and cobbles. The stiffness of the silt/clay material typically increased with depth.

Occasional lenses of sand and gravel are present within the silt/clay material at the proposed MBT facility site. The sand ranges from medium to coarse grained and is quite silty. Occasional bands of clean gravel were also encountered. The gravel clasts vary from sub-rounded to well rounded, with clasts generally ranging from pebble to cobble size.



### Bedrock Geology

Bedrock was not encountered in any boreholes or trial pits undertaken in 2011. Previous site investigation works in the surrounding area encountered bedrock between 9 m bgl (GW3D) and 15 m bgl (GW2D). The depth to bedrock under the proposed MBT facility site is greater than 10 m bgl.

The depth to bedrock is in accordance with the GSI geological map. Waulsortian limestone, which comprises pale grey, fine grained limestone, was encountered throughout most of the Bord na Mona landholding (boreholes GW1D, GW4D and GW6).

The site specific borehole information suggests that the contact between the Boston Hill Formation and the Waulsortian Limestone Formation extends further to the east than shown on the GSI geology map. As the bedrock at the base of borehole GW 7 is the Edenderry member, the lithological divide between the Waulsortian and the Allenwood Formation extends further west than shown on the GSI geology map. Notwithstanding the difference in the lithological divides between the Waulsortian Limestone Formation and the Boston Hill Formation/Allenwood Formation, the borehole drilling is generally consistent with the GSI geology map.

#### *5.3.4 Geotechnical analysis of subsoil material*

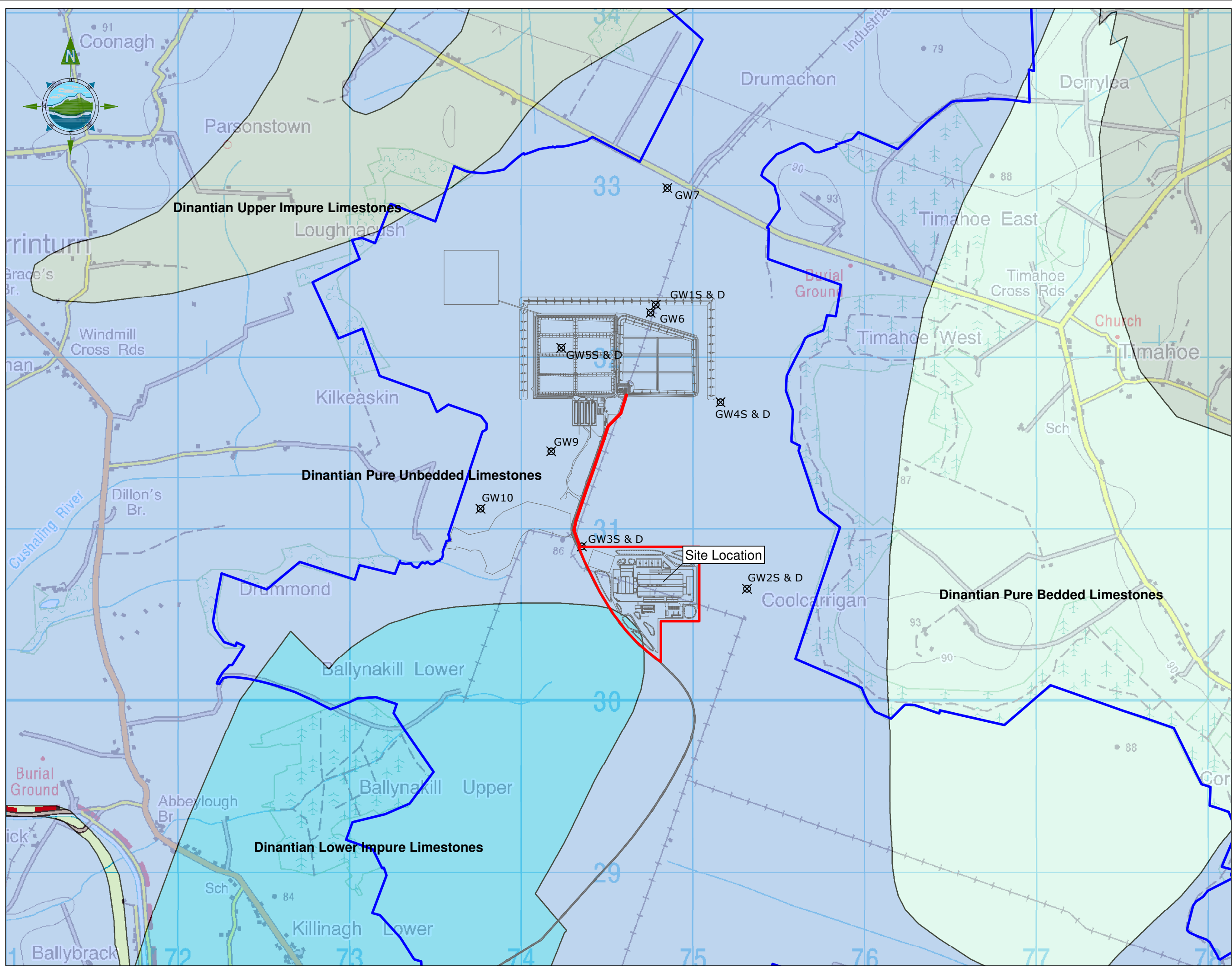
Geotechnical samples of the quaternary subsoil material were obtained during site investigation works conducted in 2011. A total of 12 No. disturbed samples were obtained to determine the particle size distribution (PSD) of the unconsolidated material from boreholes BH1–BH6 and from trial pits TP31 and TP38. These samples are considered to be representative of the fine grained subsoil (SILT, SILT/CLAY, CLAY) that dominates within the proposed MBT Facility site. Disturbed bulk samples of the gravel horizons from BH3 and BH5 were also analysed.

The grading of the disturbed bulk samples was determined by wet sieving, in accordance with Test 9.2 and 9.3 of BS1377: Part 2, 1990. All peat material was excluded from the sample. The results of the PSD laboratory tests are included in Appendix 5.2.

#### *5.3.5 Hydrogeology Data*

##### *Aquifer Classification*

The GSI has prepared a Groundwater Protection Scheme for County Kildare (2004). The aquifer classification for the bedrock units underlying the MBT Facility site are obtained from the GSI website [www.gsi.ie](http://www.gsi.ie) (2012) and an extract from the groundwater web mapping is provided in Figure 5.5 and in Appendix 5.3.



**Legend**

- Site Boundary
- Landownership Boundary
- Wells
- Dinantian Lower Impure Limestones
- Dinantian Pure Bedded Limestones
- Dinantian Pure Unbedded Limestones
- Dinantian Upper Impure Limestones

0 100 200 400 600 800

Metres

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Issue	Date	Description	By	Chkd.

Client:

**BORD NA MÓNA**

Project:

DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

Title:

SITE INVESTIGATION  
LOCATIONS 2003

Scale @ A3: 1:20,000

Prepared by:	Checked:	Date:
G.Fill	J.Dillon	May 2012

Project Director: D.Grehan

Patrick J. Tobin & Co Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
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**GENERAL LEGEND**

OWNERSHIP BOUNDARY SITE BOUNDARY

TRIAL PIT LOCATION

BOREHOLE LOCATION

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**BORD NA MÓNA**

Project:

**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:

**SITE INVESTIGATION  
LOCATIONS 2011**

Scale @ A3: 1:5,000

Prepared by: M. Nolan Checked: S. Tinnelly Date: April 2012

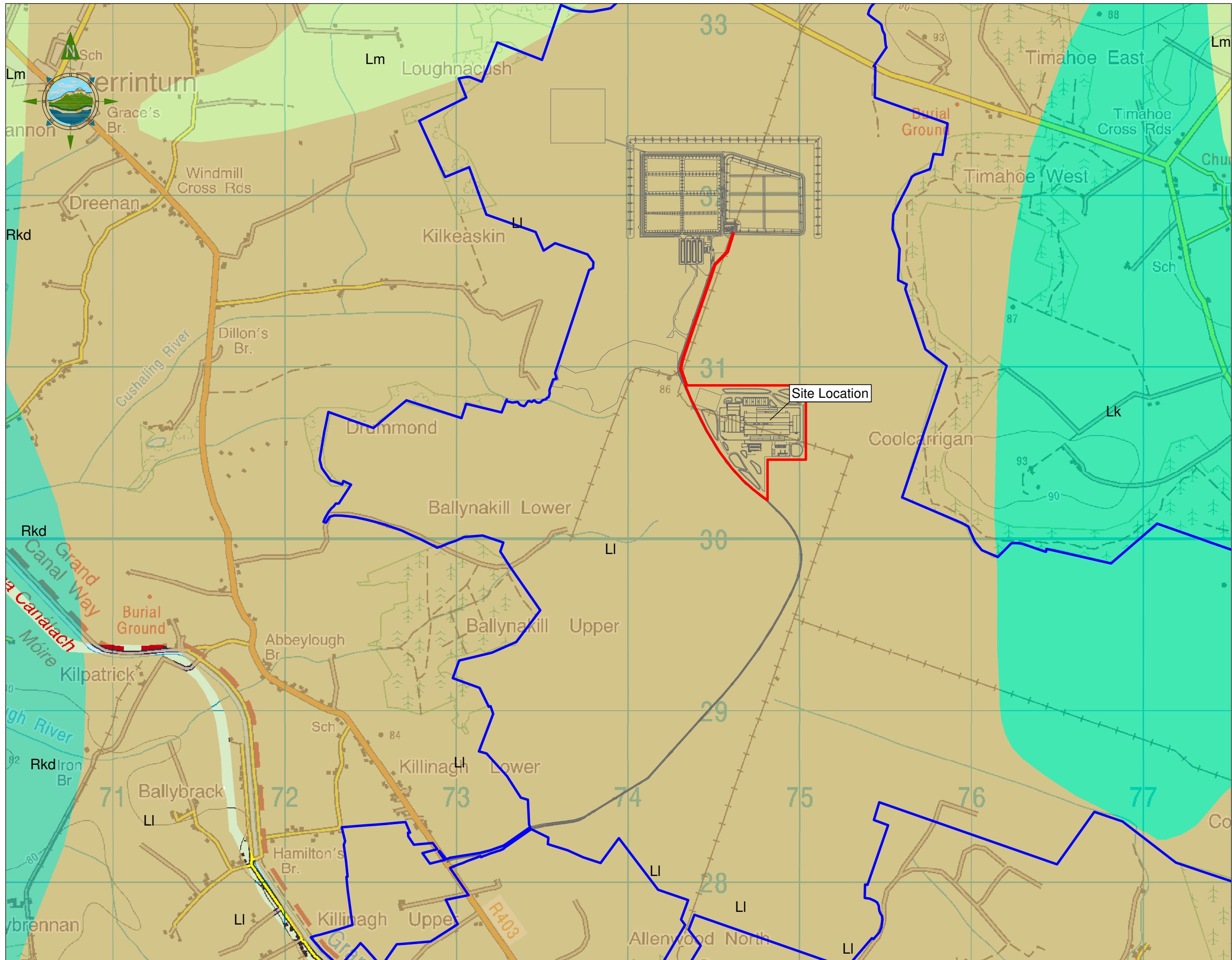
Project Director: D. Grehan

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Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
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**Legend**

Site Boundary

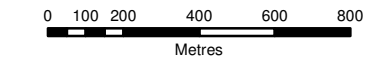
Landownership Boundary

Locally Important Aquifer - Karstified

Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones

Locally Important Aquifer - Bedrock which is Generally Moderately Productive

Regionally Important Aquifer - Karstified (diffuse)



- NOTES**
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Client:

**BORD NA MÓNA**

Project:

DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

Title:

AQUIFER  
CLASSIFICATION MAP

Scale @ A3: 1:20,000

Prepared by:  
G.Fill

Checked:  
J.Dillon

Date:  
May 2012

Project Director:

D.Grehan

**TOBIN**  
Patrick J. Tobin & Co Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
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**Figure 5.5**  
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The Boston Hill Formation and the Waulsortian Limestone Formation are classified as Locally Important Aquifers, which are moderately productive only in localised zones (Ll), see Figure 5.5. The Calp limestone located 2.4 km to the north west of the proposed MBT Facility site is classified as a Locally Important Aquifer generally moderately productive (Lm). The Allenwood Formation and the Ballyadams Formation are located to the east and west of the MBT Facility site. The Ballyadams Formation is located 3.7 km to the west of the MBT Facility site and is classified as a Regionally Important Karst Aquifer (Rkd). The Allenwood Formation located 1.1 km to the east of the MBT Facility site is classified as a Locally Important Karst aquifer (Lk) due to the limited areal extent, while to the west the Allenwood Formation is classified as a Regionally Important Karst Aquifer (Rkd). The variation in aquifer classification is due to the limited areal extent of the Allenwood Formation to the east.

#### *Aquifer Potential*

The groundwater flow characteristics within the limestones underlying the MBT Facility are dominated by secondary permeability, i.e. fissure flow. There is effectively no primary permeability (inter-granular permeability) in these rocks.

As part of previous site investigations of the aquifer potential in 2003, a 72 hour pump test was carried out to determine the characteristics of the aquifer. The pump test was undertaken on borehole GW6, which is approximately 1.5km from the MBT Facility site (Figure 5.3).

The peak pump rate measured during the test was 56m<sup>3</sup>/day. The pump rate of 43m<sup>3</sup>/day was used for calculations as an average pump rate maintained during the log cycle in which the data was interpreted (i.e. 10 to 100 minutes), due to slight fluctuation in discharge during the test.

### 5.3.6 Groundwater Vulnerability

The DoEHLG, EPA and GSI have produced guidelines on groundwater vulnerability mapping that aim to represent the intrinsic geological and hydrogeological characteristics that determine how easily groundwater may be contaminated by human activities. 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.

The DoEHLG, EPA and GSI vulnerability mapping guidelines allow for the assignment of vulnerability ratings from “extreme” to “low”, depending upon the subsoil type and thickness. A groundwater vulnerability map for County Kildare has been prepared by the GSI as part of the Groundwater Protection Scheme. According to the information available from the GSI, the vulnerability rating is classified as ‘*Low Vulnerability*’ (>10m, Low permeability soils) across the MBT Facility site, which is the rating that affords greatest natural protection against contamination. Details of vulnerability mapping guidelines are detailed in Figure 5.6 below.

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
<b>Extreme (E)</b>	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
<b>High (H)</b>	> 3.0m	3.0 - 10.0m	3.0 - 5.0m	> 3.0m	N/A
<b>Moderate (M)</b>	N/A	> 10.0m	5.0 - 10.0m	N/A	N/A
<b>Low (L)</b>	N/A	N/A	> 10.0m	N/A	N/A
Notes: (1) N/A = not applicable. (2) Precise permeability values cannot be given at present. (3) Release point of contaminants is assumed to be 1-2 m below ground surface.					

**Figure 5-6 Vulnerability Mapping Guidelines**

### 5.3.7 Water Abstractions

During the course of the environmental baseline assessment, information was collated regarding the provision of services to the community surrounding the facility. The MBT Facility is approximately 1.15km from the nearest domestic dwelling (0.94km between the dwelling and the red line activity boundary) and the extremely low permeability and thickness of the soil and subsoil material underlying the MBT Facility site inhibits infiltration to the bedrock aquifer. The water distribution network



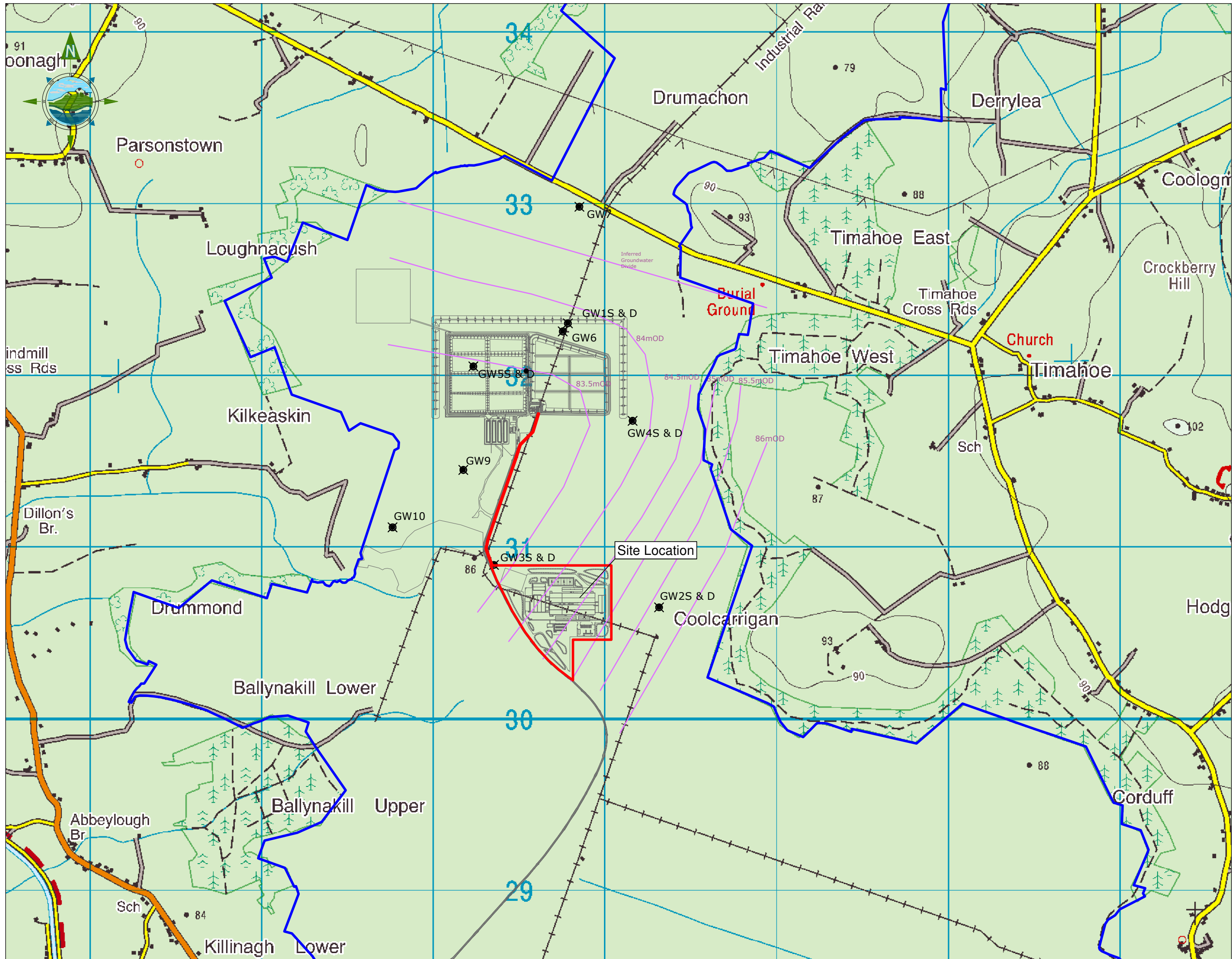
from public supplies (Robertstown and Johnstown Bridge) and group water schemes are extensive in this area; however some households may have retained private wells to meet their own water requirements. These supplies will not be impacted by the development as the MBT facility is not located within the respective source protection zones.

#### 5.3.8 *Groundwater Piezometry*

Paired monitoring boreholes / piezometers in the bedrock and overburden (See Figure 5.3) were drilled in 2003 at five different locations within the Bord na Móna landholding which provided for monitoring of the shallow and deep groundwater levels. These boreholes are designated a number and the letter “D” if the borehole is screened only in the bedrock (e.g. GW1D); or the letter “S” if it is a shallow overburden borehole screened only in the Till (e.g. GW1S).

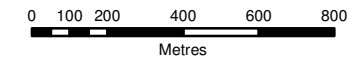
In order to determine the groundwater flow direction and the groundwater gradients within the MBT Facility site, the topographic elevation of all monitoring points was established. Based on the water level monitoring and the topographic elevation it was possible to establish the piezometric head at each monitoring point.

All levels were measured relative to Ordnance Datum (Malin Head). The elevation and piezometric head of all measured points are tabulated in Table 5.1. The piezometric data and inferred groundwater contours are shown on Figure 5.7.



Legend

- Site Boundary
- Landownership Boundary
- Groundwater Contours
- Wells



- NOTES
- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
  - ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
  - ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
  - ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	05.05.12	Issued	G.F.	J.D.

Client:  
**BORD NA MÓNA**

Project:  
DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

Title:  
INFERRED GROUNDWATER  
CONTOURS

Scale @ A3: 1:20,000

Prepared by: G.Fill Checked: J.Dillon Date: May 2012  
Project Director: D.Grehan

**TOBIN**  
Patrick J. Tobin & Co Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

**Table 5-1 Location and Elevation of Groundwater Monitoring Points and Piezometric Head**

Reference	Grid Reference	Ground Elevation	Static Water Level	Static Water Level	Static Water Level
	Easting, Northing	(mOD)	(m OD) Jan 2003	(m OD) Jan 2007	(m OD) Jan 2011
GW1D	E274767, N232294	84.886	83.856	83.922	82.906
GW1S	E274773, N232292	84.852	83.727	84.286	83.582
GW2D	E275305, N230640	87.862	85.857	n/a	n/a
GW2S	E275312, N230650	87.37	86.32	86.07	86.08
GW3D	E274349, N230902	85.115	83.505	82.178	n/a
GW3S	E274354, N230907	85.018	82.998	82.695	82.798
GW4D	E275153, N231756	84.612	83.932	n/a	n/a
GW4S	E275159, N231740	84.213	83.413	n/a	n/a
GW5D	E274236, N232062	85.85	84.895	85.35	83.63
GW5S	E274246, N232059	85.799	85.154	84.919	84.019
GW6	E274765, N232278	84.737	83.782	83.497	n/a
GW 10	E673762, N231115	84.56	n/a	n/a	82.59

It is not possible to accurately tell the natural piezometric level of the bog prior to the drainage and harvesting of peat. Historical data for raised bogs suggests that the water level fluctuation in raised bogs varies by no more than 30cm, which is considerably less than fluctuations that would occur in mineral soil/subsoil and exposed bedrock environments.

The shallow subsoil piezometric levels and the deep bedrock piezometric levels differ across the MBT Facility site. The shallow piezometric levels are considered to be

heavily influenced by the artificial drains traversing the MBT Facility site. These drains are excavated to the level of the mineral subsoil across the MBT Facility site. Shallow flows are considered to discharge to the drains, with very short flowpaths. The fluctuation in water levels varies in response to rainfall in the shallow subsoil environment.

The bedrock piezometry is not considered to be as heavily influenced by the artificial drainage of the MBT Facility compared to the shallow piezometers. The bedrock piezometric levels suggest that the groundwater flow is from the east towards the west of the MBT Facility site (see Figure 5.7). The flow direction is consistent with the surface water drainage from the MBT Facility, which is towards the west/southwest and the Cushaling River and the Abbeylough River. The Cushaling emerges as a surface flow within the Bord na Mona landholding and continues to flow and gain groundwater baseflow further to the west of the property.

## 5.4 POTENTIAL IMPACTS

### 5.4.1 *Potential Impact of Configuration A (MBT with Composting)*

#### **Construction Phase**

Potential impacts during the construction phase include activities associated with the movement, excavation and disposal of soils, contaminated materials (if present), compaction of soils and construction of roads. This can result in temporary and permanent impacts on the geological environment.

In order to minimise any potential impact on the environment, including the soil, geological and hydrogeological environment, 'Avoidance of Impact' was incorporated into the design of the development. For example, one of the considerations when selecting the site within the Bord na Móna landholding was minimising the depth of peat that would require excavation.

Some shallow peat removal along the proposed access roads and hardstand areas will be required. However, the natural soil and geological environment has been impacted by past industrial activity undertaken within the proposed property. Since the cessation of peat harvesting the lands have largely remained unaffected by human activity or development. The proposed facility involves the development of approximately 29ha of land within an overall landholding of 2,544ha. The geological and hydrogeological environment over a large area within the landownership boundary (2,544 ha) will therefore remain unaffected by proposed activities.

Earthworks and excavations are likely to cause the greatest impact on the soil environment during the construction phase. Imported material required for the construction of the facility will require appropriate handling during the construction

phase. There is potential to encounter contamination in the former railway line during construction works. Proposed mitigation measures are included in Section 5.5.

All excavations within the MBT Facility site will be terminated in the unconsolidated material with the exception of driven piles which may be required during the construction phase; potential impact on the bedrock environment will be negligible. It will be necessary to progressively clear the peat material from the proposed footprint in order to achieve formation levels for proposed construction. Approximately 66,000 m<sup>3</sup> of peat and subsoil will be removed to allow construction of the hardstand areas, settlement lagoons and roads. The peat and subsoil material will be used to screen the proposed facility as outlined in section 10 of the EIS.

The operation of plant and machinery during construction poses a potential risk of soil and groundwater contamination, through the potential spillage of fuel, lubricants or chemicals directly onto exposed surfaces.

The potential impact associated with exposed soil surface principally relates to sediment laden run-off to watercourses. The greatest risk of sediment run-off will occur during wet weather. Management and control of water falling on worked areas will be an important aspect in minimising the impact of construction. Mitigation measures are proposed below in Section 5.5 to reduce the impact on the soil environment. The implementation of such measures will ensure that surface water discharges will be of good quality.

The baseline assessment indicates that there are no groundwater abstraction wells for potable supply within approximately 1km of the proposed MBT Facility (based on distance to nearest sensitive receptors). Due to the low permeability of the natural subsoil and the thickness of this unconsolidated material, the potential impacts on any domestic wells or boreholes in the broad vicinity of the proposed facility are considered low. Based on hydrogeological conditions in this region the zone of contribution to domestic wells is small and would not extend to the MBT Facility.

The proposed facility will not impact upon the quality or abstraction rate of any supplies in the area. The proposed facility is outside of the source protection zones of both the Robertstown well field and the Johnstown Bridge well field (over 5 km from the MBT Facility). Therefore the proposed MBT Facility will not impact upon these abstractions.

### **Operational Phase**

Due to the nature of the proposed development, machinery will be present and operational on the MBT Facility. This may lead to occasional accidental emissions, in the form of oil, petrol or diesel leaks, which could cause contamination if the contaminants entered the soil environment. Similarly there is the potential for leakage

of process water from the proposed MBT Facility which could cause contamination of the soil and groundwater environment.

However, given that the MBT Facility site is underlain with low permeability subsoil, the potential for migration offsite is low/negligible. Contaminated groundwater/soil would be contained in the shallow subsoil environment and treated in accordance with mitigation measures outlined below.

As the greatest potential impact will be as a result of processes associated with the operation of the MBT Facility and potential spillages that may directly or indirectly impact on the surface water environment in the area of the development, operational impacts are considered in more detail in Chapter 6, Water.

#### *5.4.2 Potential Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The potential impacts for Configuration B (MBT with Dry Anaerobic Digestion and Composting) are similar to the potential impacts for Configuration A (MBT with Composting) and therefore the potential impacts are as outlined above in section 5.4.1.

### 5.5 MITIGATION MEASURES

#### *5.5.1 Mitigation Measures for Configuration A (MBT with Composting)*

##### **Construction Phase**

The mitigation measures proposed herein are to ensure that the proposed development has a minimal impact on the soil, geology and hydrogeology environment. As detailed above, during the development design, “Avoidance of Impact” was incorporated into the design rationale, to ensure that, insofar as possible, potential impacts were eliminated and mitigation measures were incorporated to minimise the risk to the environment.

All potentially polluting materials, including hydraulic fluid, engine oil and fuel, will be stored in specified areas, which will be bunded to ensure total containment in the unlikely event of total failure of a storage tank. This will reduce the risk of soil contamination due to activity of plant and equipment. There is potential to encounter contamination in the former railway line during construction works. Any potential contamination will be sampled according to best practice and removed to an appropriate licensed waste facility in accordance with the Waste Management Act 1996-2011.



During the construction of the facility and especially when excavation of unconsolidated material is required, standard approved working methods will be employed to reduce the risk to the surrounding environment. Exposed soil surfaces have the potential to flow from the MBT Facility site to surface water channels. Temporary and permanent water control measures, comprising temporary sediment control measures and permanent settlement lagoons, will control the quality of any water discharged from the site of the MBT Facility. Details of the water control measures are included in the Water Chapter, Section 6.

During the course of progressive ground clearance for the proposed facility footprint, the excess soil material will be used to create visual berms where possible. To mitigate soil erosion, all exposed soil surface will be anchored by vegetation and/or by use of ground stabilisation geogrids. During construction work and until vegetation has anchored the embankments, any water accumulating on exposed soil will be diverted through settlement lagoons.

The use of piled foundations for the MBT building will minimise the requirement for subsoil and peat removal from large areas of the MBT Facility. Due to the minimal disturbance of the geological environment, the mitigation measures are restricted to the stabilisation of exposed soil surfaces.

The surface water run-off from low risk hardstanding areas will be collected centrally, where the accumulated water will be diverted through a sediment grit trap, an oil interceptor and finally discharged to the proposed facility surface water lagoons. A fixed rate outfall will be maintained from the surface water retention lagoons to the adjoining drainage network, which drains to the Cushaling River via the existing Bord na Móna surface water lagoon which services the southern portion of the Bord na Móna landholding. The fixed rate outfall from the Facility surface water retention lagoons will ensure that during extreme rainfall events peak flows will be retained within the MBT Facility site, as described in detail in Chapter 6 of this EIS.

In order to provide assurance that the MBT Facility is constructed in accordance with intended design and technical specifications, a comprehensive Construction Quality Assurance (CQA) plan will be implemented during the construction stage. A Construction Quality Assurance (CQA) validation report will be completed for the MBT Facility. The validation report will be undertaken by an appropriately qualified independent specialist.

Given the above mitigation measures proposed, it is considered that the impact on the geological and hydrogeological environment will be negligible and permanent.

**Operational Phase**

The avoidance of impacts is integral to the design and operation of the MBT Facility. The proposed MBT Facility will comprise fully enclosed dedicated buildings for the treatment and processing of waste. These buildings in turn will be fully bunded to prevent leachate and process water from entering the soils and groundwater environment at the proposed MBT Facility.

All potentially polluting materials, including hydraulic fluid, engine oil and fuel, will be stored in bunded areas to ensure total containment in the event of failure of the storage tank/piping. Any vehicles utilised during the operational phase will be regularly maintained and checked to ensure any damages or leakages are corrected. This reduces the risk of soil contamination due to activity of plant and equipment.

If any leakage occurs to the shallow subsoil/groundwater, the potentially polluting material will be contained by the presence of low permeability subsoil material and cannot enter the underlying aquifer. Any contaminated material can be collected and treated in an appropriate manner according to best practice and the waste management act 1996-2011. As part of the operational phase and in compliance with future waste licence conditions, groundwater monitoring will be undertaken at the MBT Facility.

As mentioned in the potential impacts section (Section 5.4), the greatest potential impact during the operational phase will be as a result of processes associated with the operation of the MBT Facility and potential spillages that may directly or indirectly impact on the surface water environment in the area of the development. The mitigation measures associated with these impacts are considered in more detail in Chapter 6 (Water) of this EIS.

Given the above mitigation measures proposed (and the measures included in Chapter 6, Water), it is considered that the impact on the geological and hydrogeological environment will be low/negligible albeit permanent.

#### *5.5.2 Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The mitigation measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting) are similar to the mitigation measures proposed for Configuration A (MBT with Composting) and therefore the mitigation measures are as outlined in section 5.5.1. above.

## 6 WATER

### 6.1 INTRODUCTION

This Chapter presents an assessment of the potential impact of the proposed development on the water environment and should be read in conjunction with the site layout plans (Volume 3 of this EIS) and project description (Chapter 2) of this EIS. Relevant mitigation measures are also presented in this Chapter.

The proposed Drehid MBT Facility site is located in a large Bord na Móna landholding in north Co.Kildare. The entire Bord na Móna landholding comprises 2,554ha, which is divided into a northern portion of 799ha and a southern portion of 1,745ha by the L5025 County Road, which crosses the narrowest section of the peat deposit.

The proposed MBT Facility will occupy an area of 29ha and will be located in the southern portion of the landbank. The Bord na Móna landholding in this area has been utilised for the industrial harvesting of peat over an approximate 50 year period. Artificial drainage of the bog has resulted in an alteration of the natural hydrology and therefore this assessment details the surface water and groundwater environment at its current state.

The information included in Chapter 5 (Soils and Geology) and Chapter 4 (Ecology) should be read in conjunction with this Water Chapter.

#### 6.1.1 Methodology

The assessment of the potential impact of the proposed development on the water environment was carried out according to the methodology specified in the following guidance documents:

- Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Statements (2002); and
- EPA Advice Notes on Current Practice (in the Preparation of EIS) (2003).

The following sources of information were utilised to establish the baseline environment:

- The Geological Survey of Ireland (GSI) well card and groundwater records for the area were inspected, with reference to hydrology and hydrogeology;
- Office of Public Works (OPW) flood mapping;
- EPA water quality monitoring data for watercourses in the area;
- Results from the chemical analysis of water samples taken in 2003 - 2011;
- Water Framework Directive Monitoring Programme, EPA 2010;

- Information from the River Basin Management Plan for the South Eastern River Basin District (SERBD); and
- Site visits of the study area.

An area investigation was carried out in November 2011 and January 2012 by TOBIN Consulting Engineers, in order to visually assess the water environment in the vicinity of the MBT Facility site.

Recommendations arising from consultations with both Inland Fisheries Ireland and Kildare County Council (see Chapter 1) were incorporated into the water impact assessment and mitigation measures.

## 6.2 EXISTING ENVIRONMENT

### 6.2.1 *Drainage*

The local and regional surface water features are shown on Figure 6.1 and Figure 6.2. The natural and artificial surface water channels within (and immediately adjacent to) the proposed Drehid MBT Facility site are shown on Figure 6.3.

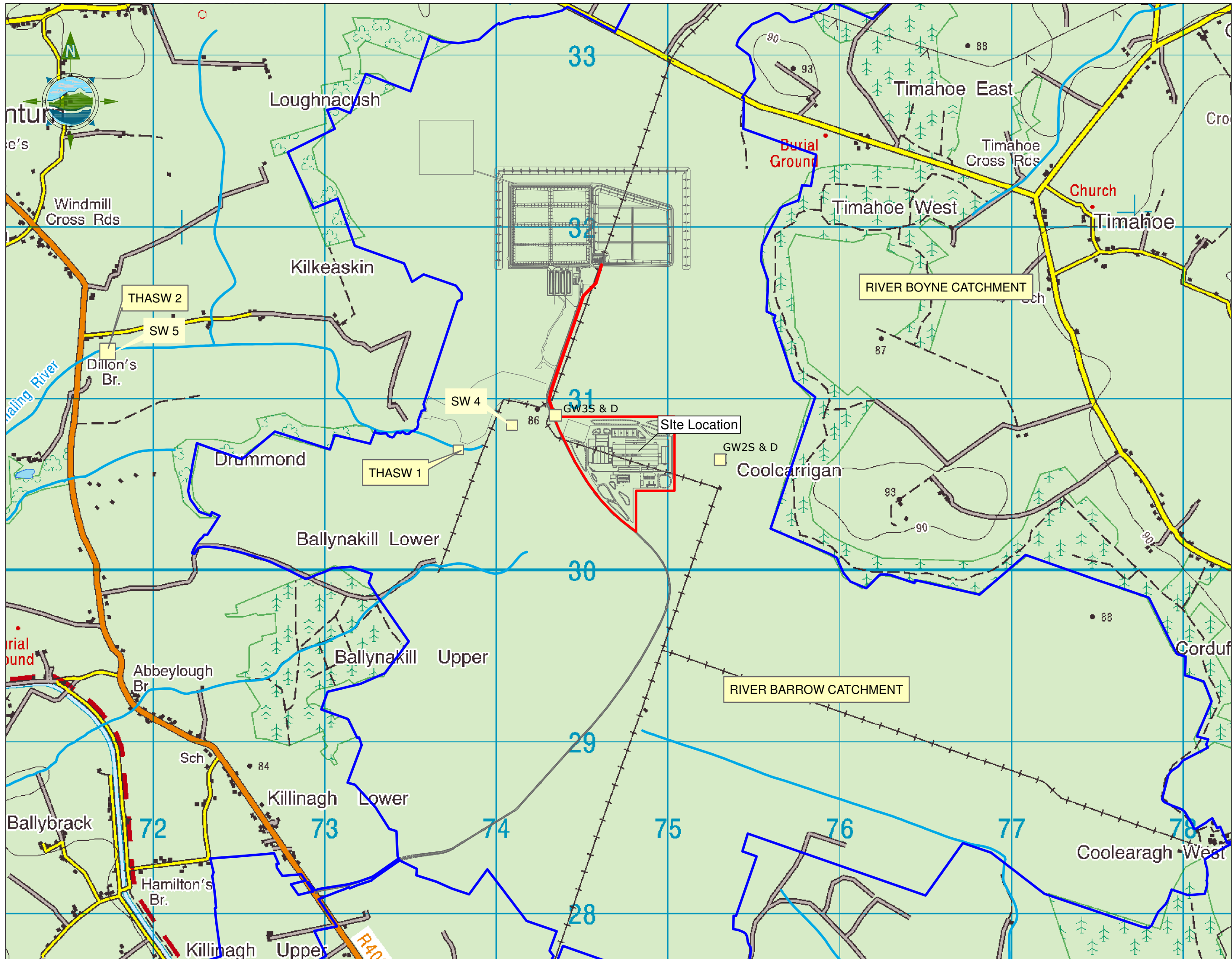
The 19<sup>th</sup> Century 6-inch to 1-mile scale geological field sheets indicate that prior to exploitation of the peat resources within the MBT Facility site there were no natural surface water channels crossing the MBT Facility site. The only natural features are recorded close to the margin of the peat deposits.

In its natural state an undisturbed peat bog is predominantly water, with a moisture content of approximately 95% near the surface and reducing to approximately 90% in the deepest layer, due to compaction of material. The eco-system of an undisturbed bog depends solely on rainfall for its water supply. A natural bog comprises two discrete layers, the acrotelm and the underlying catotelm. The acrotelm is the top 10-30cm of living and poorly humified sphagnum mosses, which is periodically aerated and highly permeable. The catotelm is the lower thicker layer which is more highly humified with depth and has low permeability.

Although the surface of an undisturbed bog lies above the natural watertable of the adjoining free draining lands, the watertable lies within 0.3m of the surface within the bog itself. Therefore a bog can be viewed as a very large reservoir of water. The bog will naturally regulate the release of water; therefore there is very little seasonal fluctuation in the watertable within a bog.

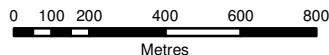
Discharges from natural bogs are dependent on seasonal factors. During summer months bogs will largely absorb all precipitation to replenish its reservoir and ensure that the watertable does not fall too low. During winter months precipitation will be absorbed to an optimal level and after which all precipitation will be rejected. Hydrographs at the margins of bogs show peakflows during and shortly after winter

rainfall events with quick recessions in surface flow following the cessation of rainfall.



## Legend

- Activity Boundary
- Rivers
- Ownership Boundary
- Monitoring Locations



### NOTES

- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
- ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
- ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
- ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	05.06.12	Issued	G.F.	J.D.

Client:

**BORD NA MÓNA**

Project:

**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:

**SURFACE WATER CATCHMENT  
AND MONITORING  
LOCATIONS**

Scale @ A3: 1:20,000

Prepared by: G.Fil Checked: J.Dillon Date: May 2012

Project Director: D.Grehan



Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

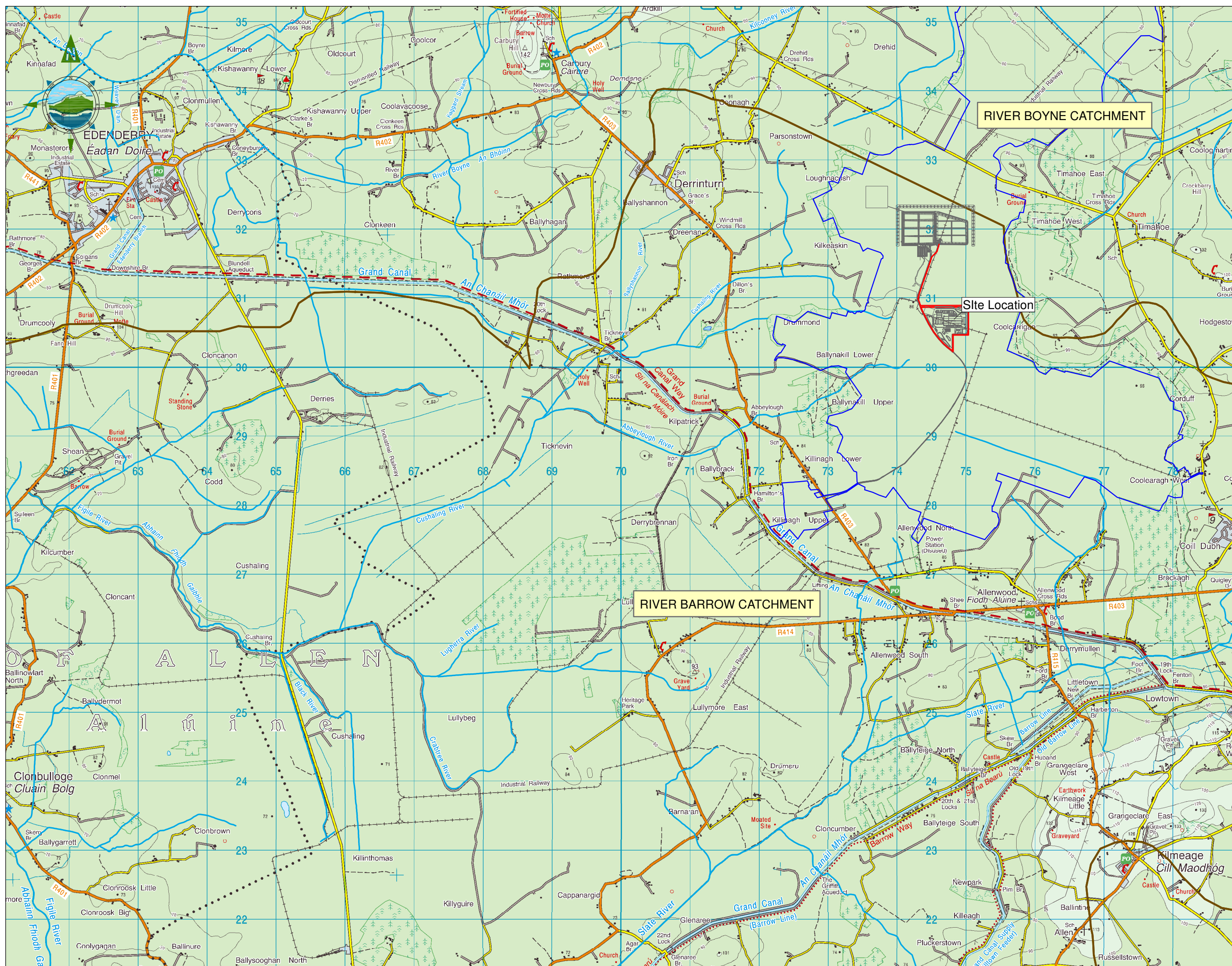
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Figure 6.1

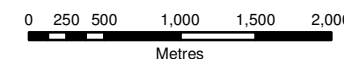
A





## Legend

- 
- Site Boundary  
 Ownership Boundary  
 RiverBasinDistrict  
 Rivers



## NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

A	05.06.12	Issued	G.F.	J.F.
Issue	Date	Description	By	Cl

Client:

**BORD NA MÓNA** 

Project:

DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

■ Title:

REGIONAL SURFACE  
WATER CATCHMENT

Scale @ A3: 1:50,000

Prepared by:	Checked:	Date:
G.Fil	J.Dillon	May 201

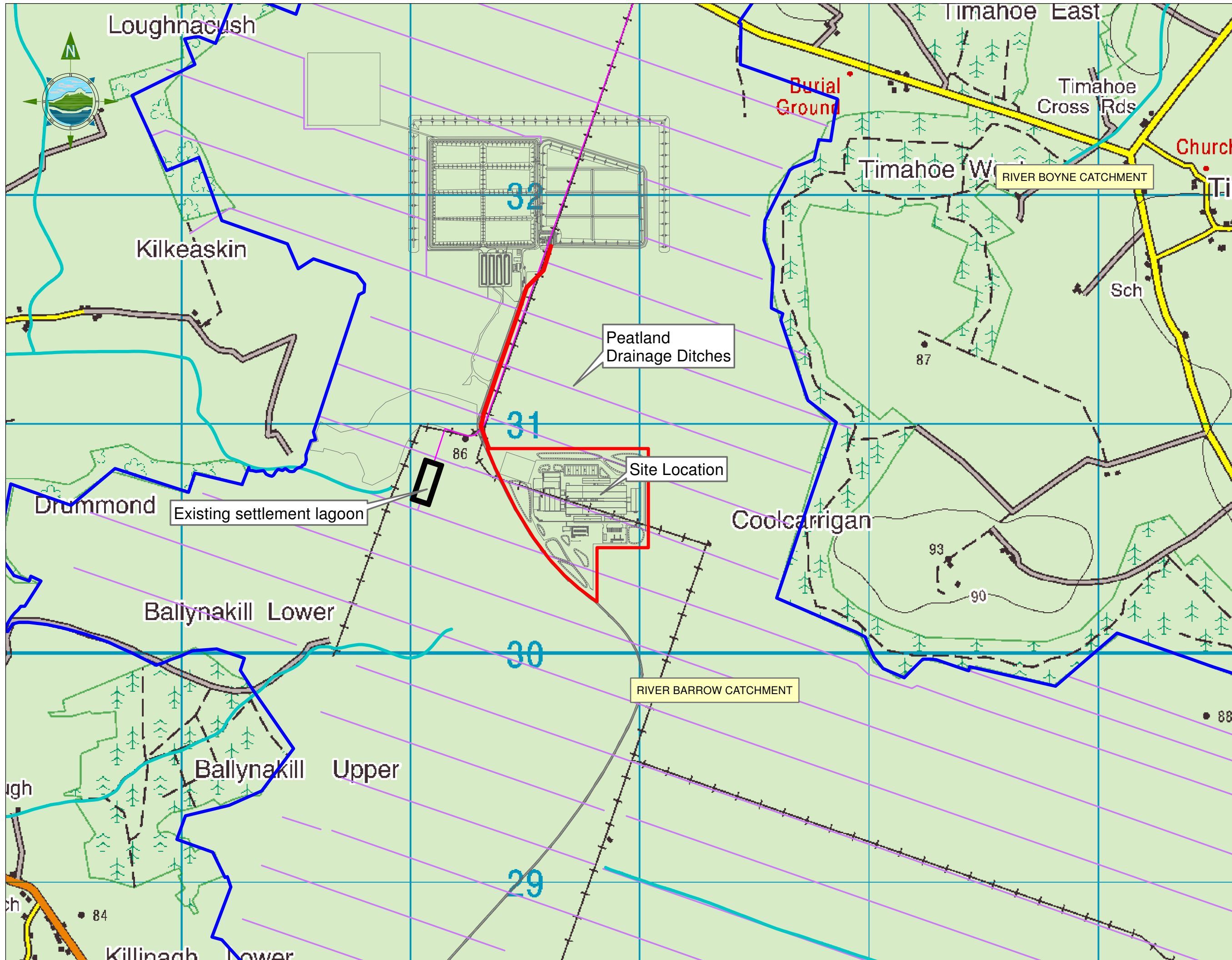
Project Director:	D.Grehan
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Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: [info@tobin.ie](mailto:info@tobin.ie)  
[www.tobin.ie](http://www.tobin.ie)

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**Legend**

- Ownership Boundary
- Site Boundary
- Rivers
- Drainage Ditches
- Main Drain
- Settlement lagoon

0 75 150 300 450 600  
Metres

**NOTES**  
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING  
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A	05.06.12	Issued	G.F.	J.D.
Issue	Date	Description	By	Chkd.

Client:

**BORD NA MÓNA**

Project:

DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

Title: SITE DRAINAGE LAYOUT  
AND SURFACE WATER  
FEATURES

Scale @ A3: 1:15,000

Prepared by:	Checked:	Date:
G.Fil	J.Dillon	May 2012

Project Director: D.Grehan

**TOBIN**  
Patrick J. Tobin & Co Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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Figure 6.3

The Bord na Móna landholding has been subject to industrial peat activity over an approximate 50 years period. To reduce the moisture content of the peat material it was necessary to systematically drain the whole bog. A network of large artificial drains were opened up across the bog in order to reduce the water content of the peat and increase the bearing capacity, thus allowing the land to be traversed by heavy plant and machinery. The drainage plan involved the progressively deepening of drains over a period of 7-10 years.

The artificial drainage network heavily influences the current appearance of the bog. The entire Bord na Móna landholding has been divided into a number of compartments, referred to as 'peat fields' due to the excavation of east-west trending artificial surface drains. These artificial surface drains discharge to a central underground culvert, trending in a general north to south direction. The hydraulics of these central drains is controlled by the fall in topographic elevation and the flow to natural hydrological discharge points. Figure 6.3 shows the orientation of the drainage channels within the MBT Facility site.

In the vicinity of the MBT Facility site activity boundary, all water draining from the artificial drains discharges to the central culvert, which flows towards the existing settlement lagoon located (see Figure 6.3). The settlement lagoon allows for treatment prior to discharge to the Cushaling River at the western margins of the bog.

The surface water drainage pattern in the broader vicinity of the applicant's property was also assessed as part of the baseline assessment to determine the catchment conditions in the region. The catchment divides were delineated from the EPA Water Quality in Ireland annual publications (1998 – to date) and the South Eastern River Basin District (SERBD) [www.wfdireland.ie](http://www.wfdireland.ie). The Ordnance Survey of Ireland (OSI) Discovery Series (Sheet No. 49) was also used to refine the catchment and sub-catchment divides.

Reference to Figure 6.2 indicates that all lands within the MBT Facility activity boundary are located within the catchment of the River Barrow. All surface water from the proposed MBT Facility will drain to the west to the Cushaling River, which is a tributary of the Figile River. The existing access road from the R403 to the Drehid Waste Management Facility passes through the sub-catchment of the Abbeylough River, which is also a tributary of the Figile River (See Figure 6.2). The Figile River is a sub-catchment of the River Barrow.

The Slate River sub-catchment encroaches on the southern portion of the applicant's property. No activities associated with the proposed development are located within the sub-catchment of the Slate River. The Slate River and the Figile River converge to the north of Bracknagh, County Offaly to form a water feature referred to as the Black

River. This Black River converges with the River Barrow just north of Monasterevin, County Kildare.

The catchment divide between the regional catchments of the River Barrow and the River Boyne is delineated approximately 0.75 km to the north east of the MBT Facility activity boundary.

The total flow in the surface water channels is comprised of two different flow mechanisms. The dominant flow mechanism, due to the soil cover in the area, comprises overland run-off of surface water. The flow in the surface water features responds quickly to rainfall during winter months, when the peat is fully saturated. This ‘flashy flow’ is common in areas where bog cover dominates, due to their low infiltration capacity characteristics. The fall off in surface water flow is also relatively quick following the rainfall event.

The second flow mechanism comprises a slow release of shallow groundwater baseflow to the surface water environment at the margins of the bog. This portion of the total surface water flow may be quite small during heavy rainfall events, compared to the surface run-off portion. However during periods of low precipitation and during summer droughts, the groundwater contribution will comprise almost all the surface water flow. This slow release of the groundwater maintains a surface water flow throughout the year.

#### *6.2.2 Surface Water Flow Measurements*

Hydrological studies have been undertaken in other bog areas to determine the impact of peat harvesting. The removal of surface vegetation from the bog is considered to have the greatest effect on the quantity of surface water run-off which discharges to the receiving waters. The function of the drainage channels within the proposed MBT Facility site is to divert rainwater from the surface of the bog. Research suggests that as much as 80% of rainfall during winter periods will discharge to receiving waters from a drained bog, compared to less than 20% from an intact bog.

It should be noted that harvesting of peat has now ceased within the proposed MBT Facility site and re-vegetation of the bog surface is well established in many areas. The drainage ditches have been excavated to a depth where the base of the ditch is within the mineral subsoil. The drainage ditches are approximately 3-4m wide and approximately 3m deep. Water is retained in the drainage ditches even during summer months, which suggest that the channels are acting as storage channels and discharging to the main drain at a constant rate. Therefore the run-off rate from the current bog environment is considered to be significantly less than when the bog was operational and peat was being harvested.

The only available hydrometric data for surface water flows in this area are from a hydrometric station maintained by the Office of Public Works (OPW) at Clonbulloge on the River Figile. The information available is included in Appendix 6.1 and summarised below.

As detailed above, all surface water generated from the proposed MBT Facility activity boundary drains from the bog to the Cushaling River, which is a tributary of the River Figile. Historical hydrometric data from the OPW hydrometrics station (Stn. 14004) at Clonbulloge are available for the years 1972 to 2002. This hydrometric station records water levels and a rating curve is used to estimate flows. The hydrometric station is approximately 21.4km downstream of the MBT Facility site activity boundary and a number of surface water channels contribute to the flow in the River Figile along its course.

The information interpreted from the hydrometric dataset relates to annual maximum flows from 1957 to 2009. Annual maximum flows on the River Figile at Clonbulloge range from  $13.2\text{m}^3/\text{sec}$  to  $28.8\text{m}^3/\text{sec}$ . The annual maximum flow in 2008 was significantly elevated above those of previous years, with the flow measured on the 18/08/2008 comprising  $28.8\text{m}^3/\text{sec}$ . It is not possible to obtain rainfall data from the Lullymore rainfall gauge as measurements were discontinued in 1990; however this storm event resulted from extreme rainfall across Ireland.

The highest flows on the River Figile were recorded on the 19/11/1965, when flows were estimated to comprise  $38.4\text{m}^3/\text{sec}$ . This flow was generated by an extreme rainfall event on the 17/11/1965, when the rainfall comprised 70.8mm over a 24 hour period. Interpretation of the annual maximum flows at Clonbulloge and rainfall measurements from Lullymore indicate that the storm peakflows respond at the hydrometric station approximately two days after the extreme rainfall event.

#### **Site Specific Hydrometric Data**

The discharge from the majority of the southern half of the applicant's property, flows into the Cushaling River. This flow is discharged via an existing settlement lagoon, prior to gravity flow to the Cushaling River (See Figure 6.3). The groundwater baseflow to the Cushaling River is considered to be low, due to the artificial drainage of the Bord na Móna landholding.

Two monitoring stations (THASW 1 and THASW 2) were established on the Cushaling River for auto-sampling and hydrometric flow gauging, as shown in Figure 6.1. At each of these locations a hydrometric flow gauge and a data logger were installed to determine the hydrometric conditions on the Cushaling River.

The flow in the watercourse was determined by measuring the water level by using an electronic bubble gauge, in a known cross sectional area of water, with these water

levels being recorded every 2 minutes on a data-logger. Using appropriate empirical formulas for the cross-sectional area of the water course and the water levels recorded by the data-logger, it was possible to determine the flow in the watercourse. The hydrographs are presented in Appendix 6.1.

The first monitoring station (Code: THASW 1) is a 12-inch concrete outfall pipe. This 12-inch concrete outfall pipe represents the outfall from the central drain of the northern section of the cutover bog and controls the overall outfall from the Bord na Móna landholding. A faceplate was installed on this pipe to allow the flow across the area of the pipe to be determined and to allow an accurate flow measurement by the instrumentation installed.

At the second location THASW 2, a weir was installed at a monitoring point on the Cushaling River, approximately 1km downstream of the outfall point from the central drain. The monitoring station was established along a narrow section of the watercourse, with a minimal area of flood plain. This weir was constructed using wood and was sealed using local clay fill from the bankside. The weir achieved laminar flow across the weir face and the flow meter (water height) was installed behind this weir.

The hydrometric data was downloaded during each water sampling occasion, and the data logger was serviced to ensure correct operation. The ranges in flow recorded at the flow stations indicate the flashy nature of the Cushaling River. The minimum flow recorded at THASW1, i.e. the commencement of the Cushaling River was 0 m<sup>3</sup>/hour and the maximum recorded was 218 m<sup>3</sup>/hour (60.6 l/sec), with a median flow of 42 m<sup>3</sup>/hour (11.7 l/sec). The minimum flow recorded at THASW2 (at a temporary weir) was 0 m<sup>3</sup>/hour and the maximum recorded was 338 m<sup>3</sup>/hour (93.9 l/sec), with a median flow of 35 m<sup>3</sup>/hour (9.7 l/sec).

The flow on the Cushaling River as it exits the Bord na Móna landholding was approximately 0.0376m<sup>3</sup>/sec (3,250m<sup>3</sup>/day). The flow on the Cushaling River at Dillon's Bridge, approximately 2.25km downstream was approximately 0.0771m<sup>3</sup>/sec (6,660m<sup>3</sup>/day), indicating that the flow had more than doubled in a short lateral interval. As stated above the Cushaling River originates within the Bord na Móna landholding and therefore the stream is gaining flow along its course, as would be expected. The flow in the Cushaling River was well contained within the capacity of the flow channel. It is estimated that the channel could accommodate an approximate three to four fold increase in flow without exceeding the capacity of the stream channel.

The carrying capacity of the river channel was determined by utilising Manning's Equation. The maximum channel capacity of the Cushaling River at the western boundary of the proposed MBT Facility is estimated to be approximately 8,550



litres/sec, with a channel cross sectional area of approximately  $9.5\text{m}^2$ . The maximum channel capacity of the Cushaling River at Dillon's Bridge, where the Cushaling River flows under the R403 road, is estimated to be approximately 9,900 litres/sec, with a channel cross sectional area of  $6.61\text{m}^2$ . The culvert under the R403 is a concrete box culvert, of dimensions 3m high and 2.2m wide. The stream channel upstream and downstream of the bridge is incised deeply into the ground and extends to up to 6-7m, with shallow flood plains which attenuate flow in the mid part of the stream.

It should be noted that the water currently discharged from the MBT Facility site naturally drains to the Cushaling River. All surface water collected at the MBT Facility site, following construction, will be treated prior to discharge at a regulated rate.

### **Flooding Data**

Substantial areas of the proposed MBT Facility site and surrounding area catchments have been artificially drained to enable industrial harvesting of peat from the 1960's to 1990's. The OPW 'Flood Hazard Database' was used in order to obtain information on historical flooding events within the proposed MBT Facility site boundary. This information was used to establish the current baseline conditions and specifically if the proposed MBT Facility site is liable to flood. No records of flooding were noted on the OPW website for the site of the proposed MBT Facility.

Data on historical flooding is limited but the records do not indicate that flooding occurred at the proposed MBT Facility site or on the Cushaling River immediately downstream. The network of drainage ditches effectively drain the proposed MBT Facility site and surrounding area. The groundwater monitoring data indicates that the watertable is shallow (<2 m bgl). The presence of tall scrub is also an indication that the proposed MBT Facility site is not waterlogged and is not inundated during winter periods.

### **6.2.3 Surface Water Quality**

#### **Regional Surface Water Quality**

The water quality of the major rivers in Ireland is monitored continuously by the EPA. The monitoring programme was established under the Environmental Protection Act 1992. The objectives of the programme include the following:

- a) To establish the ongoing quality status of our rivers and streams;
- b) To monitor quality changes and trends over time;
- c) To assess the performance of pollution control and abatement measures;
- d) To provide feedback to the responsible control agencies; and
- e) To inform the general public.

Q Values are used by the EPA to express biological water quality, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. See Table 6.1 for an explanation of the ratings. Q1 indicates a seriously polluted water body; Q5 indicates unpolluted water of high quality. Appendix 6.2 shows a more detailed description of the Biological Quality Classes.

**Table 6-1 Q Rating Table**

Quality Ratings	Quality Class	Pollution Status	Condition
<b>Q5, Q4-5, Q4</b>	Class A	Unpolluted	Satisfactory
<b>Q3-4</b>	Class B	Slightly Polluted	Unsatisfactory
<b>Q3, Q2-3</b>	Class C	Moderately Polluted	Unsatisfactory
<b>Q2, Q1-2, Q1</b>	Class D	Seriously Polluted	Unsatisfactory

Available information for the Figile River catchment was referenced to determine the existing quality of the surface water environment. Reference to information obtained from the EPA and Southern Regional Fisheries Board indicates that the Figile and Slate Rivers, of which the Cushaling and Abbeylough Rivers are tributaries, support both salmonid and cyprinid fish populations.

Reference to EPA information indicates that there are four water sampling stations between the MBT Facility site and Clonbulloge (approximately 21.4km downstream of the MBT Facility site). Table 6.2 and 6.3 should be read in conjunction with the Q rating system as outlined in Table 6.1.

According to the EPA, the invertebrate community diversity at Ticknevin Bridge is low to very low. The EPA physio-chemical summary of results indicates that the water quality is low with the dissolved oxygen depleted by either biological or chemical uptake. It is likely that the water in the Cushaling River at Ticknevin Bridge is affected by a high chemical demand on the Dissolved Oxygen, due to the predominance of peat upstream of the sampling point.

Further downstream at Cushaling Bridge (Nat. Grid Ref.: E265100, N225850), approximately 11km downstream of the proposed MBT Facility, the biological analysis indicates that the water quality is moderately polluted (Q2-Q3) between 1997 and 2003 with improvements noted since 2006. The chemical analysis indicates that the Dissolved Oxygen saturation is greater indicating a lower uptake, suggesting the affects of chemical activity of peat is reduced. The location of this sampling point is further downstream from peatland and is adjacent to free draining agricultural lands.

**Table 6-2 EPA Monitoring of Biological Quality of Waters on the River Figile**

Location	Bridge South of Ticknevin Bridge	Cushaling Bridge	Kilcumber Bridge	Clonbulloge Bridge
Station No	050	100	200	300
Grid Ref.	E269675, N230150	E265100, N225850	E261050, N226800	E261000, N223450
2011	Q3	Q3-4	Q3-4	Q4
2009	Q2-3	Q3-4	Q3-4	-
2006	Q2-3	Q3-4	Q3-4	Q4
2003	Q2	Q3	Q3-4	Q4
2000	Q1-2	Q3	Q3-4	Q4-5
1997	Q1	Q2	Q3	Q3-4
1994	Q1	No Sample	No Sample	No Sample
1993	Q2	Q3-4	Q3-4	No Sample
1990	Q1-2	No Sample	No Sample	No Sample
1989	Q2	Q3-4	Q3	Q4
1986	No Sample	Q3-4	Q3-4	Q4

The biological analysis indicates that the water quality of the River Figile at Kilcumber Bridge (Nat. Grid Ref.: 261050, N226800) is slightly polluted and unpolluted at Clonbulloge Bridge (Nat. Grid Ref.: 261000, N223450). Again the sampling at these locations indicates that the Dissolved Oxygen saturation is higher. The impacts on the water quality at these location appears to be related to agricultural activity, with oxidised nitrogen, ammonia and ortho-phosphate elevated above normal background levels.

The closest sampling station to the proposed MBT Facility is at Dillon's Bridge (Nat. Grid Ref.: E271600, N231230), which is approximately 2.7 km downstream of the MBT Facility activity boundary. This location is monitored as required by the EPA Waste Licence for the Drehid Waste Management Facility (EPA Waste Licence W0201-03). The biological analysis of the surface waters indicates that the surface water quality was considered moderately polluted (Q3-Q4), as shown in Table 6.3 below. The results are comparable to the 2008 assessment, which was carried out prior to waste acceptance at the existing Drehid Waste Management Facility.

**Table 6-3 Biological Monitoring at Dillon's Bridge (W0201-03 AER)**

Location	Dillon's Bridge (SW-4)
Grid Ref.	E271600, N231230
2011	Q3-4
2010	Q3-4
2008	Q3-4

### Site Specific Surface Water Quality

#### Data points

As part of the original environmental site investigations for the existing Drehid Waste Management Facility, a number of water sampling stations were established at the boundary of the Bord na Móna landholding. These monitoring locations included the following:

- SW4 – Dillon's Bridge(Cushaling River); and
- SW5 – Settlement lagoon for Bord na Móna landholding, prior to discharge to the Cushaling River.

The locations are shown on Figure 6.1. As potential surface water discharges from the proposed facility will enter the Cushaling River, it is considered appropriate to focus monitoring on this watercourse. Weekly monitoring in 2011 at Dillon's Bridge (SW4) and the settlement lagoon (SW5) are included in Appendix 6.3. Water quality results indicated that the water samples were within the permitted guidelines.

#### Discussion of results

The pH of the samples ranges from 7.5 to 8.2, which is within the maximum allowable concentration (MAC) for drinking water and typical of surface water samples in the surrounding environment. The pH values recorded are slightly basic. Slightly elevated levels of ammonia are considered reflective of the reducing conditions within the peat subsoils.

The chloride concentrations at SW4 and SW5 are recorded within the range 10-21mg/l, which is within normal background levels. Weekly surface water results indicate chloride concentrations are typically less than 15 mg/l.

#### *6.2.4 Groundwater Chemistry*

No groundwater abstractions occur at the site of the proposed MBT Facility at present, however a groundwater abstraction point is proposed to supply potable water to the proposed facility. The baseline groundwater quality is outlined below and in Table 6.4.

Groundwater samples were taken from GW-2S and GW-3S (See Figure 6.1) on the 19<sup>th</sup> October 2011 as part of on-going monitoring as required under the EPA waste license for the existing Drehid Waste Management Facility. The pH ranges between 7.0 (GW-2S) and 6.6 (GW-3S), which is slightly acidic. The electrical conductivity ranges from 827 to 832  $\mu\text{S}/\text{cm}$  @ 25°C. The hydrochemical signature of the groundwater is calcium bicarbonate.

The concentration of nitrate is very low with all concentrations below 0.05mg/l (as  $\text{NO}_3$ ). Ammonical Nitrogen concentrations however were elevated with groundwater samples exceeding the MAC. This would suggest that reducing conditions are present within the peat and that denitrification may have occurred.

Chloride concentrations in GW-2S and GW-3S are less than 15mg/l, which is considered to be below the mean natural background level of 18mg/l (Baker, G., Crean, D. and Moran, S. 2007<sup>59</sup>) and the groundwater saline intrusion threshold value (S.I. No. 9 of 2010 Groundwater Regulations) of 24 mg/l. This is indicative of a low pollution loading at the proposed MBT Facility site. Exceedance of the ammonium, manganese and iron MACs are likely, based on-site experience and the reducing conditions in the soil and bedrock. Naturally high ammonium, iron and manganese concentrations are known to occur within the limestone bedrock in County Kildare and County Meath where reducing conditions are prevalent. Concentrations of ortho-phosphate in GW-2S and GW-3S varied between 0.12 mg/l (GW-2S) and 0.02 mg/l (GW-3S).

Elevated concentrations of arsenic were detected in 2011 in GW2S (20  $\mu\text{g}/\text{l}$ ) and GW3S (9  $\mu\text{g}/\text{l}$ ). These concentrations are above the Groundwater Threshold Value (GTV) level of 7.5  $\mu\text{g}/\text{l}$ . In the 2003 monitoring event (in advance of the development of the existing Drehid Waste Management Facility) elevated concentrations of arsenic were detected in groundwater. The source of the arsenic is unknown however it is noted that *“concentrations in groundwater in some areas are sometimes elevated as a result of erosion from natural sources”* (EPA 2001; Parameter of Water Quality). A literature review reveals several studies which attribute arsenic concentrations to reducing conditions associated with peat deposits. As such, these results represent the natural geochemistry beneath the peatland.

Barium concentrations recorded in 2011 in GW2S (756  $\mu\text{g}/\text{l}$ ) and GW3S (556  $\mu\text{g}/\text{l}$ ) are elevated compared to studies of typical background concentrations (162  $\mu\text{g}/\text{l}$ ; Baker, G., Crean, D. and Moran, S. 2007). However, barium concentrations above typical background concentrations were also detected in the 2003 monitoring event where

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<sup>59</sup> Baker, G., Crean, D. and Moran, S. (2007) Establishing Natural Background Levels for Groundwater Quality in Ireland. GSI Groundwater Newsletter No. 46.

concentrations ranged from 90 to 270 µg/l in the deeper boreholes and from 130 to 520 µg/l in the shallow boreholes and (as with arsenic concentration) are believed to be representative of the natural geochemistry beneath the peatlands at the proposed MBT Facility site. Elevated concentrations of nickel were detected in GW2S (34 µg/l) in 2011. Concentrations of nickel in GW3S (6 µg/l) are below the (GTV) value of 15 µg/l.

Elevated concentrations of aluminium were detected in GW2S (517 µg/l), GW3S (326 µg/l), in 2011. At near neutral pH (pH 5-9); concentrations of aluminum are typically low in groundwater samples. As the groundwater wells are screened within the peat and clayey subsoil horizon, it is possible that clay particles containing aluminum are present in the groundwater samples. This would indicate that the elevated concentrations found in the groundwater samples are as a result of the presence of clay in the suspended solids and not dissolved aluminium. Similarly elevated concentrations of iron are likely to reflect natural background conditions in the peat and soil.

The concentrations of sulphate, potassium, sodium, magnesium and calcium are within normal ranges. The potassium: sodium (K:Na) ratio is low at less than 0.2. Calcium concentrations are reflective of the limestone subsoils.

In summary, the groundwater quality monitoring adjacent to the MBT Facility site suggests that reducing conditions are present in the soils. The chloride and K:Na ratio are both low, however high ammonia concentrations are present which commonly occur in these reducing environments.



**Table 6-4: Groundwater Quality (19<sup>th</sup> October 2011)**

Borehole	Units	GW-2S	GW-3S	MAC S.I. No. 278 of 2007	GTV S.I. No. 9 of 2010
Temperature	°C	11.6	10.7	-	-
Conductivity	µS/cm	827	832	2500	1875
pH	pH units	7.0	6.6	6.5-9.5	-
Ammonia – N as N mg/l	mg/l	2.04	4.77	0.23	0.136
Chloride	mg/l	12	13	250	187 (24)
Nitrate as N	mg/l	<0.05	<0.05	11.3	8.47
Nitrite	mg/l	<0.03	<0.03	0.5	0.11
Ortho-phosphate	mg/l	0.12	0.02	-	-
Sulphate	mg/l	7.94	2.62	-	187
Sodium	mg/l	7.4	15	200	150
Potassium	mg/l	0.8	1.7	-	-
Magnesium	mg/l	30	18	-	-
Calcium	mg/l	378	218	-	-
Aluminium	µg/l	517	326	250	150
Antimony	µg/l	<2	<2	5	-
Chromium	µg/l	3	2	50	-
Cobalt	µg/l	8	<2	-	-
Manganese	µg/l	901	432	50	-
Nickel	µg/l	34	6	20	15
Copper	µg/l	10	5	2000	1500
Zinc	µg/l	61	48	-	-
Cadmium	µg/l	2	<2	5	3.75
Barium	µg/l	756	556	-	-
Beryllium	µg/l	<2	<2	-	-
Silver	µg/l	<2	<2	-	-
Lead	µg/l	10	8	25	15
Selenium	µg/l	2	<2	10	-
Iron	mg/l	17	14	0.2	-
Boron	µg/l	42	25	1000	750
Tin	µg/l	<2	<2	-	-
Arsenic	µg/l	20	9	10	7.5
Mercury	µg/l	<1	<1	1	0.75

M.A.C = Maximum Admissible Concentration under S.I. No. 278, 2007 (Water Quality -Dangerous Substances- Regulations).

G.T.V. = Groundwater Threshold Value (S.I. No. 9 of 2010 Groundwater Regulations)

**Table 6-5 Groundwater Chemistry from Samples obtained on 04/02/2003**

Parameter	Units	M.A.C.	Detection Limit	GW 1D	GW 1S	GW 2D	GW 2S	GW 3D	GW 3S	GW 4D	GW 4S	GW 5D	GW 5S
pH			0.01	7.51	7.17	7.46	6.93	7.66	7.16	7.75	7.55	7.56	7.53
Electrical conductivity EC	m S/cm	6.5 < pH < 9.5	0.014	0.835	1.043	0.755	0.983	0.319	0.936	0.493	0.722	0.9	0.71
Dissolved oxygen (DO)	mg/l	2500	0.1	4.9	6.1	7.6	6.8	5.4	6.6	8.8	7.5	7.9	8.4
Redox potential	mV	n/a		121	14	120	124	102	126	110	119	128	128
COD	mg/l	n/a	10	178	176	166	193	87	167	95	133	107	114
Total solids	mg/l	n/a	1	18579	34946	8693	48647	3152	16635	1557	22710	80762	14169
Total suspended solids	mg/l	n/a	10	16476	31904	10616	43392	2916	15050	1270	18930	73980	11390
Total hardness (as CaCO <sub>3</sub> )	mg/l	60 MRC	5	320	520	266	478	300	312	366	258	300	220
Total alkalinity (as CaCO <sub>3</sub> )	mg/l	30 MRC	1	380	570	460	520	210	240	290	380	370	350
Ammonia as NH <sub>4</sub> -N	mg/l	0.3	0.2	8	1.9	2	2.1	0.5	6.6	0.8	6.1	3.2	7.6
Nitrate NO <sub>3</sub>	mg/l	50	0.3	0.3	0.3	2.6	25.6	0.05	0.3	<0.3	<0.3	<0.3	<0.3
Nitrite NO <sub>2</sub>	mg/l	0.5	0.05	0.07	0.18	0.39	0.68	0.18	0.1	<0.05	0.11	<0.05	0.3
TON	mg/l	n/a	0.3	<0.3	<0.3	0.7	6.1	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chloride Cl	mg/l	250	1	31	21	44	37	20	39	36	31	37	41
Fluoride F	mg/l	1	0.01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate SO <sub>4</sub>	mg/l	250	3	59	31	14	45	10	4	4	13	<3	55
ortho-Phosphate PO <sub>4</sub>	mg/l	5	0.03	0.2	0.3	0.2	0.2	0.2	0.2	0.3	1.2	0.2	2.6
Potassium K	mg/l	12	0.2	3.2	0.8	1.8	4.1	1.3	2.9	1.4	2.4	3	2.1
Sodium Na	mg/l	200	0.2	39.5	9.2	32	16.8	12.4	17	15.5	40	64	12.2
Calcium Ca	mg/l	200	0.05	124.9	156	128.2	152	48.51	161.7	81.74	108.5	117.8	119.1
Magnesium Mg	mg/l	50	0.05	11.11	44.06	9.17	34.72	7.56	11.33	13.68	17.14	11.81	9.64
Aluminium Al	mg/l	0.2	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc Zn	mg/l	1	0.005	0.007	0.011	<0.005	0.008	0.017	0.006	<0.005	<0.005	0.006	0.006
Iron Fe	mg/l	0.2	0.001	0.008	0.023	0.005	0.02	0.003	0.014	0.002	0.002	0.003	0.004
Manganese Mn	mg/l	0.05	0.001	0.006	0.242	0.084	0.409	0.082	0.151	0.006	0.142	0.383	0.26
Barium	mg/l	0.5	0.05	0.12	0.13	0.27	0.18	0.09	0.52	0.17	0.13	0.1	0.4
Boron	mg/l	1	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead Pb	µg/l	10	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Copper	µg/l	2000	5	<5	7	<5	<5	<5	<5	<5	<5	<5	<5
Mercury Hg	µg/l	1	0.05	0.12	0.11	<0.05	<0.05	0.1	0.05	0.23	0.11	0.08	0.27
Nickel Ni	µg/l	20	10	<10	11	<10	<10	14	14	<10	<10	18	13
Arsenic	µg/l	10	5	19	<5	<5	<5	22	6	8	<5	<5	<5
Cyanide CN	µg/l	50	50	60	<50	<50	<50	<50	<50	<50	<50	170	<50
Cadmium Cd	µg/l	5	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium Cr	µg/l	50	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Silver Ag	µg/l	10	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Selenium	µg/l	10	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Phenols (HPLC)	mg/l	0.0005	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Diesel Range Organics (DRO)	µg/l	10	10	<10	<10	<10	3303	<10	4441	<10	1649	5533	2731
Mineral Oil	µg/l	10	10	<10	<10	<10	1486	<10	1776	<10	<10	1383	956
Petrol Range Organics C4-C10	µg/l	10	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Petrol Range Organics C10+	µg/l	10	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BTEX (MTBE) Compounds	µg/l	10	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
PAH (16 EPA Compounds)	µg/l	100	10	<10	<10	<10	1332	<10	<10	<10	<10	<10	<10
Semi-Volatile Organic Compounds	µg/l		1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Volatile Organic Compounds	µg/l		1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Coliforms	c.f.u./100ml	0	1	1450	2880	4130	34480	1480	81640	28	310	4590	1460
Faecal Coliforms	c.f.u./100ml	0	1	6	2	<1	<1	<1	<1	<1	<1	<1	<1
Ionic Balance	%			4.22%	14.14%	5.10%	9.19%	0.19	37.97	8.43	13.97	26.72	2.21

**Legend**

M.A.C = Maximum Admissible Concentration under S.I. No. 439, 2000 (European Communities Drinking Water Regulations).

&lt; = Less than

#### 6.2.5 Water Framework Directive Requirements

The Water Framework Directive (WFD) requires ‘good water status’ for all European waters. This is to be achieved through a system of river basin management planning and extensive monitoring. In 2004 a characterisation and analysis of all River Basin Districts (RBD’s) in Ireland was undertaken as required by Article 5 of the WFD. In this characterisation study the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g. water regulation structures). The Cushaling River was identified as at risk of failing to meet the objectives of the WFD by 2021.

A review of the WFD in relation to the Cushaling River indicates the following:

- There are no RPA (Registered Protected Area) nutrient sensitive rivers within 5 km of the MBT Facility site;
- There are no RPA habitat rivers within 5 km of the MBT Facility site;
- There are no RPA nutrient sensitive lakes and estuaries within 5 km of the MBT Facility site; and
- There are no RPA shell fish areas within 5 km of the MBT Facility site.

Based on the available information, the Cushaling River catchment is ‘*at Risk of not achieving Good Status*’ in relation to Surface Water (*1a status*). The catchment is predominantly cutover peat and agricultural land.

### 6.3 POTENTIAL IMPACTS

Both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) will have the same footprint and accept the same volume of waste.

In the case of MBT Configuration A (MBT with Composting), all waste water produced by the MBT process will be reused in the process. However, in the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), the worst case scenario considers that all waste water produced by the MBT process may not be reused in the process and that an estimated 3,285 cubic metres per annum will require treatment off-site at an EPA licensed waste water treatment facility. It should be noted that Bord na Móna has received confirmation from both Rilta Environmental Ltd. (Rilta) and Enva Ireland Ltd. that their licensed facilities have both the capacity and capability to accept and treat waste water from the MBT Facility. This correspondence is included in Appendix 6.5.

As a consequence the potential impacts for each configuration are addressed separately.

#### *6.3.1 Potential Impacts of Configuration A (MBT with Composting)*

The purpose of this section is to detail the potential impacts on the surface water and groundwater environment as a result of the construction and operation of the MBT Facility. This section details the water management measures and other mitigation measures, which reduce the potential impact of the MBT Facility activities on the surface water and groundwater environment.

In assessing the potential impacts, it is important to note that MBT process waste water will be fully contained and collected in process waste water tanks. The MBT process waste water collection system will be fully isolated from the surface water collection system during the lifetime of the facility. As such, the potential impact of the proposed MBT Facility is substantially mitigated through avoidance of impacts. Outlined below are potential impacts that may arise during the construction and operational phases.

#### **Construction Phase**

The construction of the MBT Facility has the potential to have a negative impact on the surface water and groundwater environment if not managed properly. All construction activities will be confined to a 29ha landbank, which is referred to as the MBT Facility site activity boundary.

It is proposed to re-route existing drainage channels at the periphery of the MBT Facility site to minimise the volume of water that could potentially be impacted during the construction phase. The re-routing of the drainage channels, as shown on Drawing 6301-2602 (Appendix 5 of the Engineering Services Report), will not significantly impact on the drainage of the wider Bord na Móna landholding, as the water will continue to discharge to the main central drain and continue to discharge to the Cushaling River.

As with all construction projects of this scale, the management of surface water and groundwater is a very important aspect of the development. Water control measures and discharge management will be maintained where construction occurs as outlined in Section 6.4.1 below.

Reference to Section 5.3 of Chapter 5 (Soil, Geology and Hydrogeology) indicates that the risk to the groundwater environment is low due to the naturally low permeability of the mineral subsoil across the proposed MBT Facility site. Groundwater seepage to excavations will be minor and insignificant during heavy rainfall events, due to the low permeability of the underlying subsoil material throughout the MBT Facility site.

#### Sediment Discharges

There is the potential for the release of sediments into watercourses as a consequence of soil stripping (required to construct the MBT Facility roads, site compounds, foundations, etc.) and also due to potential run-off and erosion from soil stockpiles (prior to reinstatement and seeding).

The result of increased sediment loading to watercourses is to potentially degrade the water quality of the receiving waters and change the substrate character. Details of water treatment (where appropriate) is outlined in Section 6.4 below.

Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse could be detrimental to water quality and fauna and flora.

During the construction of the MBT Facility there will be a requirement to provide temporary wastewater facilities at the site compounds. It is not proposed to discharge wastewater from the site compounds. Rather, wastewater from welfare facilities will be transported off-site to a licensed waste water treatment plant.

The regional hydrological setting will not be significantly impacted by the proposed development. Re-routing of artificial drainage ditches at the periphery of the proposed MBT Facility site will be required. The re-routing of the artificial drainage ditches will not significantly impact the receiving environment. The re-routing will however reduce the risk of waters draining from areas upgradient of the MBT Facility site coming in contact with construction activities.

#### **Operational Phase**

MBT process waste water will be fully contained and collected in process waste water tanks for reuse in the process. The MBT process waste water collection system will be fully isolated from the surface water collection system during the lifetime of the facility. Therefore, there will be no discharge of waste water in to water environment. As such, the physico-chemical assimilative capacity of the Cushaling River will not be impacted by the operation of the MBT Facility.

At present there is no potable water supply at the MBT Facility site. Potable water will be required at the proposed MBT facility to facilitate the welfare of the workforce. The total daily demand is estimated as 4.69 m<sup>3</sup>/day.

The operation of the MBT Facility has the potential to increase the rate of surface water runoff from this site. In order to provide the necessary attenuation, it is proposed to construct permanent surface water settlement lagoons. It should be noted that attenuation will also be provided by the existing settlement lagoon located downgradient of the proposed settlement lagoons at the MBT Facility site. The proposed 3 No. settlement lagoons will be required during the operation of the MBT Facility as detailed in Section 6.4 below.

The acceptance and treatment of waste will only take place within fully enclosed and bunded MBT Facility buildings. Waste water will be recycled within the MBT process. It is envisaged that no excess process waste water will be discharged from the facility.

In the event of a fire at the MBT Facility, the management of excess firewater will be required. It is proposed that firewater will be collected within the surface water ponds and managed as detailed in the mitigation measures in Section 6.4.1 below.

No evidence of flooding was recorded during the site investigations, site walkovers or during previous peat harvesting at the MBT Facility site and as such the potential flooding impacts are low/negligible.

#### *6.3.2 Potential Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The potential impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting) are effectively the same as for Configuration A (MBT with Composting) as detailed in section 6.3.1 above.

All potentially contaminated water, including MBT process waste water, will be diverted to the process waste water holding tanks, from where this waste water will be reused within the MBT process where possible.

In the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), the worst case scenario considers that all waste water produced by the MBT process may not be reused in the process and that an estimated 3285 cubic metres per annum will require treatment off-site at a EPA licensed waste water treatment.

## 6.4 MITIGATION MEASURES

### *6.4.1 Mitigation Measures for Configuration A (MBT with Composting)*

The purpose of the mitigation measures outlined in this Report is to minimise the direct and indirect impacts of the proposed development on the surrounding water environment during the construction and operational phases.



During the construction phase and the operational phase a high standard of environmental engineering practices will be implemented to minimise the impact of the facility on the surrounding surface water and groundwater environment.

### **Construction Phase**

Wash down and washout of concrete transporting vehicles will take place at a designated bin area to prevent cementitious material and water entering the surface water network.

A number of drainage ditches will be excavated to divert existing surface water drainage away from the proposed excavations and construction activities (see Drawing No. 6301-2602). All rainwater run-off from the hard surfaces will be collected in this drain. The collected water in this drain will flow to the north of the MBT Facility Site, from where the captured water will be discharged to the existing settlement lagoon, to allow settlement of particles prior to discharge to the receiving environment.

In order to reduce the risk of sediment laden water adversely impacting surface water, measures will be implemented during the construction stage to divert such water through treatment systems (settlement lagoons) prior to discharge to receiving waters. During the construction period all water pumped from the base of excavations will be pumped to temporary/mobile sediment control devices, comprising grit traps or devices of similar efficiency. The contract documents will specify the necessity for the contractor to take all precautions needed to prevent silt laden run-off discharging directly to watercourses. Upper limits of sediment in discharges will be specified in contract documents. Frequent sampling of discharges will be a requirement of the contract. It is proposed to construct the proposed settlement lagoons early in the construction phase to optimise the treatment of surface water for the remainder of the construction stage.

The proposed lagoons are designed to reduce the potential impact at source. It should be noted that the overall capacity of the proposed settlement lagoons has been designed to accommodate all impermeable areas at the MBT Facility (including hardstanding areas and roofed areas) and to cater for a 1 in a 100 year storm event. An existing surface water lagoon (adjacent to SW4) will provide further attenuation prior to the discharge of surface water run-off to the Cushaling River. The surface water quality of all water discharged from the MBT Facility will be monitored to ensure that the receiving water quality is not impaired.

To minimise any potential impact on the surface water and groundwater environments from material spillages, all fuel oils and other oils used during the construction phase will be stored within bunded areas. The design of all bunds will conform to EPA bunding specifications. The retention capacity of bunded areas will be 110% of the capacity of the largest tank or drum to be stored within the bunded area. Spill kits will be retained on-site to ensure that all spillages or leakages are dealt with immediately and staff will be trained in their proper use. Any servicing of vehicles on-site will be confined to designated areas.

The presence of significant numbers of workers on site during the construction period will lead to the generation of foul sewage from temporary showers, toilets, canteens and washing facilities. This foul sewage will be collected and tankered off-site for disposal at a licensed waste water treatment facility.

Contractors will be required to ensure that the public roads in the vicinity of the site are maintained free from all mud, dirt and rubbish, which may arise from or by reason of the execution of the works. To facilitate this, contractors will be instructed to use a temporary wheel wash which will be installed at the site of the MBT Facility.

### **Operational Phase**

It is important to note that MBT process waste water will be fully contained and collected in process waste water tanks for reuse in the MBT process. The MBT process waste water collection system will be fully isolated from the surface water collection system during the lifetime of the facility.

Rainwater falling on impermeable areas (including hardstanding areas and roofed areas) will be collected, stored and discharged to the receiving waters in a controlled manner (i.e. at greenfield runoff rates) in accordance with the principles set down by the Greater Dublin Strategic Drainage Study (GSDSDS). The control of the surface water discharge rate to the receiving environment can be classified as a SuDs (sustainable urban drainage) measure.

The settlement lagoons have been designed to provide an adequate retention time to allow suspended solids to fall out of suspension prior to discharge of surface water to the receiving environment. The location of the settlement lagoons at the MBT Facility are shown on Drawing 6301-2611 (Appendix 5 of the Engineering Services Report). The settlement lagoons will also serve as a fire water supply and as a supply of fresh water to the MBT process, thereby allowing reuse and recycling of water within the proposed MBT Facility site. Water will be recycled within the MBT Facility where possible.

It is proposed to construct 2 No. water settlement lagoons to the north of the proposed MBT Facility and 1 No. lagoon to the south, adjacent to the car park hardstanding area (See Drawing 6301-2602). All water collected will first pass through an appropriately sized oil interceptor and grit trap. The surface water runoff will subsequently pass through settlement lagoons which have adequate retention time to allow suspended solids to fall out of suspension and provide stormwater storage during extreme rainfall events.

The settlement lagoons will be constructed from suitable material sourced on-site and compacted to ensure stability. Following the completion of earthworks associated with the formation of the lagoons, the integrity of the lagoons will be further secured by the installation of a HDPE geomembrane liner.

The provision of a storm water freeboard has been accounted for in the design of the settlement lagoons, thereby providing for storage of storm water in the event of intense

rainfall events. The settlement lagoons are sized to provide sufficient retention time to facilitate adequate settlement of suspended solids prior to discharge to the surface water environment.

Meteorological data was sourced from the closest rainfall gauge at Lullymore. The matrix of extreme rainfall events, detailing rainfall durations and return periods for the rainfall gauge at Lullymore is included in Appendix 6.4. The extreme rainfall event chosen for the sizing of the settlement lagoons is a 1 in 100 year return period.

Interpretation of the meteorological data using the GDSDS/SuDs methodology allows an estimation of the peak rainfall runoff intensity. The surface water management system is designed to capture and control the runoff and allow outflow to receiving waters at a regulated rate. The calculation sheets for the greenfield run-off rate and the sizing of the settlement lagoons are included in the Engineering Services Report in Appendix 2.2 of this EIS.

It is proposed that the maximum outfall rate from the MBT Facility site will be maintained at 5.22 litres/second/ha of land drained (using a flow constriction). Therefore, over the full extent of the MBT Facility site, the discharge rate will be maintained at approximately 140 litres/second or 504m<sup>3</sup>/hour

In extreme rain fall events, the storm water freeboard in the settlement lagoons will provide sufficient storage to maintain a regulated discharge rate (i.e. greenfield run off rate) to receiving waters.

The design of the settlement lagoon is based on creating a low energy water environment to settle out suspended solids from aqueous suspension. The theory behind the design of the settlement lagoons is the application of Stoke's Law. The settlement lagoons have been designed to provide sufficient retention time and a low velocity environment to allow suspended solids of a very small particle size to fall out of suspension prior to allowing the water to outfall to the receiving environment. Interpretation of Stoke's Law of settlement indicates that a 12 hour retention time will allow 100% removal of sand and silt down to 10µm. The design calculations for the settlement lagoons are provided in Appendix 6.4. The average retention time is calculated to be in excess of 12.8 days and the efficiency of the settlement lagoons is considered sufficient to ensure that the quality of the discharged water will meet acceptable discharge limits. These calculations do not take into account the additional settlement provided in the existing Bord na Móna settlement lagoon located downgradient of the proposed MBT Facility.

In terms of the capacity of the Cushaling River to transmit the water discharged from the MBT Facility, the channel capacity was assessed at the 2 No. locations where site specific hydrometric readings were taken (refer to Section 6.2.2). The carrying capacity of the river channel was determined by utilising Manning's Equation.

The maximum channel capacity of the Cushaling River at the western boundary of the MBT Facility site is estimated to be approximately 8,550 litres/sec, with a channel cross sectional area of approximately 9.5m<sup>2</sup>. The maximum channel capacity of the Cushaling River at Dillon's Bridge, where the Cushaling River flows under the R403 road, is estimated to be approximately 9,900 litres/sec, with a channel cross sectional area of 6.61m<sup>2</sup>. The culvert under the R403 is a concrete box culvert, of dimensions 3m high and 2.2m wide. The stream channel upstream and downstream of the bridge is incised deeply into the ground and extends to up to 6-7m, with shallow flood plains which attenuate flow in the mid part of the stream. With respect to the proposed MBT Facility, it is proposed to discharge a maximum of 140 litres/second from the MBT Facility site during extreme rainfall events. This maximum discharge corresponds to the greenfield runoff rate.

All surface water discharged from the MBT Facility will comprise clean treated surface water. The water discharged will be diverted through settlement lagoons to reduce any potential for siltation of the river channel. The surface water quality of all water discharged from the MBT Facility will be continuously monitored to ensure that there is no negative impact on the receiving water quality. Continuous monitoring will take place at the inlet and outlet of the surface water lagoons. Instrumentation linked to a SCADA system will continuously monitor the following parameters:

- Dissolved Oxygen
- pH
- Electrical Conductivity
- Flow Rate

An actuated valve at the surface water lagoon outlets will be controlled by the SCADA system. This valve will be programmed to close should any of the above parameters fall outside permitted levels. The volume of surface water discharged to the surrounding environment will also be controlled through the same actuated valve and SCADA system.

As process wastewater or any other potentially contaminated material from the MBT Facility will be fully contained and isolated from the surface water collection system. As such, the physico-chemical assimilative capacity of the Cushaling River will not be impacted.

All vehicles exiting the MBT Facility site will be required to divert through a wheelwash located along the access road of the MBT Facility site. This infrastructure will ensure that vehicles do not cause soiling of roads. Water will be recycled within the wheelwash facility to minimise the water requirement. A tank will store water for washing purposes; 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.

To minimise any impact on surface water from material spillages, all fuel oils and other oils used during operations will be stored within bunded areas. The design (volume and construction) of all bunds will conform to EPA bunding specifications. The retention capacity of bunded areas

will be 110% of the capacity of the largest tank or drum to be stored within the bunded area. Spill kits will be retained on-site to ensure that all spillages or leakages are dealt with immediately & staff will be trained in their proper use. Any servicing of vehicles on-site will take place within the bunded Maintenance Building.

In the event of a fire at the MBT Facility, excess firewater will be collected and retained in the surface water ponds. The firewater will subsequently be analysed prior to possible tankering off-site to an approved wastewater treatment plant.

#### Water Supply

Currently, no public water supply exists on the site. To eliminate the requirement for a public water supply for the proposed MBT Facility a groundwater supply borehole will be sunk on-site to ensure an adequate supply of potable water to the proposed MBT Facility. This borehole well will be screened within the bedrock aquifer and grout sealed to prevent contamination of the groundwater. There will be no significant adverse direct or indirect impacts on the groundwater environment as a result of the installation of the water well and water supply connections during the construction and operational phase of the development. It is proposed to abstract less than 5 m<sup>3</sup>/day of water to supply the MBT Facility. Pump test data (compiled in 2003) indicates a potential yield of >40 m<sup>3</sup>/day. This data demonstrates that there is a sufficient supply of groundwater within the bedrock aquifer to satisfy the requirements of the MBT Facility. A supply of 40 m<sup>3</sup>/day is consistent with the aquifer classification of the underlying bedrock aquifer. Due to the potential for high ammonium, iron and manganese within the underlying aquifer, a treatment system will be required to meet the drinking water standards. The water main layout including location of valves, hydrants, etc are shown on Drawing No's. 6301-2613 in Appendix 5 of the Engineering Services Report (ESR), that accompanies this EIS. The location of the borehole well is also shown on this drawing.

#### Foul Sewerage

Refer to Drawing No. 6301-2612 of the ESR for details of the MBT Facility site layout. The average foul sewerage volume that will be generated by welfare facilities at the MBT Facility is estimated as 4.69 m<sup>3</sup>/day. It is proposed to collect and store foul sewerage in a sealed waste water holding tank for removal and further treatment/disposal offsite. All wastewater will be fully contained and stored at the MBT Facility. Therefore there will be no potential impacts from wastewater on the Cushaling River.

The proposed foul water network is shown on Drawing No. 6301-2612. The design calculations for the foul water network are included in the ESR in Appendix 2.2.

The collection, storage, treatment and monitoring of surface water prior to being discharged at greenfield run off rates is considered the principal mitigation measure to ameliorate the predicted and potential impact of the development post-construction.

#### 6.4.2 *Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting) are the same as for Configuration A (MBT with Composting) as detailed in section 6.4.1 above.

### 6.5 CONCLUSION

The proposed Drehid MBT Facility will occupy a 29ha site within an overall 2,544ha Bord na Móna landholding within the townlands of Coolcarrigan, Drummond and Kilkeaskin at Carbury, County Kildare. The MBT Facility site has previously been disturbed during the construction of a railway line and during the production of sod peat for energy generation.

All potentially contaminated water, including MBT process waste water, will be fully contained and collected in process waste water holding tanks, from where this waste water will be reused within the MBT process where possible. Sewerage generated by welfare facilities at the facility will be stored on site prior to being transported to a licensed waste water treatment facility.

There will be no uncontrolled discharge from the proposed MBT facility to the surface water or groundwater environment during construction or the operational phase. Regular sampling of the surface water environment will be undertaken downstream to ensure that MBT Facility activities are not causing an adverse impact on the natural water quality. This information will be compared to pre-development water quality data to determine any cumulative impacts or negative trends.

Given the above mitigation measures and the high design standard of the proposed MBT Facility, the risk to the surface water and groundwater environment is significantly reduced. The measures employed will ensure that there is no adverse impact on the surface water or groundwater environment.

Proposed mitigation measures outlined in this Report will seek to reduce any impacts of the proposed MBT Facility development during the construction and operational phases on the wider environment. Given the mitigation measures proposed in this Chapter, it is considered that the impact on the water environment will be low/negligible and permanent.



## 7 CLIMATE

### 7.1 INTRODUCTION

This chapter assesses the impact on climate arising from the proposed Drehid MBT Facility located within the Bord na Móna landholding in the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare.

#### 7.1.1 Methodology

All meteorological data contained in this Report has been received from Met Éireann. This information has been adjusted where necessary to take into account the proposed MBT Facility's location and elevation. All calculations detailed in the report are advised methods as described by Met Éireann.

#### 7.1.2 Weather Observing Stations

##### Rainfall Stations

There are a number of rainfall measuring stations throughout the country. These stations measure the daily rainfall in millimetres (mm). A number of these stations also measure additional parameters such as soil moisture, temperature, humidity, etc.

##### Synoptic Stations

Synoptic stations are those, which observe and record all the surface meteorological data. These observations include rainfall, temperature, wind speed and direction, relative humidity, solar radiation, clouds, atmospheric pressure, sunshine hours, evaporation and visibility. They report a mixture of snapshot hourly observations of the weather known as synoptic observations and daily summaries of the weather known as climate observations. There are currently 14 synoptic stations located throughout Ireland.

### 7.2 EXISTING ENVIRONMENT

#### 7.2.1 General Climate of Ireland

Over the summer months, the influence of anticyclonic weather conditions on the western and north western regions of Ireland results in dry continental air interspersed by the passage of Atlantic frontal systems. During much of the winter period the climate is characterised by the passage of Atlantic low pressure weather systems and associated frontal rain belts from the west. Occasionally the establishment of a high pressure area or anticyclone over Ireland results in calm conditions and during the winter months these are characterised by clear skies and the formation of low level temperature inversions with light wind conditions at night time. If anticyclonic conditions become established for a few days or more during the summer months, high temperatures during the day might be recorded, especially at inland locations. Long spells of dry weather are relatively rare but should continental air masses or anticyclones persist over Ireland a period of drought conditions may occur which could last up to two or three weeks.

### 7.2.2 Rainfall

In order to give reliable climatic data on a particular area a weather station should be located within 10km of the site and in operation for at least 30 years. A rainfall station is located at Lullymore (Bord na Móna) approximately 3.9m south west of the proposed MBT Facility. This station was in operation from 1945 to 1992 (47 years). Casement Aerodrome is the nearest synoptic station and it is located approximately 29km east of the proposed facility. This station began operating in 1944. Specifics of these stations relative to the proposed MBT Facility are outlined in Table 7.1.

**Table 7-1 Designated Meteorological Stations for the proposed MBT Facility**

Location	Grid Reference (Irish National Grid (ING))	Elevation (m O.D.)	Height Difference (m)
Proposed Drehid MBT Facility	274783, 230671 (ING)	83-86	-
Lullymore (Bord na Móna)	268402, 225010 (ING)	84	1
Casement Aerodrome	303285, 229044 (ING)	94	9

The elevation of the proposed MBT Facility ranges from approximately 83m-86m O.D. The elevation of the rainfall gauge at Lullymore (Bord na Móna) is approximately 84m O.D and the elevation of Casement Aerodrome is approximately 94m O.D.

According to Met Éireann, annual precipitation levels increase by 200 – 300mm per 100m elevations. The difference in height between the rainfall gauge at Lullymore and the proposed MBT Facility is relatively small and therefore no adjustment of precipitation levels is considered necessary. The average monthly and annual precipitation recorded at Lullymore is considered to be representative of the proposed MBT Facility location. Average monthly and annual precipitation levels are detailed in Table 7.2.

At the proposed facility, approximately 53% of the total annual rainfall is recorded during the winter period (October – March). This amount of precipitation (including snow) will normally be associated with more prolonged Atlantic frontal weather depressions passing over the region compared to the summer.

**Table 7-2 Average Monthly & Annual Precipitation (1960-1990)**

Location	Lullymore (Bord na Móna) Rainfall Station
Ht. m O.D.	84m
January	79mm
February	54mm
March	60mm
April	54mm
May	61mm
June	63mm
July	57mm
August	78mm
September	71mm
October	80mm
November	76mm
December	83mm
Annual	816mm

### 7.2.3 *Evapotranspiration and Effective Rainfall*

The nearest meteorological station with evapotranspiration measuring equipment is located at Casement Aerodrome. Evapotranspiration is the return of water vapour to the atmosphere by evaporation from land and by the transpiration of plants, generally measured from a short-grass covered surface (such as a permanent pasture) adequately supplied with water. Evaporation is the return of water vapour to the atmosphere by evaporation from a free water surface such as a pan of water, known as a 'Class A Pan', fitted with a depth measuring gauge. The potential evapotranspiration figures for the Casement Aerodrome are detailed in Table 7.3.

It can be noted that evapotranspiration is very low during winter months, when temperatures are lower than summer months, relative humidity is generally higher and plant growth is minimal. The vast majority of evapotranspiration during winter months is attributable to direct evaporation from ground surfaces. During summer months the rate of evapotranspiration increases and often exceeds the monthly rainfall. This is due to increased free evaporation from the surface and from transpiration from leaves and plants.

Effective rainfall is defined as precipitation minus actual evapotranspiration. Using the estimated rainfall data for the proposed facility and the potential evapotranspiration data for the nearest synoptic station i.e. Casement Aerodrome, the effective rainfall for the study area can be calculated. Refer to Table 7.3. Potential Evapotranspiration (PE) refers to the water flux under unlimited soil water conditions. Actual evapotranspiration is estimated as 95% of potential evapotranspiration to allow for seasonal soil moisture deficits.

**Table 7-3 Effective Rainfall for the proposed MBT Facility**

Month	Rainfall (mm)	Potential Evapotranspiration (PE) (mm)	Actual Evapotranspiration (mm)	Effective Rainfall (mm)
			(PE x 0.95)	
January	79	7.2	6.8	72.2
February	54	18.1	17.2	36.8
March	60	35	33.3	26.8
April	54	53.9	51.2	2.8
May	61	75.7	71.9	-10.9
June	63	87	82.7	-19.7
July	57	85.5	81.2	-24.2
August	78	68.4	65.0	13.0
September	71	45.9	43.6	27.4
October	80	22.3	21.2	58.8
November	76	7.5	7.1	68.9
December	83	3.7	3.5	79.5
<b>Total</b>	<b>816</b>	<b>510.2</b>	<b>484.7</b>	<b>331.31</b>

Any rain falling on the site will infiltrate to the ground, through the peat and underlying subsoil, evaporate from the surface or become surface water runoff. The surface water runoff drainage system is discussed in more detail in Chapter 6 of this EIS.

#### 7.2.4 Wind

The closest synoptic station with the capability of measuring wind and that has been in operation for at least 30 years is Casement Aerodrome. This station is located approximately 29km east of the proposed facility and is located at an elevation of approximately 94m O.D.

The wind rose for Casement Aerodrome shows that the prevailing winds are from the south west. Refer to Appendix 7.1 'Casement Aerodrome Wind Rose Diagram' for further details. The mean wind speed at Casement Aerodrome is 11.1 knots (5.7m/s). The elevation of the meteorological anemometer is approximately 94m O.D. The mean monthly wind speed from 1968-1996 (available 30 year average report) at Casement Aerodrome was 11 knots (5.6m/s), while the maximum gust reached 81 knots (41.6m/s). The mean number of days with gales during these years was 20.1 days. These wind speeds are likely to be indicative of those at the proposed MBT facility.

### 7.3 POTENTIAL IMPACTS

#### *7.3.1 Potential Impacts of Configuration A (MBT with Composting)*

During the construction phase of the proposed development, the potential impacts on climate will be those associated with dust and exhaust emissions from construction traffic. These impacts will be of temporary duration and their impacts are not considered to be significant.

The proposed MBT Facility will divert waste from landfill, thus contributing to the fulfilment of Ireland's target under the Landfill Directive (1993/31/EC) and the Kyoto Protocol.

#### *7.3.2 Potential Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

During the construction phase of the proposed development, the potential impacts on climate will be those associated with dust and exhaust emissions from construction traffic. These impacts will be of temporary duration and their impacts are not considered to be significant.

The proposed MBT Facility will divert waste from landfill, thus contributing to the fulfilment of Ireland's target under the Landfill Directive (1993/31/EC) and the Kyoto Protocol.

During the operational phase of the proposed development, the potential impacts on climate are likely to arise from emissions from mobile plant e.g. loading shovels, mechanical grabs etc, the CHP plants and from the standby gas flare (when in use).

Dry anaerobic digestion generates biogas from biodegradable waste. The biogas produced is used to produce renewable electricity and heat. The generation of renewable electricity from biogas results in no net increase in greenhouse gas emissions. Given that the production of renewable electricity displaces the production of electricity from fossil fuels, the dry anaerobic digestion step in Configuration B (MBT with Dry Anaerobic Digestion and Composting) will reduce overall carbon dioxide emissions to the atmosphere and the potential impacts of climate change.

The proposed development will assist Ireland in meeting its commitments under the EU Directive 2001/77/EC on electricity from renewable sources. Furthermore, the Solid Recovered Fuel (SRF) produced by the MBT process will displace the use of fossil fuels in cement kilns.

Methane is a harmful greenhouse gas if it escapes to atmosphere. By virtue of the biological process in the proposed MBT Facility, biodegradable municipal waste will be biostabilised thereby eliminating its potential to generate methane (a harmful greenhouse gas) and leachate, thus contributing to the fulfilment of Ireland's targets under the Landfill Directive (1999/31/EC).

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## 7.4 MITIGATION MEASURES

### 7.4.1 *Mitigation Measures for Configuration A (MBT with Composting)*

During the construction phase of the proposed development, all contractors will ensure that machinery used on site is properly maintained and is switched off when not in use to avoid unnecessary dust and exhaust emissions from construction traffic.

The proposed MBT Facility will include a building ventilation system and an odour abatement system.

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 maintaining of a negative pressure environment within each building will prevent the emission of untreated air to atmosphere.

Air extracted by the building ventilation system and the process air exhausted by the biological treatment process will be treated in an odour abatement system before being vented to atmosphere. The core components of the odour abatement system will include acid scrubbers, humidifiers and biofilters.

### 7.4.2 *Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

During the construction phase of the proposed development, all contractors will ensure that machinery used on site is properly maintained and is switched off when not in use to avoid unnecessary dust and exhaust emissions from construction traffic.

The proposed MBT Facility will include a building ventilation system and an odour abatement system.

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 maintaining of a negative pressure environment within each building will prevent the emission of untreated air to atmosphere.

Air extracted by the building ventilation system and the process air exhausted by the biological treatment process will be treated in an odour abatement system before being vented to atmosphere. The core components of the odour abatement system will include acid scrubbers, humidifiers and biofilters.

The dry anaerobic digestion will generate biogas which is considered a carbon neutral fuel, thereby resulting in the production of carbon neutral electricity (i.e. where there is no net increase in greenhouse gas emissions). Emissions from the CHP plants' stack will be maintained below emission limit values imposed by the EPA in the form of a waste licence for the proposed MBT Facility. Monitoring of emissions will be in accordance with the



conditions of an EPA waste licence. A standby gas flare will be provided to facilitate the thermal destruction of the biogas in the event of unavailability of the CHP plants and insufficient volume in the biogas storage units.

Further details on potential air emissions and proposed mitigation measures are included in Chapter 8, Air Quality.

## 7.5 CONCLUSION

### **Configuration A (MBT with Composting)**

The proposed MBT Facility will result in a number of environmental benefits including the lowering of greenhouse gas emissions by the diversion of waste from landfill and by the stabilisation of biodegradable municipal waste prior to landfilling. The proposed development will assist Ireland in meeting its commitments under the Landfill Directive (1999/31/EC) and the Kyoto protocol.

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

The proposed MBT Facility will result in a number of environmental benefits including the lowering of greenhouse gas emissions by the diversion of waste from landfill and by the stabilisation of biodegradable municipal waste prior to landfilling.

The proposed development will assist Ireland in meeting its commitments under the Landfill Directive (1999/31/EC), the Kyoto protocol and the EU Directive 2001/77/EC on electricity from renewable sources.



## 8 AIR

### 8.1 AIR QUALITY, ODOUR & BIOAEROSOLS

#### 8.1.1 INTRODUCTION

AWN Consulting Ltd. has been commissioned to carry out an air quality impact assessment including an air dispersion modelling study of air, odour and bioaerosol emissions from the proposed Drehid MBT Facility at the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare based on the design details. The facility is designed to process municipal solid waste with an overall capacity of 250,000 tonnes per annum.

The purpose of this assessment is to determine whether the air, odour and bioaerosol emissions from the facility will lead to ambient concentrations which are in compliance with the relevant ambient air quality standards and guidelines for odour, NO<sub>2</sub> & PM<sub>10</sub>/PM<sub>2.5</sub>. The assessment was conducted using the methodology outlined in “*Air Dispersion Modelling from Industrial Installations Guidance Note (AG4) (EPA, 2010)*”<sup>(1)</sup>.

This assessment describes the outcome of this study. The study consists of the following components:

- Review of emission data and other relevant information needed for the modelling study;
- Summary of background NO<sub>2</sub> & PM<sub>10</sub>/PM<sub>2.5</sub> levels;
- Dispersion modelling of released substances (including odour and bioaerosols) under worst-case emission scenarios;
- Presentation of predicted ground level concentrations of released substances; and
- Evaluation of the significance of these predicted concentrations, including consideration of whether these ground level concentrations are likely to exceed the relevant ambient air quality limit values and guideline values.

Information supporting the conclusions has been detailed in the following sections. The assessment methodology and study inputs are presented below. The dispersion modelling results and assessment summaries are presented in Section 8.4. The model formulation is detailed in Appendix 8.1 and a review of the meteorological data used is detailed in Appendix 8.2.

##### 8.1.1.1 Methodology

Emissions from the proposed facility have been modelled using the AERMOD dispersion model (Version 11353) which has been developed by the U.S. Environmental Protection Agency (USEPA)<sup>(2)</sup> and following guidance issued by the EPA<sup>(1)</sup>. The model is a steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources and has replaced ISCST3<sup>(3)</sup> as the regulatory model by the USEPA for modelling emissions from industrial sources in both flat and rolling terrain<sup>(4-6)</sup>. The model has more

advanced algorithms and gives better agreement with monitoring data in extensive validation studies<sup>(7-11)</sup>. An overview of the AERMOD dispersion model is outlined in Appendix 8.1.

The air dispersion modelling input data consisted of information on the physical environment (including building dimensions and terrain features), design details from all emission points on-site and a full year of appropriate meteorological data. Using this input data the model predicted ambient ground level concentrations beyond the site boundary for each hour of the modelled meteorological year. The model post-processed the data to identify the location and maximum of the worst-case ground level concentration. This worst-case concentration was then added to the background concentration to give the worst-case predicted environmental concentration (PEC). The PEC was then compared with the relevant ambient air quality standard to assess the significance of the releases from the site.

Throughout this study a worst-case approach was taken. This will most likely lead to an over-estimation of the levels that will arise in practice. The worst-case assumptions are outlined below:

- Continuous operation of all emission points assumed for 24 hours per day, 365 days per year;
- The maximum predicted ground level air pollutant concentrations for NO<sub>2</sub> and PM<sub>10</sub> were reported in this study, based on a dense network of receptor grids. These receptors included areas where no residential receptors were present and thus may overestimate the impact at the nearest residential receptors;
- Worst-case background concentrations were used to assess the baseline levels of substances released from the site. The background concentration includes the contribution from existing traffic and additional traffic under scenario 1 (landfill operational and accepting 120,000 tonnes) and scenario 2 (landfill non-operational). The worst-case traffic accessing the site will peak at 164 HGVs and 267 LVs movements per day under Scenario 2 and will contribute an additional 0.5  $\mu\text{g}/\text{m}^3$  to the NO<sub>2</sub> levels and 0.1  $\mu\text{g}/\text{m}^3$  to the PM<sub>10</sub> levels. In order to account for the additional NO<sub>2</sub> and PM<sub>10</sub> levels, the contribution from traffic was added to the background NO<sub>2</sub> and PM<sub>10</sub> levels respectively. This combined background and traffic-derived NO<sub>2</sub> or PM<sub>10</sub> concentration was then used as the baseline level to which the contribution from the process emissions was added in order to obtain the overall predicted environmental concentration (PEC); and
- The effect of building downwash, due to buildings, has been included in the model.

In relation to odour and bioaerosols, the nearest residential receptors to the Drehid MBT Facility site were specifically mapped into the model and the worst-case ambient odour and bioaerosol concentrations at these specific receptors are reported in this chapter (as highlighted in Figure 8.1).

## **Characteristics of Odour**

### ***Odour***

Odours are sensations resulting from the reception of a stimulus by the olfactory sensory system, which consists of two separate subsystems: the olfactory epithelium and the trigeminal nerve. The olfactory epithelium, located in the nose, is capable of detecting and discriminating between many thousands of different odours and can detect some of them in concentrations lower than those detectable by currently available analytical instruments<sup>(12)</sup>. The function of the trigeminal nerve is to trigger a reflex action that produces a painful sensation. It can initiate protective reflexes such as sneezing to interrupt inhalation. The olfactory system is extremely complex and peoples' responses to odours can be variable. This variability is the result of differences in the ability to detect odour; subjective acceptance or rejection of an odour due to past experience; circumstances under which the odour is detected; and the age, health and attitudes of the human receptor.

### ***Odour Intensity and Threshold***

Odour intensity is a measure of the strength of the odour sensation and is related to the odour concentration. The odour threshold refers to the minimum concentration of an odorant that produces an olfactory response or sensation. This threshold is normally determined by an odour panel consisting of a specified number of people, and the numerical result is typically expressed as occurring when 50% of the panel correctly detect the odour. This odour threshold is given a value of one odour unit and is expressed as 1 OU<sub>E</sub>/m<sup>3</sup>. The odour threshold is not a precisely determined value, but depends on the sensitivity of the odour panellists and the method of presenting the odour stimulus to the panellists. An odour detection threshold relates to the minimum odorant concentration required to perceive the existence of the stimulus, whereas an odour recognition threshold relates to the minimum odorant concentration required to recognise the character of the stimulus. Typically, the recognition threshold exceeds the detection threshold by a factor of 2 to 10<sup>(12)</sup>.

### ***Odour Character***

The character of an odour distinguishes it from another odour of equal intensity. Odours are characterised on the basis of odour descriptor terms (e.g. putrid, fishy, fruity etc.). Odour character is evaluated by comparison with other odours, either directly or through the use of descriptor words.

### ***Hedonic Tone***

The hedonic tone of an odour relates to its pleasantness or unpleasantness. When an odour is evaluated in the laboratory for its hedonic tone in the neutral context of an olfactometric presentation, the panellist is exposed to a stimulus of controlled intensity and duration. The degree of pleasantness or unpleasantness is determined by each panellist's experience and emotional associations. The responses among panellists may vary depending on odour character; an odour pleasant to many may be declared highly unpleasant by some.

### ***Adaptation***

Adaptation, or Olfactory Fatigue, is a phenomenon that occurs when people with a normal sense of smell experience a decrease in perceived intensity of an odour if the stimulus is received continually. Adaptation to a specific odorant typically does not interfere with the ability of a person to detect other odours. Another phenomenon known as habituation or occupational anosmia occurs when a worker in an industrial situation experiences a long-term exposure and develops a higher threshold tolerance to the odour.

### ***Odour Abatement Techniques***

Odour abatement options start with process management to limit the production of odour at source. Residual emissions to the atmosphere from industrial processes have traditionally been controlled by end-of-pipe abatement equipment and dispersion of the pollutants using a stack of suitable height. Biofilters are commonly used to treat odours from animal by-product rendering facilities, MBT facilities, composting works, intensive livestock raising and a number of industrial facilities. Bio-filtration works on the principle of passing the waste gases into a space above or below a bed of organic material. As the gas passes through the filter, the odorants are retained on the filter material, mainly by absorption into the aqueous phase. The compounds are subsequently degraded by microorganisms which reside on the organic material and can mutate and adapt to treat a wide variety of organic and inorganic compounds. A number of media can be used in biofilters, the most common of which are soil, peat, compost and bark. The efficiency of soil biofilters can be >99% and that of peat/heather biofilters >95%<sup>(13)</sup>. As well as reducing the odour emissions from a facility, bio-filtration also help to change the hedonic tone of the odour emitted. This can be an important factor in cases where the odour of the untreated waste gases is particularly unpleasant. In relation to the Drehid MBT Facility, It is envisaged that the biofiltration material proposed for the current facility will either consist of woodchip or one of two proprietary products (Monafil and Monashell). Monafil has an odour efficiency of typically between 95 – 98% up to a range of 100,000 OU<sub>E</sub>/m<sup>3</sup> 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<sub>E</sub>/m<sup>3</sup> falling to a range in efficiency of 90 – 95% for odour concentrations between 5,000 - 20,000 OU<sub>E</sub>/m<sup>3</sup>.

### ***Odour Standards & Guidelines***

The exposure of the population to a particular odour consists of two factors; the concentration and the length of time that the population may perceive the odour. By definition, 1 OU<sub>E</sub>/m<sup>3</sup> is the detection threshold of 50% of a qualified panel of observers working in an odour-free laboratory using odour-free air as the zero reference (the selection criteria result in the qualified panel being more sensitive to a particular odorant than the general population). The recognition threshold is generally about five times this concentration (5 OU<sub>E</sub>/m<sup>3</sup>) and the concentration at which the odour may be considered a nuisance is between 5 and 10 OU<sub>E</sub>/m<sup>3</sup> based on hydrogen sulphide (H<sub>2</sub>S)<sup>(14)</sup>. Clarkson and Misslebrook<sup>(15)</sup> proposed that a “faint odour” was an acceptable threshold criteria for the assessment of odour as a nuisance. Historically, it has been generally accepted that odour concentrations of between 5 and 10 ou/m<sup>3</sup> would give rise to a faint odour only, and that only a distinct odour (concentration of >10 OU<sub>E</sub>/m<sup>3</sup>) could give rise to a nuisance<sup>(16)</sup>. However, this criteria has generally been based on waste water treatment plants where the source of the odour is generally hydrogen sulphide. In 1990, a survey of the populations surrounding 200 industrial odour sources in the Netherlands showed that there were no justifiable complaints when 98%ile compliance with an odour exposure standard of a “faint odour” (5-10 OU<sub>E</sub>/m<sup>3</sup>) was achieved<sup>(16)</sup>.



The odour which will be generated within the MBT Facility may consist of untreated municipal waste (from deliveries and mechanical treatment), composting and anaerobic digestion odours (from the biological treatment areas) and biofilter odour (from the biofilters). However, as the waste reception area, Mechanical Treatment Building, Biological Treatment Buildings, SRF Building, Maturation Buildings and Refining Building will all be under negative pressure, with ducted air directed to six biofilters, untreated odours are unlikely to be significant. Biofilter media are solid porous material which react with the odorous material through biological oxidation leading to usually much less odorous compounds. In general, biofilters typically have a distinct residual odour which will not be far below 100-300  $\text{OU}_E/\text{m}^3$ <sup>(17, 18)</sup>. However, this residual odour will in most cases resemble the odour of the soil, which is an earthy odour generally not recognised as annoying, as its character resembles that of odours naturally emitted from soil<sup>(17)</sup>.

DEFRA<sup>(19,20)</sup> in the UK has published detailed guidance on appropriate odour threshold levels based in part on the offensiveness of the odour. As shown in Table 8.1, a MBT Facility is not included in the list although the untreated odour generated could be considered similar, at various stages of the process, to other waste treatment facilities such as landfills or wastewater treatment plants.

DEFRA has also detailed installation-specific exposure criteria based on the “annoyance potential”<sup>(19)</sup> which is defined as “the likelihood that a specific odorous mixture will give reasonable cause for annoyance in an exposed population”. Industrial sources have been ranked into three categories based on their relative offensiveness which are “low”, “medium” and “high” and exposure criteria assigned to each category (as shown in Table 8.2). The relevant exposure criteria vary from 1.5  $\text{OU}_E/\text{m}^3$  for highly odorous sources to 6.0  $\text{OU}_E/\text{m}^3$  for the least offensive odours. The relevant exposure criteria for an MBT Facility with biofilter treatment (with the use of acid scrubbers for certain air streams) is not included, but, given that the biofilter odour is similar to an earthy / soil-like odour and thus of a medium offensiveness, it may be assumed to be 3.0  $\text{OU}_E/\text{m}^3$  which should be expressed as a 98<sup>th</sup> percentile and based on one hour means over a one-year period in the absence of any local factors.

**Table 8-1 Ranking Table For Various Industrial Sources<sup>(19)</sup>**

Environmental Odour Industrial Source	Ranking UK Median	Ranking UK Mean	Ranking Dutch Mean
Bread Factory	1	2.5	1.7
Coffee Roaster	2	3.9	4.6
Chocolate Factory	3	4.6	5.1
Beer Brewery	6	7.7	8.1
Fragrance & Flavour Factory	8	8.5	9.8
Charcoal Production	8	9.2	9.4
Green Fraction composting	9	10.3	14
Fish smoking	9	10.5	9.8
Frozen Chips production	10	11	9.6
Sugar Factory	11	11.3	9.8
Car Paint Shop	12	11.7	9.8
Livestock odours	12	12.6	12.8
Asphalt	13	12.7	11.2
Livestock Feed Factory	15	14.2	13.2
Oil Refinery	14	14.3	13.2
Car Park Bldg	15	14.4	8.3
Wastewater Treatment	17	16.1	12.9
Fat & Grease Processing	18	17.3	15.7
Creamery/milk products	10	17.7	-
Pet Food Manufacture	19	17.7	-
Brickworks (burning rubber)	18	17.8	-
Slaughter House	19	18.3	17.0
Landfill	20	18.5	14.1

**Table 8-2 Indicative Odour Standards Based On Offensiveness Of Odour<sup>(19)</sup>**

Industrial Sectors	Relative Offensiveness of Odour	Indicative Criterion
Rendering Fish Processing Oil Refining Creamery WWTP Fat & Grease Processing	High	1.5 OU <sub>E</sub> /m <sup>3</sup> as a 98 <sup>th</sup> ile of hourly averages at the worst-case sensitive receptor
Intensive Livestock Rearing Food Processing (Fat Frying) Paint-spraying Operations Asphalt Manufacture	Medium	3.0 OU <sub>E</sub> /m <sup>3</sup> as a 98 <sup>th</sup> ile of hourly averages at the worst-case sensitive receptor
Brewery Coffee Roasting Bakery Chocolate Manufacturing Fragrance & Flavouring	Low	6.0 OU <sub>E</sub> /m <sup>3</sup> as a 98 <sup>th</sup> ile of hourly averages at the worst-case sensitive receptor

**Air Quality Standards for NO<sub>2</sub> & PM<sub>10</sub>/PM<sub>2.5</sub>**

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or “Air Quality Standards” are health- or environmental-based levels for which additional factors

may be considered. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Council Directive 2008/50/EC (published 11/06/08) (see Table 8.3). The ambient air quality standards applicable for NO<sub>2</sub> and PM<sub>10</sub>/PM<sub>2.5</sub> are outlined in this Directive.

These standards have been used in the current assessment to determine the potential impact of NO<sub>2</sub> and PM<sub>10</sub>/PM<sub>2.5</sub> emissions from the proposed facility on air quality.

**Table 8-3 EU Ambient Air Quality Standards (Based on Directive 2008/50/EC (SI 180 of 2011))**

Pollutant	Regulation <small>Note 1</small>	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	None	200 µg/m <sup>3</sup> NO <sub>2</sub>
		Annual limit for protection of human health	None	40 µg/m <sup>3</sup> NO <sub>2</sub>
		Annual limit for protection of vegetation	None	30 µg/m <sup>3</sup> NO + NO <sub>2</sub>
Particulate Matter (as PM <sub>10</sub> )	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50%	50 µg/m <sup>3</sup> PM <sub>10</sub>
		Annual limit for protection of human health	20%	40 µg/m <sup>3</sup> PM <sub>10</sub>
PM <sub>2.5</sub> (Stage 1)	2008/50/EC	Annual limit for protection of human health	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m <sup>3</sup> PM <sub>2.5</sub>
PM <sub>2.5</sub> (Stage 2)	-	Annual limit for protection of human health	None	20 µg/m <sup>3</sup> PM <sub>2.5</sub>

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFE) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

### Air Dispersion Modelling Methodology

The United States Environmental Protection Agency (USEPA) approved AERMOD dispersion model has been used to predict the ground level concentrations (GLC) of compounds emitted from the principal emission sources on-site.

The model incorporated the following features:

- Two receptor grids were created at which concentrations would be modelled. Receptors were mapped with sufficient resolution to ensure all localised “hot-spots” were identified without adding unduly to processing time. The receptor grids were based on Cartesian grids with the Drehid MBT Facility site at the centre. An outer grid extended to 10 km from the site with concentrations calculated at 500 m intervals. A smaller grid extended to 4000 km from the site with concentrations calculated at 100 m intervals. Boundary receptor locations were also placed along the boundary of the site, at 50 m intervals, giving a total of 6638 calculation points for the model.

- All on-site buildings and significant process structures were mapped into the computer to create a three dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling.
- Hourly-sequenced meteorological information has been used in the model. The meteorological data over a five year period (Casement Aerodrome, 2006 - 2010) was selected for use in the model (see Figure 8.2).
- AERMOD incorporates a meteorological pre-processor AERMET PRO<sup>(21)</sup>. The AERMET PRO meteorological pre-processor requires the input of surface characteristics, including surface roughness ( $z_0$ ), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and albedo and to a distance of 1km for surface roughness in line with USEPA recommendations<sup>(21)</sup>.
- The source and emission data, including stack dimensions, gas volumes and emission temperatures have been incorporated into the model.
- Terrain has not been mapped into the model as the area is predominantly flat.

### **Process With Odour Potential from Drehid MBT Facility – Configuration A (MBT with Composting)**

#### *Waste Acceptance*

Waste delivery vehicles accessing the mechanical treatment building will reverse to the waste receiving doors and discharge waste down into the waste reception bunker. The doors at the waste reception area will be rapid closing doors, with an opening or closing time of approximately 20 seconds. Additionally, doors for the acceptance of waste will be fitted with air curtains to minimise the escape of odorous emissions when a door is open. Based on 3 air changes per hour, a total air volume of 70,125 m<sup>3</sup>/hr will be extracted from this area to avoid odour build-up and to ensure a satisfactory working environment. This extracted air, following integration with extracted air from other facility buildings, will ultimately be sent to one of the odour abatement systems for treatment prior to discharge to atmosphere.

#### *Mechanical Treatment Building*

The organic fines fraction of the waste stream will contain the majority of the organic items such as food waste and garden waste and thus will be the principal source of odour at the mechanical stage of the process.

Based on 2 air changes per hour, a total air volume of 133,835 m<sup>3</sup>/hr will be extracted from the mechanical treatment building to ensure a satisfactory negative pressure, to avoid odour build-up and to ensure a satisfactory working environment. This extracted air, following integration with extracted air from other facility buildings, will ultimately be sent to one of the odour abatement systems for treatment prior to discharge to atmosphere.

#### *Biological Processing Of Waste*

The organic fines will reside in the composting tunnels for a period of four weeks. Each tunnel will have an aeration fan which will blow a mixture of fresh air and process air through an air plenum and into the PVC pipes embedded in the floor of the composting tunnel. Pressurised air will flow through the composting material to ensure intensive contact between the air and the composting material thus maintaining aerobic conditions.

The process air from the composting tunnels will flow through a humidifier, chemical acid scrubber (in order to control the ammonia level in the emissions) and a biofilter before being vented to atmosphere. The composting tunnels will be maintained under negative pressure throughout the process in order to prevent odorous air from being released inside the buildings.

Negative pressure will also be created in all of the facility buildings to force odorous air to the odour abatement system thereby preventing uncontrolled emissions from the MBT Facility. Based on 3 air changes per hour, a total air volume of 142,007 m<sup>3</sup>/hr will be extracted from the aerobic composting building to ensure a satisfactory negative pressure, to avoid odour build-up and to ensure a satisfactory working environment. This extracted air, following integration with extracted air from other facility buildings, will ultimately be sent to one of the odour abatement systems for treatment prior to discharge to atmosphere.

The material discharged from the composting process will be conveyed to the maturation building for a period of five weeks. The floor of the maturation bays will have aeration pipe work which will be operated as a negative pressure system thereby minimising the generation of odorous compounds within the maturation building. Based on 3 air changes per hour, a total air volume of 144,720 m<sup>3</sup>/hr will be extracted from the maturation building to ensure a satisfactory negative pressure, to avoid odour build-up and to ensure a satisfactory working environment. This extracted air, following integration with extracted air from other facility buildings, will ultimately be sent to one of the odour abatement systems for treatment prior to discharge to atmosphere.

#### **Process With Odour Potential from Bord na Móna Drehid MBT Facility – Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

##### *Waste Acceptance*

Waste acceptance will be as outlined above for Configuration A (MBT with Composting). Based on 3 air changes per hour, a total air volume of 70,125 m<sup>3</sup>/hr will be extracted from this area to ensure a satisfactory negative pressure, to avoid odour build-up and to ensure a satisfactory working environment. This extracted air, following integration with extracted air from other facility buildings, will ultimately be sent to one of the odour abatement systems for treatment prior to discharge to atmosphere.

### *Mechanical Treatment Building*

The mechanical process will be as outlined in Configuration A (MBT with Composting) above with all operations taking place within the mechanical treatment building. Based on 2 air changes per hour, a total air volume of 133,835 m<sup>3</sup>/hr will be extracted from the mechanical treatment building to ensure a satisfactory negative pressure, to avoid odour build-up and to ensure a satisfactory working environment. This extracted air, following integration with extracted air from other facility buildings, will ultimately be sent to one of the odour abatement systems for treatment prior to discharge to atmosphere.

### *Biological Processing Of Waste*

#### Dry Anaerobic Digestion Process

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

The AD process, which occurs in the absence of oxygen, breaks down the organic matter into primarily methane and carbon dioxide. Each dry AD tunnel will consist of a sealed concrete structure equipped with a loading / unloading insulated door provided with a pressurised rubber seal. A slightly positive pressure will be maintained throughout the process in order to prevent air entering the tunnels during the anaerobic phases.

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

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

The residence time in the dry AD tunnels is expected to be four weeks.



### Composting Process

The mixture of digestate and fresh organic fines will reside in the composting tunnels for a period of four weeks. The composting process will be as outlined in Configuration A (MBT with Composting) above.

Negative pressure will also be created in all of the facility buildings to force odorous air to the odour abatement system thereby preventing uncontrolled emissions from the MBT Facility. Based on 3 air changes per hour, a total air volume of 148,044 m<sup>3</sup>/hr will be extracted from the anaerobic digestion building and the aerobic composting building to ensure a satisfactory negative pressure, to avoid odour build-up and to ensure a satisfactory working environment. This extracted air, following integration with extracted air from other facility buildings, will ultimately be sent to one of the odour abatement systems for treatment prior to discharge to atmosphere.

The material discharged from the composting process will be conveyed to the maturation building for a period of four weeks. The floor of the maturation bays will have aeration pipe work which will be operated as a negative pressure system thereby minimising the generation of odorous compounds within the maturation building. Based on 3 air changes per hour, a total air volume of 111,132 m<sup>3</sup>/hr will be extracted from the maturation building to ensure a satisfactory negative pressure, to avoid odour build-up and to ensure a satisfactory working environment. This extracted air, following integration with extracted air from other facility buildings, will ultimately be sent to one of the odour abatement systems for treatment prior to discharge to atmosphere.

### **Literature Review Of Odour Emission Rates From MBT Facilities**

A significant amount of data is available in the literature in relation to odour emission rates from either MBT facilities or from individual processes within an MBT Facility (i.e. mechanical treatment, composting, anaerobic digestion).

In relation to full MBT assessments, one of the most extensive assessments was undertaken by Sironi et al (2006)<sup>(22)</sup>. The assessment was based on the results of odour measurements conducted over the period 2000 – 2005 at 40 waste MBT facilities in Italy treating either non-segregated organic fraction of MSW or segregated organic material and using composting but not anaerobic digestion. The capacity of the plants monitored ranged from 10,000 – 240,000 tonnes with an average capacity of 60,000 tonnes. Around 50 air samples were taken at each plant giving a total of 2,000 individual samples. The measurements were carried out in different seasons and differing weather conditions. The emission rates determined from the facilities were normalised to the tonnage of waste processed and were presented upstream of any abatement systems. Table 8.4 outlines the average odour concentrations, median and % deviation (which gives an indication of the scatter in the data):

**Table 8-4 Average Odour Concentration Values, Median And Percent Deviation<sup>(22)</sup>**

Waste Process	Geometric Mean (OU <sub>E</sub> /m <sup>3</sup> )	Median (OU <sub>E</sub> /m <sup>3</sup> )	% Deviation
Waste Receiving	2,786	3,000	11.8
Aerobic Biological Treatment	10,079	11,000	8.9
Maturation	1,701	3,899	24.1
Overscreen Storage	490	836	29.1
Final Product Storage	414	529	20.5
All Process Steps	7,903	8,234	7.8

The paper used the concentration and throughput to calculate the odour emission factors (OEF) in terms of odour units per tonnage as shown in Table 8-5.

**Table 8-5 Average Odour Emission Factors, Median And Percent Deviation<sup>(22)</sup>**

Waste Process	Geometric Mean OEF (10 <sup>6</sup> OU <sub>E</sub> /tonne)	Median of OEF (10 <sup>6</sup> OU <sub>E</sub> /tonne)	% Deviation
Waste Receiving	12.553	11.051	5.0
Aerobic Biological Treatment	139.948	127.042	6.1
Maturation	39.943	29.946	7.4
Overscreen Storage	2.424	3.196	12.0
Final Product Storage	7.536	9.247	8.3
All Process Steps	100.673	123.460	6.5

The overall OER (odour emission rate) in units of odour units per sec (OU<sub>E</sub>/s) is calculated by the following formula:

$$OER_{TOT} = C (OEF_{rec} + OEF_{bio} + OEF_{mat} + OEF_{fp} + OEF_{os})$$

Where:

C = plant capacity (in this case 250,000 tonnes for Configuration A (MBT with Composting))

rec = waste receiving

bio = aerobic biological treatment

mat = maturation

fp = final product storage

os = overscreen storage

The study found that for a 50,000 tonne facility, a representative odour emission rate would be 3.2E+5 OU<sub>E</sub>/s prior to any abatement. The study compared their results to that of an earlier study (Bidlemaier (1996)) which found an odour emission rate from composting facilities of about 1E+5 OU<sub>E</sub>/s (which was independent of plant size).

Many studies are available on specific composting or anaerobic facilities. Fischer et al (2008)<sup>(23)</sup> and its sister paper Albrecht et al (2008)<sup>(24)</sup> undertook a 3 year study at 9 composting facilities in Germany. The facilities ranged from open pile and open storage, enclosed tunnels and open storage to enclosed tunnels, biofilters and enclosed storage. The inputs in all cases were predominately domestic waste with tonnage ranging from 6,000 – 60,000 tonnes/annum. Although the actual results were not reported in detail, a summary of the results were outlined in Figure 4 of the publication which is reproduced below:

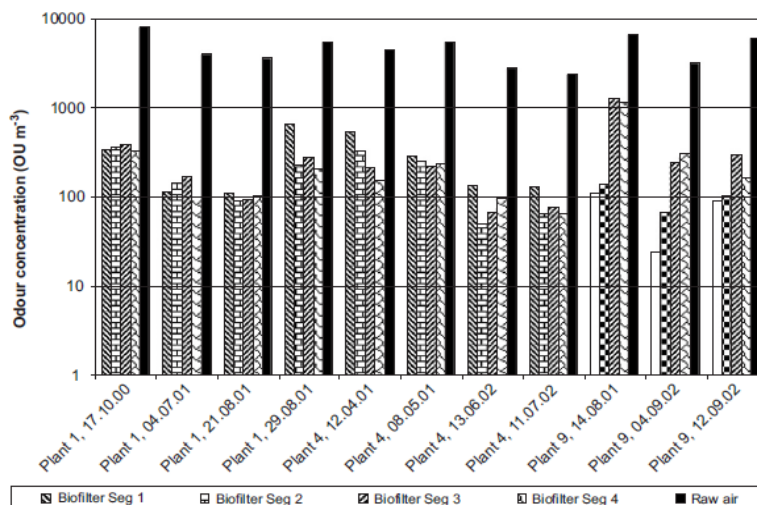


Fig. 4. Odour concentrations in raw and cleaned air in the facilities 1, 4, and 9. The two columns on the left represent data assessed at compost piles and sieving sites of facility 9.

Taken from Fischer et al (2008<sup>(23)</sup>) "Analysis of airborne microorganisms, MVOC and odour in the surroundings of composting facilities and implications for future investigations".

Plant Nos. 1 and 9 are most relevant as they are both enclosed, use biofilters and have enclosed storage with capacities of 40,000 tonnes/annum each. Results indicate that prior to abatement odour concentrations ranged from approximately 5,000 – 9,000  $\text{OU}_E/\text{m}^3$ . The data also presents information on the efficiency of the abatement system with efficiencies of between 90 – 95% routinely achieved<sup>(23,24)</sup>.

A study by Scaglia et al (2011)<sup>(25)</sup> of an MBT Facility in northern Italy focused on the composting process and the change in odour concentration during the 90 days of aerobic composting and maturation. The results of the study are outlined in Table 8.6:

**Table 8-6 Average Odour Concentrations As A Function Of Processing Days**  
(Taken from Scaglia et al)<sup>(25)</sup>

Samples	Processing Days (Days)	Odour Concentration ( $\text{OU}_E/\text{m}^3$ )
S <sub>a</sub>	0	32,944
S <sub>b</sub>	0	24,147
Mean		28,546 ± 6,220
I <sub>a</sub>	28	5,838
I <sub>b</sub>	28	3,966
Mean		4,902 ± 1,324
E <sub>a</sub>	90	3,070
E <sub>b</sub>	90	2,067
Mean		2,569 ± 709

Biasioli et al (2004)<sup>(26)</sup> investigated odours from three composting facilities processing MSW in northern Italy. Results ranged from 24,000  $\text{OU}_E/\text{m}^3$  for just prepared windrow of MSW / dead branches (60:40), starting composting pile (100% MSW) which was 5,700  $\text{OU}_E/\text{m}^3$  and maturing windrow (55 days) which was 1,300  $\text{OU}_E/\text{m}^3$ . A second site measured odour

concentrations at the exit of the biofilter. The study found values over six samples ranging from 780 – 4,200  $\text{OU}_E/\text{m}^3$  with a geometric mean value of 1,759  $\text{OU}_E/\text{m}^3$ .

At the ECN/ORBIT e.V. Odour Management Workshop (2003) Bockreis<sup>(27)</sup> reported on an earlier paper by Pohle et al (1993) which reported three stages in composting odours. Firstly, acid starting phase with an odour concentration in the range 6,000 – 25,000  $\text{OU}_E/\text{m}^3$ , secondly, the thermophile phase with an odour concentration in the range 1,000 – 9,000  $\text{OU}_E/\text{m}^3$  and finally the cooling phase with an odour concentration in the range 150 – 3,000  $\text{OU}_E/\text{m}^3$ .

The data on MBT facilities has tended to focus on aerobic processes (composting) and the data in regards to anaerobic digestion (AD) odour emissions from MBT is more limited. A study by Orzi et al (2010)<sup>(28)</sup> investigated the odour emissions from a large scale AD plant processing 30,000 tonnes of kitchen waste per annum. The AD had a hydraulic retention time (HRT) of 40 days followed by post-digestion where the material remained for around 10 days. The result of the study is shown in Table 8.7.

**Table 8-7 Average Odour Concentrations As A Function Of Processing Days (Taken from Orzi et al (except final row))<sup>(28)</sup>**

Samples	Processing Days (Days)	Odour Emission Rate ( $\text{OU}_E/\text{m}^2\text{h}$ )	Odour Concentration ( $\text{OU}_E/\text{m}^3$ )
ND1	0	119,446	66,890
ND2	0	76,017	42,570
ND3	0	36,243	20,296
Mean ND		77,235 ± 41,614	43,252 ± 23,304
D1	40	5,458	3,056
D2	40	17,550	9,828
D3	40	29,331	16,425
Mean D		17,446 ± 11,936	9,770 ± 6,684
PD1	50	13,314	7,456
PD2	50	40,213	22,519
PD3	50	23,087	12,929
Mean PD		25,538 ± 13,615	14,301 ± 7624
<b>Overall mean</b>		<b>40,079</b>	<b>22,444</b>

(ND = non-digested, D = digested, PD = post-digested)

The results indicate a significant decrease between the non-digested and both digested and post-digested stage. The difference between the digested and post-digested stage is statistically not significant.

Data on the effectiveness of biofilters has been published in many publications. Strecker (2003)<sup>(29)</sup> reviewed the effectiveness of biofilters from composting facilities. From a review of 150 individual measurements undertaken mainly by TÜV, the following conclusions could be drawn:

- Approx. 10% of values > 1,000  $\text{OU}_E/\text{m}^3$
- Approx. 13% of values between 600 – 1,000  $\text{OU}_E/\text{m}^3$
- Approx. 77% of values between 50 - 500  $\text{OU}_E/\text{m}^3$

Data from the UK DEFRA publication “Good Practice and Regulatory Guidance on Composting and Odour Control for Local Authorities” (DEFRA, 2009)<sup>(30)</sup> is available on an operational MBT Facility processing 65,000 tonnes of household waste per year. The odour control system is a woodchip biofilter providing 45 second residence time. Typical odour concentrations leaving the MBT process range from 9,000 – 12,000 OU<sub>E</sub>/m<sup>3</sup>. Compliance testing at the site has confirmed that residual odour concentrations leaving the biofilter range from 133 – 300 OU<sub>E</sub>/m<sup>3</sup> (efficiency of between 97 – 99%).

A report undertaken by SEPA / SNIFFER in 2007 entitled “Measurement and Modelling of Emissions from Three Composting Sites” (SEPA/SNIFFER, 2007)<sup>(31)</sup> measured odour emission concentrations from 3 sites one of which was a MSW in-vessel system. The results from the two measurement surveys were 4,700 and 9,376 OU<sub>E</sub>/m<sup>3</sup> which were the geometric mean of triplicate sampling.

### **Literature Review Of Bioaerosol Emission Rates From MBT Facilities**

Bioaerosols is a general term for micro-organisms (including fungi and bacteria as well as components such as mycotoxins, endotoxins and glucans) suspended in the air<sup>(32)</sup>. They are generally less than 10 µm and can penetrate the human respiratory system, resulting in inflammatory and allergic responses.

The UK Environment Agency has issued a Position Statement (Number 31) on composting and the potential health effects from bioaerosols<sup>(33)</sup>. The Position Statement indicates that a site-specific bioaerosol risk assessment is required if there is a workplace or dwelling within 250m of a composting facility. The Environment Agency has outlined appropriate levels for bioaerosols which should not be exceeded at the sensitive receptors. The appropriate levels are:

- i) bioaerosol levels no greater than:
  - o 1,000 colony forming units (cfu) / m<sup>3</sup> total bacteria,
  - o 300 cfu/m<sup>3</sup> gram-negative bacteria and
  - o 500 cfu/m<sup>3</sup> aspergillus fumigatus.<sup>(33)</sup>

As no formal guidance is available in Ireland, the UK Environment Agency appropriate levels for composting have been adopted for the current assessment.

### **Bioaerosol Emission Rates**

Data on emission rates of bioaerosols tend to vary significantly in the literature. Data from the Environment Agency publication “Guidance on the Evaluation of Bioaerosol Risk Assessments for Composting Facilities” (2009)<sup>(32)</sup> indicates a wide range in bioaerosol (fungi, aspergillus fumigatus, bacteria) concentrations from a range of different sources as outlined in Table 8.8.

**Table 8-8 Bioaerosol Concentrations From A Range Of Different Sources (EA (2009))<sup>(32)</sup>**

Bioaerosol	Source	Quantity	Reference
Fungi (cfu/m <sup>3</sup> )	Indoors (UK homes)	28 - >35,000	<a href="#">Swan et al., 2003</a>
	Grain harvesting	10 <sup>5</sup> -10 <sup>7</sup>	<a href="#">Swan et al., 2003</a>
	Cattle sheds	10 <sup>4</sup> -10 <sup>5</sup>	<a href="#">Swan et al., 2003</a>
	Horse stables	10 <sup>3</sup> -10 <sup>4</sup>	<a href="#">Swan et al., 2003</a>
	Pig houses	10 <sup>4</sup> -10 <sup>5</sup>	<a href="#">Swan et al., 2003</a>
	Poultry houses	10 <sup>3</sup>	<a href="#">Swan et al., 2003</a>
	Textile mills	10 <sup>5</sup>	<a href="#">Swan et al., 2003</a>
	Paper mills	10 <sup>2</sup>	<a href="#">Swan et al., 2003</a>
	Waste collection	10 <sup>4</sup> -10 <sup>5</sup>	<a href="#">Nielsen et al., 1997</a>
	Composting facility	10 <sup>3</sup> - 10 <sup>4</sup>	<a href="#">Wheeler et al., 2001</a>
	Outdoor air	0-690	<a href="#">Millner et al., 1994</a>
	Garden waste collection	10 <sup>4</sup>	<a href="#">Nielsen et al., 1997</a>
Aspergillus fumigatus (cfu/m <sup>3</sup> )	Composting facility	10 <sup>6</sup>	<a href="#">Clark et al., 1983</a>
	Composting turning activity	10 – 16 × 10 <sup>6</sup>	<a href="#">Taha et al., 2005</a>
	50m from composting facility	200-1000	<a href="#">Kothary et al., 1984</a>
	250m from composting facility	50	<a href="#">Kothary et al., 1984</a>
Bacteria (cfu/m <sup>3</sup> )	Grain harvesting	10 <sup>7</sup> -10 <sup>8</sup>	<a href="#">Swan et al., 2003</a>
	Cattle sheds	10 <sup>3</sup> -10 <sup>5</sup>	<a href="#">Swan et al., 2003</a>
	Horse stables	10 <sup>5</sup>	<a href="#">Swan et al., 2003</a>
	Pig houses	10 <sup>4</sup> -10 <sup>6</sup>	<a href="#">Swan et al., 2003</a>
	Poultry houses	10 <sup>5</sup>	<a href="#">Swan et al., 2003</a>
	Textile mills	10 <sup>5</sup>	<a href="#">Swan et al., 2003</a>
	Paper mills	10 <sup>4</sup> -10 <sup>6</sup>	<a href="#">Swan et al., 2003</a>
	Waste collection	10 <sup>3</sup> -10 <sup>4</sup>	<a href="#">Nielsen et al., 1997</a>
	Composting facility	10 <sup>5</sup> - 10 <sup>6</sup>	<a href="#">Wheeler et al., 2001</a>
	200m from composting facility	0-1	<a href="#">Gilbert et al., 2002</a>

Another review by Prasad et al (2004)<sup>(34)</sup> for the Composting Association of Ireland reviewed literature studies on a range of bioaerosols including aspergillus fumigatus and total bacteria. In relation to aspergillus fumigatus, levels ranged mainly from 10<sup>2</sup> to 10<sup>3</sup> cfu/m<sup>3</sup>. Highest concentrations were recorded whenever the compost piles were disturbed. The total bacteria concentrations varied from 10<sup>2</sup> to 10<sup>5</sup> cfu/m<sup>3</sup> with most levels around 10<sup>2</sup> cfu/m<sup>3</sup>. Again, levels increased as disturbance (turning, shredding) increased.

Taha et al (2006)<sup>(35)</sup> reported on earlier studies which found static levels of 10<sup>3</sup> cfu/m<sup>3</sup> of aspergillus fumigatus rising to as much as 10<sup>4</sup> – 10<sup>7</sup> cfu/m<sup>3</sup> of airborne fungi and bacteria during agitation. The study found that the bioaerosol emission rate and dispersal was influenced by a number of factors including (i) the material being composted; (ii) the on-site processes involved; (iii) the associated vehicle movements; (iv) the process equipment used;



(v) individual bioaerosol properties; and (vi) the geographical, topographical and meteorological conditions on- and off-site<sup>(35)</sup>. The study found levels of  $19$  and  $29 \times 10^3$  cfu/m<sup>3</sup> of aspergillus fumigatus from static compost windrows which was similar to reported background levels of aspergillus fumigatus of  $10^3$  cfu/m<sup>3</sup> (Wheeler et al, 2001) and  $42 - 116$  (mean  $79$ )  $\times 10^3$  cfu/m<sup>3</sup> (Swan et al, 2002). In contrast, emission of aspergillus fumigatus during turning operations was a factor of 3-log higher (of the order of  $10^7$  cfu/m<sup>3</sup>).

A follow-up study by Taha et al (2007)<sup>(36)</sup> found levels ranging from  $10^3 - 10^4$  cfu/m<sup>3</sup> of aspergillus fumigatus for static windrows of different ages. The results revealed that the age of the compost had little effect on the bioaerosol concentration from passive windrows. For various agitation activities (turning, shredding) levels ranged generally from  $10^4 - 10^5$  cfu/m<sup>3</sup> of aspergillus fumigatus for windrows of different ages. Results also showed that emissions from turning compost during the early stages may be higher than during the later stages.

A report undertaken by SEPA / SNIFFER in 2007 entitled “Measurement and Modelling of Emissions from Three Composting Sites” (SEPA / SNIFFER, 2007)<sup>(31)</sup> measured bioaerosol emission concentrations from 3 sites one of which was a MSW in-vessel system. The results from the three seasonal measurement surveys ranged from  $1.3 - 17 \times 10^3$  cfu/m<sup>3</sup> from the vessels with much lower levels downwind of the source.

Fischer et al (2008)<sup>(23)</sup> and its sister paper Albrecht et al (2008)<sup>(24)</sup> undertook a 3 year study at 9 composting facilities in Germany. The facilities ranged from open pile and open storage, enclosed tunnels and open storage to enclosed, biofilters and enclosed storage. The input in all cases was predominately domestic waste with tonnage ranging from  $6,000 - 60,000$  tonnes/annum. Although the actual results were not reported in detail, the concentrations ranged from  $10^2$  to  $10^5$  cfu/m<sup>3</sup> with the lowest values found on the biofilters and the highest values during the turning of the compost.

Kummer et al (2008)<sup>(37)</sup> investigated the various control measures for the release of bioaerosols from waste facilities. The study reported that semi-permeable membranes can reduce bioaerosol emissions by between  $83 - >99\%$  compared to open windrow composting. In relation to biofilters, the study reported that although it was difficult to make a general statement on removal efficiencies, data from Schilling (2003) revealed a removal efficiency for aspergillus fumigatus of up to two orders of magnitude ( $99\%$  removal) from a range of waste management facilities.

Sanchez-Monedero et al (2003)<sup>(38)</sup> reported on the effectiveness of bioaerosol control at composting facilities. In relation to aspergillus fumigatus, biofiltration was found to have an average reduction of greater than  $90\%$  (geometric mean of  $97\%$ ). After passing through the biofilter, levels ranged from less than  $10^2$  to  $1.2 \times 10^3$  cfu/m<sup>3</sup> regardless of the inlet concentration which were of the same magnitude as background concentrations. In relation to mesophilic bacteria, levels prior to the biofilter ranged from  $10^3$  to  $2.2 \times 10^5$  cfu/m<sup>3</sup>. Biofiltration was found to have an average reduction of  $73\%$  (as a geometric mean) although the range was broad ( $39\% - 94\%$ ). The study found that a major reason for the difference in efficiency between the aspergillus fumigatus and bacteria was the bioaerosol particle size. As aspergillus fumigatus is larger (maximum of diameter size distribution between  $2.1 - 3.3 \mu\text{m}$  compared to  $1.1 - 2.1 \mu\text{m}$  for bacteria), these larger particles will preferentially impact with the bed medium rather than remaining in the gas flow thus increasing removal efficiency.

It is envisaged that the biofiltration material proposed for the current facility will either consist of woodchip or one of two commercial products (Monafil and Monashell). Monafil is

a manufactured granular high-density peat media with a media life of up to 10 years. The product brochure quotes an odour efficiency of typically between 95 – 98% up to a range of 100,000 OU<sub>E</sub>/m<sup>3</sup>. Monashell is a manufactured shell-based media. The product brochure quotes an odour efficiency of typically between 95 – 98% for the range of 20,000 - 400,000 OU<sub>E</sub>/m<sup>3</sup> falling to a range in efficiency of 90 – 95% for odour concentrations between 5,000 - 20,000 OU<sub>E</sub>/m<sup>3</sup>.

### 8.1.2 EXISTING ENVIRONMENT

#### **Meteorological Data**

The selection of the appropriate meteorological data has followed the guidance issued by the USEPA<sup>(4)</sup> and EPA<sup>(1)</sup>. A primary requirement is that the data used should have a data capture of greater than 90% for all parameters. Casement Aerodrome meteorological station, which is located approximately 30 km east of the site, collects data in the correct format and has a data collection of greater than 90%.

Long-term hourly observations at Casement Aerodrome meteorological station provide an indication of the prevailing wind conditions for the region (see Figure 8.2 for the wind profiles for 2006 - 2010). Results indicate that the prevailing wind direction is from south to westerly in direction. The mean wind speed is approximately 5.6 m/s over the period 1968-1996.

#### **Baseline Air Quality**

A baseline monitoring study was carried out close to the Drehid MBT Facility as shown in Figure 8.1. The results of the survey allow an indicative comparison with the annual limit values for NO<sub>2</sub>. The results also provide information on the influence of road sources relative to the prevailing background level of these pollutants in the area. The monitoring methodology and results are described below.

#### Nitrogen Dioxide (NO<sub>2</sub>)

NO<sub>2</sub> was monitored, using nitrogen dioxide passive diffusion tubes, over a one month period at four locations. The monitoring locations were sited close to the Drehid MBT Facility (see Table 8.9 and Figure 8.1). Passive sampling of NO<sub>2</sub> involves the molecular diffusion of NO<sub>2</sub> molecules through a polycarbonate tube and their subsequent adsorption onto a stainless steel gauze coated with triethanolamine. Following sampling, the tubes were analysed using Gas Chromatography, at a UKAS accredited laboratory (ESG Laboratories, Oxfordshire).

The locations were chosen in order to assess roadside and background levels of NO<sub>2</sub>. The results allow an indicative comparison with the annual average limit value and an assessment of the spatial variation of NO<sub>2</sub> away from existing road sources. The spatial variation is particularly important for NO<sub>2</sub>, as a complex relationship exists between NO, NO<sub>2</sub> and O<sub>3</sub> leading to a non-linear variation of NO<sub>2</sub> concentrations with distance.

Studies in the UK have shown that diffusion tube monitoring results generally have a positive or negative bias when compared to continuous analysers. This bias is laboratory specific and is dependent on the specific analysis procedures at each laboratory. A diffusion tube bias of 0.75 was obtained for the ESG Oxfordshire laboratory (which analysed the diffusion tubes)

from the UK Air Quality Review and Assessment website (University of West England, 2007). This bias was applied to the diffusion tube monitoring results.

The passive diffusion tube survey was designed to assess background and roadside levels close to the Drehid MBT Facility (see Table 8.9 and Figure 8.1). The average monitoring results for NO<sub>2</sub> for the monitoring period ranged from 5.5 – 12.9 µg/m<sup>3</sup>.

All NO<sub>2</sub> concentrations measured over the period were below the annual limit value with worst-case levels reaching 32% of the limit value.

**Table 8-9 Results Of NO<sub>2</sub> Diffusion Tube Monitoring Carried Out Near The Proposed Drehid MBT Facility.**

Location	Sampling Period	NO <sub>2</sub> Concentration (µg/m <sup>3</sup> ) <sup>Note 1</sup>
M1 – Timahoe	18/11/11 – 19/12/11	5.5
M2 – Coolearagh East	18/11/11 – 19/12/11	6.6
M3 – Drummond	18/11/11 – 19/12/11	12.9
M4 – Killinagh Upper	18/11/11 – 19/12/11	5.5
<i>Limit Value</i>		40 <sup>Note 2</sup>

<sup>Note 1</sup> Diffusion tube bias factor of 0.75 applied to laboratory results

<sup>Note 2</sup> S.I. 180 of 2011 and EU Council Directive 2008/50/EC (as an annual average)

### Sulphur Dioxide (SO<sub>2</sub>)

Background levels of SO<sub>2</sub> were monitored using sulphur dioxide passive diffusion tubes over a four-week period at two locations in the region of the Drehid MBT Facility (see Table 8.10 and Figure 8.1, Locations M1, M3). The results allow an indicative comparison with the annual average limit value and an assessment of the spatial variation of SO<sub>2</sub> in the region.

**Table 8-10 Results Of SO<sub>2</sub> Diffusion Tube Monitoring Carried Out Near The Proposed Drehid MBT Facility.**

Location	Sampling Period	NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )
M1 – Timahoe	18/11/11 – 19/12/11	4.7
M3 – Drummond	18/11/11 – 19/12/11	6.7
<i>Limit Value</i>		20 <sup>Note 2</sup>

<sup>Note 1</sup> S.I. 180 of 2011 and EU Council Directive 2008/50/EC (as an annual average)

All SO<sub>2</sub> concentrations measured over the period were below the annual limit value with worst-case levels reaching 34% of the limit value.

## Background Concentrations

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities<sup>(39,40)</sup>. The most recent annual report on air quality “Air Quality Monitoring Annual Report 2010” (EPA, 2011)<sup>(39)</sup>, details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes<sup>(39)</sup>. Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 21 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D. In terms of air monitoring, the Bord na Móna landholding is categorised as Zone D<sup>(39)</sup>.

NO<sub>2</sub> monitoring was carried out at two rural Zone D locations in 2010, Glashaboy and Kilkitt<sup>(39)</sup>. The NO<sub>2</sub> annual average in 2010 for both sites was 10 and 3 µg/m<sup>3</sup> respectively. Hence long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m<sup>3</sup>. The annual mean background NO<sub>2</sub> concentration within the Bord na Móna landholding in 2012 was estimated at 10 µg/m<sup>3</sup> as a worst-case and the maximum 1-hour averaging period was assessed using real monitoring data for Kilkitt for 2010 in addition to ozone data from Kilkitt in 2010 and using the methodology outlined in Appendix E of AG4<sup>(1)</sup>.

Long-term PM<sub>10</sub> monitoring was carried out at the rural Zone D location of Kilkitt in 2010. The average concentration measured was 10 µg/m<sup>3</sup>. In addition, the results of a Zone D measurement carried out at Kilkitt in 2009, gave an average level of 9 µg/m<sup>3</sup><sup>(39)</sup>. Data from the Phoenix Park provides a good indication of urban background levels, with an annual average in 2010 of 11 µg/m<sup>3</sup><sup>(39)</sup>. Based on the above information, a conservative estimate of the background PM<sub>10</sub> concentration for within the Bord na Móna landholding of 10 µg/m<sup>3</sup> has been used and the maximum 24-hour averaging period was assessed using real monitoring data for Kilkitt for 2010 and using the methodology outlined in Appendix E of AG4<sup>(1)</sup>.

The results of PM<sub>2.5</sub> monitoring at Station Road in Cork City in 2010<sup>(39)</sup> indicated an average PM<sub>2.5</sub>/PM<sub>10</sub> ratio of 0.68 whilst the ratio in Ennis was 0.59<sup>(12)</sup>. Based on this information, a conservative ratio of 0.70 was used to generate a background PM<sub>2.5</sub> concentration of 7 µg/m<sup>3</sup>.

In relation to the annual averages, the ambient background concentration was added directly to the process concentration. However, in relation to the short-term peak concentration, concentrations due to emissions from elevated sources cannot be combined in the same way. Guidance from the UK DEFRA<sup>(41)</sup> and EPA<sup>(1)</sup> advises that for NO<sub>2</sub> and PM<sub>10</sub> an estimate of the maximum combined pollutant concentration can be obtained as shown below:

**NO<sub>2</sub>** - The 99.8<sup>th</sup>ile of total NO<sub>2</sub> is equal to the minimum of either A or B below:

- a) 99.8<sup>th</sup>ile hourly background total oxidant (O<sub>3</sub> & NO<sub>2</sub>) + 0.05 x (99.8<sup>th</sup>ile process contribution NO<sub>x</sub>)
- b) The maximum of either:
  - 99.8<sup>th</sup>ile process contribution NO<sub>x</sub> + 2 x (annual mean background NO<sub>2</sub>); or

- $99.8^{\text{th}}$ ile hourly background  $\text{NO}_2 + 2 \times$  (annual mean process contribution  $\text{NO}_x$ )

**PM<sub>10</sub>** - The  $90.4^{\text{th}}$ ile of total 24-hour mean PM<sub>10</sub> is equal to the maximum of either A or B below:

- a)  $90.4^{\text{th}}$ ile of 24-hour mean background PM<sub>10</sub> + annual mean process contribution PM<sub>10</sub>
- b)  $90.4^{\text{th}}$ ile 24-hour mean process contribution PM<sub>10</sub> + annual mean background PM<sub>10</sub>

### 8.1.3 POTENTIAL IMPACTS

#### Odour Emission Rates From the Drehid MBT Facility

As the study undertaken by Sironi et al (2006)<sup>(22)</sup> was an extensive and wide-ranging study based on the results of odour measurements conducted at 40 waste MBT facilities giving a total of 2,000 individual samples, the average results from this study should give a good indication of likely emissions from the proposed facility. As per this study, the emission rates determined from the Drehid MBT Facility were normalised to the tonnage of waste processed and were presented upstream of any abatement systems.

#### Configuration A (MBT with Composting)

Table 8.11 outlines the derived odour concentration and odour emission rate from the Drehid MBT Facility based on a tonnage of 250,000 tonnes per annum. The overall OER (odour emission rate) in odour units per sec ( $\text{OU}_E/\text{s}$ ) is calculated using the formula of Sironi et al<sup>(22)</sup>. An odour efficiency of 90% was assumed based on worst-case data from the product literature for Monashell and Monafil and on data from the research literature.

**Table 8-11 Odour Concentrations & Odour Emission Rate (OER) From The Drehid MBT Facility – Configuration A (MBT with Composting) Based on Emission Rates from Sironi et al<sup>(22)</sup>**

Parameter	Formula	Units
OER <sub>TOT</sub> =	$C (OEF_{rec} + OEF_{bio} + OEF_{mat} + OEF_{fp} + OEF_{os})$	OU <sub>E</sub> /Year
OER <sub>TOT</sub> =	$250,000 * (1.26E+7 + 1.40E+8 + 3.99E+7 + 7.54E+6 + 2.42E+6)$	OU <sub>E</sub> /Year
OER <sub>TOT</sub> =	5.06E+13	OU <sub>E</sub> /Year
OER <sub>TOT</sub> =	1.60+6	OU <sub>E</sub> /sec
Biofilter Volume Flow	130.6	m <sup>3</sup> /sec
Odour Concentration (Pre-abatement)	12,289	OU <sub>E</sub> /m <sup>3</sup>
Odour Concentration (Post-abatement) Based On 90% Efficiency	1,229	OU <sub>E</sub> /m <sup>3</sup>

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

Table 8.12 outlines the derived odour concentration and odour emission rate from the Drehid MBT Facility based on a tonnage of 200,000 tonnes per annum. The overall OER (odour emission rate) in odour units per sec (OU<sub>E</sub>/s) is calculated using the formula of Sironi et al (2005)<sup>(22)</sup> with the exception of the anaerobic digestion emission factor which is based on the work of Orzi et al (2010)<sup>(28)</sup>.



**Table 8-12 Odour Concentrations & Odour Emission Rate (OER) From The Drehid MBT Facility – Configuration B (MBT with Dry Anaerobic Digestion and Composting) Based on Emission Rates from Sironi et al<sup>(22)</sup> and Orzi et al<sup>(28)</sup>**

Parameter	Formula	Units
$OER_{COM}^{Note\ 1} =$	$C (OEF_{rec} + OEF_{bio} + OEF_{mat} + OEF_{fp} + OEF_{os})$	OU <sub>E</sub> /Year
$OER_{COM} =$	$200,000 * (1.26E+7 + 1.40E+8 + 3.99E+7 + 7.54E+6 + 2.42E+6)$	OU <sub>E</sub> /Year
$OER_{COM} =$	4.05E+13	OU <sub>E</sub> /Year
$OER_{COM} =$	1.28E+6	OU <sub>E</sub> /sec
Biofilter Volume Flow (Except AD)	100.3	m <sup>3</sup> /sec
Odour Concentration (Pre-abatement) (Excluding AD)	12,800	OU <sub>E</sub> /m <sup>3</sup>
Average AD Concentration <sup>Note 2</sup>	22,444	OU <sub>E</sub> /m <sup>3</sup>
AD Volume Flow	21.1	m <sup>3</sup> /sec
$OER_{AD} =$	4.73E+5	OU <sub>E</sub> /sec
$OER_{AD + COM} =$	1.75E+6	OU <sub>E</sub> /sec
Biofilter Volume Flow (All)	121.4	m <sup>3</sup> /sec
Odour Concentration (Pre-abatement) (Total)	14,470	OU <sub>E</sub> /m <sup>3</sup>
Odour Concentration (Post-abatement) Based On 90% Efficiency	1,447	OU <sub>E</sub> /m <sup>3</sup>

Note 1  $OER_{COM}$  = Odour emission rate based on a tonnage of 200,000 tonnes/annum with approximately 100,000 tonnes composted

Note 2 Average AD concentration based on an average of three stages of AD as outlined in Table 8.7 derived from Orzi et al (2010)<sup>(28)</sup>

### Bacteria Emission Rates From the Drehid MBT Facility

As the study undertaken by Sanchez-Monedero et al (2003)<sup>(38)</sup> was relatively extensive based on the results of bioaerosol measurements conducted at 7 composting facilities, the highest results from this study should give a pessimistic indication of likely emissions from the composting activities associated with the proposed facility. Based on a highest measured level of  $2.2 \times 10^5$  cfu/m<sup>3</sup> for any of the bioaerosols (total bacteria, gram-negative bacteria and aspergillus fumigatus) and using a biofilter efficiency of 73% for both total bacteria and gram-negative bacteria and a biofilter efficiency of 97% for aspergillus fumigatus, the emitted bioaerosol concentrations were 59,400 cfu/m<sup>3</sup> for both total bacteria and gram-negative bacteria and 6,600 cfu/m<sup>3</sup> for aspergillus fumigatus.

Table 8.13 and 8.14 outlines the derived bioaerosol concentration and bioaerosol emission rate from the Drehid MBT Facility based on Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) respectively.

## Process Emissions

The information used in the odour and bioaerosol dispersion model for the proposed biofilters emission points is shown in Table 8.15 - 8.20. Emission data for the model was taken from design information supplied by Bord Na Móna and literature studies. The information used in the air dispersion model for the two proposed CHP emission points (enclosed within one stack) is shown in Table 8.21. Data for these emission points was taken from design information supplied by Bord Na Móna.

**Table 8-13 Bioaerosol Concentrations & Bioaerosol Emission Rate From The Drehid MBT Facility – Configuration A (MBT with Composting) Based on Emission Rates from Sanchez-Monedero et al (2003)<sup>(38)</sup>**

Parameter	Formula	Units
Biofilter Volume Flow	130.6	m <sup>3</sup> /sec
Total Bacteria Concentration (Pre-abatement)	$2.2 \times 10^5$	CFU/m <sup>3</sup>
Total Bacteria (Post-abatement) Based On 73% Efficiency	59,400	CFU/m <sup>3</sup>
Total Bacteria (Post-abatement) Based On 73% Efficiency	$7.8 \times 10^6$	CFU/s
Gram-Negative Bacteria Concentration (Pre-abatement) <sup>Note 1</sup>	$2.2 \times 10^5$	CFU/m <sup>3</sup>
Gram-Negative Bacteria (Post-abatement) Based On 73% Efficiency	59,400	CFU/m <sup>3</sup>
Gram-Negative Bacteria (Post-abatement) Based On 73% Efficiency	$7.8 \times 10^6$	CFU/s
Aspergillus fumigatus Concentration (Pre-abatement)	$2.2 \times 10^5$	CFU/m <sup>3</sup>
Aspergillus fumigatus (Post-abatement) Based On 97% Efficiency	6,600	CFU/m <sup>3</sup>
Aspergillus fumigatus (Post-abatement) Based On 97% Efficiency	$8.6 \times 10^5$	CFU/s

Note 1 In the absence of detailed information, the concentration of gram-negative bacteria is assumed to be equivalent to total bacteria as a worst-case.

**Table 8-14 Bioaerosol Concentrations & Bioaerosol Emission Rate From The Drehid MBT Facility – Configuration B (MBT with Dry Anaerobic Digestion and Composting). Based on Emission Rates from Sanchez-Monedero et al (2003)<sup>(38)</sup>**

Parameter	Formula	Units
Biofilter Volume Flow	121.4	m <sup>3</sup> /sec
Total Bacteria Concentration (Pre-abatement)	$2.2 \times 10^5$	CFU/m <sup>3</sup>
Total Bacteria (Post-abatement) Based On 73% Efficiency	59,400	CFU/m <sup>3</sup>
Total Bacteria (Post-abatement) Based On 73% Efficiency	$7.2 \times 10^6$	CFU/s
Gram-Negative Bacteria Concentration (Pre-abatement) <sup>Note 1</sup>	$2.2 \times 10^5$	CFU/m <sup>3</sup>
Gram-Negative Bacteria (Post-abatement) Based On 73% Efficiency	59,400	CFU/m <sup>3</sup>
Gram-Negative Bacteria (Post-abatement) Based On 73% Efficiency	$7.2 \times 10^6$	CFU/s
Aspergillus fumigatus Concentration (Pre-abatement)	$2.2 \times 10^5$	CFU/m <sup>3</sup>
Aspergillus fumigatus (Post-abatement) Based On 97% Efficiency	6,600	CFU/m <sup>3</sup>
Aspergillus fumigatus (Post-abatement) Based On 97% Efficiency	$8.0 \times 10^5$	CFU/s

Note 1 In the absence of detailed information, the concentration of gram-negative bacteria is assumed to be equivalent to total bacteria as a worst-case.

**Table 8-15 Drehid MBT Facility, County Kildare. Odour Emission Source Details for Configuration A (MBT with Composting)**

Emission Source Reference	Exit Diameter (m)	Temp (K)	Max Volume Flow (Nm <sup>3</sup> /hr)	Exit Velocity (m/sec actual, wet)	Odour	
					Concentration (OU <sub>E</sub> /m <sup>3</sup> )	Mass Emission (OU <sub>E</sub> /s)
Biofilter 1A	1.5	289	93567	15.3	1229	31943
Biofilter 1A	1.5	289	93567	15.3	1229	31943
Biofilter 2A	0.90	289	47762	21.6	1229	16305
Biofilter 2B	0.90	289	47762	21.6	1229	16305
Biofilter 3A	1.4	289	93766	17.5	1229	32010
Biofilter 3B	1.4	289	93766	17.5	1229	32010

**Table 8-16 Drehid MBT Facility, County Kildare. Odour Emission Source Details for Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

Emission Source Reference	Exit Diameter (m)	Temp (K)	Max Volume Flow (Nm <sup>3</sup> /hr)	Exit Velocity (m/sec actual, wet)	Odour	
					Concentration (OU <sub>E</sub> /m <sup>3</sup> )	Mass Emission (OU <sub>E</sub> /s)
Biofilter 1A	1.5	289	100585	16.4	1447	40430
Biofilter 1A	1.5	289	100585	16.4	1447	40430
Biofilter 2A	0.90	289	32425	14.7	1447	13033
Biofilter 2B	0.90	289	32425	14.7	1447	13033
Biofilter 3A	1.4	289	85447	16.0	1447	34345
Biofilter 3B	1.4	289	85447	16.0	1447	34345

**Table 8-17 Drehid MBT Facility, County Kildare. Total & Gram-Negative Bacteria Emission Source Details for Configuration A (MBT with Composting)**

Emission Source Reference	Exit Diameter (m)	Temp (K)	Max Volume Flow (Nm <sup>3</sup> /hr)	Exit Velocity (m/sec actual, wet)	Total Bacteria <sup>Note 1</sup>	
					Concentration (cfu/m <sup>3</sup> )	Mass Emission (cfu/s)
Biofilter 1A	1.5	289	93,567	15.3	59,400	1,543,850
Biofilter 1A	1.5	289	93,567	15.3	59,400	1,543,850
Biofilter 2A	0.90	289	47,762	21.6	59,400	788,070
Biofilter 2B	0.90	289	47,762	21.6	59,400	788,070
Biofilter 3A	1.4	289	93,766	17.5	59,400	1,547,130
Biofilter 3B	1.4	289	93,766	17.5	59,400	1,547,130

Note 1 Gram-negative bacteria concentration and emission rate is assumed equivalent to total bacteria as a worst-case

**Table 8-18 Drehid MBT Facility, County Kildare. Total & Gram-Negative Bacteria Emission Source Details for Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

Emission Source Reference	Exit Diameter (m)	Temp (K)	Max Volume Flow (Nm <sup>3</sup> /hr)	Exit Velocity (m/sec actual, wet)	Total Bacteria <sup>Note 1</sup>	
					Concentration (cfu/m <sup>3</sup> )	Mass Emission (cfu/s)
Biofilter 1A	1.5	289	100,585	16.4	59,400	1,659,650
Biofilter 1A	1.5	289	100,585	16.4	59,400	1,659,650
Biofilter 2A	0.90	289	32,425	14.7	59,400	535,010
Biofilter 2B	0.90	289	32,425	14.7	59,400	535,010
Biofilter 3A	1.4	289	85,447	16.0	59,400	1,409,880
Biofilter 3B	1.4	289	85,447	16.0	59,400	1,409,880

Note 1 Gram-negative bacteria concentration and emission rate is assumed equivalent to total bacteria as a worst-case

**Table 8-19 Drehid MBT Facility, County Kildare. Aspergillus Fumigatus Emission Source Details for Configuration A (MBT with Composting)**

Emission Source Reference	Exit Diameter (m)	Temp (K)	Max Volume Flow (Nm <sup>3</sup> /hr)	Exit Velocity (m/sec actual, wet)	Aspergillus Fumigatus	
					Concentration (cfu/m <sup>3</sup> )	Mass Emission (cfu/s)
Biofilter 1A	1.5	289	93,567	15.3	6,600	171,540
Biofilter 1A	1.5	289	93,567	15.3	6,600	171,540
Biofilter 2A	0.90	289	47,762	21.6	6,600	87,560
Biofilter 2B	0.90	289	47,762	21.6	6,600	87,560
Biofilter 3A	1.4	289	93,766	17.5	6,600	171,900
Biofilter 3B	1.4	289	93,766	17.5	6,600	171,900

**Table 8-20 Drehid MBT Facility, County Kildare. Aspergillus Fumigatus Emission Source Details for Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

Emission Source Reference	Exit Diameter (m)	Temp (K)	Max Volume Flow (Nm <sup>3</sup> /hr)	Exit Velocity (m/sec actual, wet)	Aspergillus Fumigatus	
					Concentration (cfu/m <sup>3</sup> )	Mass Emission (cfu/s)
Biofilter 1A	1.5	289	100,585	16.4	6,600	184,410
Biofilter 1A	1.5	289	100,585	16.4	6,600	184,410
Biofilter 2A	0.90	289	32,425	14.7	6,600	59,450
Biofilter 2B	0.90	289	32,425	14.7	6,600	59,450
Biofilter 3A	1.4	289	85,447	16.0	6,600	156,650
Biofilter 3B	1.4	289	85,447	16.0	6,600	156,650



**Table 8-21 Drehid MBT Facility, County Kildare. NO<sub>2</sub> and PM<sub>10</sub> Emissions From The Proposed CHP Emission Points**

Emission Source Reference	Exit Diameter (m)	Temp (K)	Max Volume Flow (Nm <sup>3</sup> /hr)	Exit Velocity (m/sec actual, wet)	NO <sub>2</sub>		PM <sub>10</sub>	
					Concentration (mg/Nm <sup>3</sup> )	Mass Emission (g/s)	Concentration (mg/Nm <sup>3</sup> )	Mass Emission (g/s)
CHP1	0.5	700	3113	12.7	500	0.43	50	0.04
CHP2	0.5	700	3113	12.7	500	0.43	50	0.04

## Air Dispersion Modelling Results – Configuration A (MBT with Composting)

### Predicted Odour Concentrations – Configuration A (MBT with Composting)

The predicted odour concentration is the maximum concentration predicted at the nearest residential receptor. Odour emissions will occur from six biofilters on-site (see Table 8.15). Emissions from these sources were modelled using design volume flows for the emission sources (as outlined in Table 8.15) and using derived odour concentrations (see Table 8.11). Details of the 98<sup>th</sup>ile of 1-hour mean odour concentrations at the nearest residential receptor are given in Table 8.22 over a five-year period.

**Table 8-22 Dispersion Model Results – Predicted Odour Concentration At Worst-case Residential Receptor – Configuration A (MBT with Composting)**

Model Scenario / Meteorological Year	Averaging Period	Predicted Odour Conc. (OUE/m <sup>3</sup> )	Guideline (OUE/m <sup>3</sup> )
		98th %ile	98th %ile
Odour / 2006	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.62	3.0
Odour / 2007	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.68	
Odour / 2008	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.58	
Odour / 2009	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.66	
Odour / 2010	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.63	

The dispersion modelling results presented in Tables 8.22 and Figure 8.3 show that under Configuration A (MBT with Composting), the 98<sup>th</sup>ile of mean hourly odour concentrations ranges from 0.58 – 0.68 OUE/m<sup>3</sup> at the worst-case residential receptor. The worst-case odour concentration of 0.68 OUE/m<sup>3</sup> is 23% of the relevant odour criterion.

### Predicted Bioaerosol Concentrations – Configuration A (MBT with Composting)

The predicted bioaerosol concentration is the maximum concentration predicted at the nearest residential receptor. Bioaerosol emissions will occur from six biofilters on-site (see Table 8.17). Emissions from these sources were modelled using design volume flows for the emission sources (as outlined in Table 8.17) and using derived bioaerosol concentrations (see Table 8.13). Details of the maximum 1-hour mean bioaerosol concentrations at the nearest residential receptor are given in Table 8.23 over a five-year period.

**Table 8-23 Dispersion Model Results – Predicted Bioaerosol Concentrations At Worst-case Receptor – Configuration A (MBT with Composting)**

Model Scenario / Meteorological Year	Averaging Period	Predicted Bioaerosol Conc. (cfu/m <sup>3</sup> )	Guideline (cfu/m <sup>3</sup> )
		Max 1-Hr	Max 1-Hr
Total Bacteria / 2006	Maximum 1-Hour	187	1000
Total Bacteria / 2007	Maximum 1-Hour	194	
Total Bacteria / 2008	Maximum 1-Hour	194	
Total Bacteria / 2009	Maximum 1-Hour	155	
Total Bacteria / 2010	Maximum 1-Hour	193	
Gram-neg Bacteria / 2006	Maximum 1-Hour	187	300
Gram-neg Bacteria / 2007	Maximum 1-Hour	194	
Gram-neg Bacteria / 2008	Maximum 1-Hour	194	
Gram-neg Bacteria / 2009	Maximum 1-Hour	155	
Gram-neg Bacteria / 2010	Maximum 1-Hour	193	
A. Fumigatus / 2006	Maximum 1-Hour	20.8	500
A. Fumigatus / 2007	Maximum 1-Hour	21.6	
A. Fumigatus / 2008	Maximum 1-Hour	21.5	
A. Fumigatus / 2009	Maximum 1-Hour	17.3	
A. Fumigatus / 2010	Maximum 1-Hour	21.5	

The dispersion modelling results presented in Tables 8.23 and Figure 8.4 show that under Configuration A (MBT with Composting), the maximum 1-hour total bacteria concentration ranged from 155 – 194 cfu/m<sup>3</sup> at the worst-case residential receptor. The worst-case total bacteria concentration of 194 cfu/m<sup>3</sup> is 19% of the relevant total bacteria criterion.

The dispersion modelling results presented in Tables 8.23 show that under Configuration A (MBT with Composting), the maximum 1-hour gram-negative bacteria concentration ranged from 155 – 194 cfu/m<sup>3</sup> at the worst-case residential receptor. The worst-case gram-negative bacteria concentration of 194 cfu/m<sup>3</sup> is 65% of the relevant gram-negative bacteria criterion.

The dispersion modelling results presented in Tables 8.23 and Figure 8.5 show that under Configuration A (MBT with Composting), the maximum 1-hour aspergillus fumigatus concentration ranged from 17.3 – 21.6 cfu/m<sup>3</sup> at the worst-case residential receptor. The worst-case gram-negative bacteria concentration of 21.6 cfu/m<sup>3</sup> is 4% of the relevant aspergillus fumigatus bacteria criterion.

## Air Dispersion Modelling Results – Configuration B (MBT with Dry Anaerobic Digestion and Composting)

### Predicted Odour Concentrations – Configuration B (MBT with Dry Anaerobic Digestion and Composting)

The predicted odour concentration is the maximum concentration predicted at the nearest residential receptor. Odour emissions will occur from six biofilters on-site (see Table 8.16). Emissions from these sources were modelled using design volume flows for the emission sources (as outlined in Table 8.16) and using derived odour concentrations (see Table 8.12). Details of the 98<sup>th</sup>ile of 1-hour mean odour concentrations at the nearest residential receptor are given in Table 8.24 over a five-year period.

**Table 8-24 Dispersion model results – Predicted Odour Concentration At Worst-case Receptor – Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

Model Scenario / Meteorological Year	Averaging Period	Predicted Odour Conc. (OUE/m3)	Guideline (OUE/m3)
		98th %ile	98th %ile
Odour / 2006	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.68	3.0
Odour / 2007	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.76	
Odour / 2008	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.64	
Odour / 2009	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.72	
Odour / 2010	Maximum 1-Hour (as a 98 <sup>th</sup> ile)	0.82	

The dispersion modelling results presented in Tables 8.24 and Figure 8.6 show that under Configuration B (MBT with Dry Anaerobic Digestion and Composting), the 98<sup>th</sup>ile of mean hourly odour concentrations ranges from 0.64 – 0.82 OUE/m<sup>3</sup> at the worst-case residential receptor. The worst-case odour concentration of 0.82 OUE/m<sup>3</sup> is 27% of the relevant odour criterion.

### Predicted Bioaerosol Concentrations – Configuration B (MBT with Dry Anaerobic Digestion and Composting)

The predicted bioaerosol concentration is the maximum concentration predicted at the nearest residential receptor. Bioaerosol emissions will occur from six biofilters on-site (see Table 8.18). Emissions from these sources were modelled using design volume flows for the emission sources (as outlined in Table 8.18) and using derived bioaerosol concentrations (see Table 8.14). Details of the maximum 1-hour mean bioaerosol concentrations at the nearest residential receptor are given in Table 8.25 over a five-year period.

**Table 8-25 Dispersion model results – Predicted Bioaerosol Concentrations At Worst-case Receptor – Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

Model Scenario / Meteorological Year	Averaging Period	Predicted Bioaerosol Conc. (cfu/m <sup>3</sup> )	Guideline (cfu/m <sup>3</sup> )
		Max 1-Hr	Max 1-Hr
Total Bacteria / 2006	Maximum 1-Hour	175	1000
Total Bacteria / 2007	Maximum 1-Hour	181	
Total Bacteria / 2008	Maximum 1-Hour	181	
Total Bacteria / 2009	Maximum 1-Hour	144	
Total Bacteria / 2010	Maximum 1-Hour	181	
Gram-neg Bacteria / 2006	Maximum 1-Hour	175	300
Gram-neg Bacteria / 2007	Maximum 1-Hour	181	
Gram-neg Bacteria / 2008	Maximum 1-Hour	181	
Gram-neg Bacteria / 2009	Maximum 1-Hour	144	
Gram-neg Bacteria / 2010	Maximum 1-Hour	181	
A. Fumigatus / 2006	Maximum 1-Hour	19.5	500
A. Fumigatus / 2007	Maximum 1-Hour	20.1	
A. Fumigatus / 2008	Maximum 1-Hour	20.1	
A. Fumigatus / 2009	Maximum 1-Hour	16.0	
A. Fumigatus / 2010	Maximum 1-Hour	20.2	

The dispersion modelling results presented in Tables 8.25 and Figure 8.7 show that under Configuration B (MBT with Dry Anaerobic Digestion and Composting), the maximum 1-hour total bacteria concentration ranged from 144 – 181 cfu/m<sup>3</sup> at the worst-case residential receptor. The worst-case total bacteria concentration of 181 cfu/m<sup>3</sup> is 18% of the relevant total bacteria criterion.

The dispersion modelling results presented in Tables 8.25 show that under Configuration B (MBT with Dry Anaerobic Digestion and Composting), the maximum 1-hour gram-negative bacteria concentration ranged from 144 – 181 cfu/m<sup>3</sup> at the worst-case residential receptor. The worst-case gram-negative bacteria concentration of 181 cfu/m<sup>3</sup> is 60% of the relevant gram-negative bacteria criterion.

The dispersion modelling results presented in Tables 8.25 and Figure 8.8 show that under Configuration B (MBT with Dry Anaerobic Digestion and Composting), the maximum 1-hour aspergillus fumigatus concentration ranged from 16.0 – 20.2 cfu/m<sup>3</sup> at the worst-case residential receptor. The worst-case gram-negative bacteria concentration of 20.2 cfu/m<sup>3</sup> is 4% of the relevant gram-negative bacteria criterion.

## Air Dispersion Modelling Results – CHP Emissions

### NO<sub>2</sub> Emissions

The NO<sub>2</sub> modelling results from the two CHP emission points, based on the emission information outlined in Table 8.21, are detailed in Table 8.26 and Figure 8.9 and 8.10. The results indicate that the ambient ground level concentrations are below the relevant air quality standards for NO<sub>2</sub>. For the worst-case scenario, emissions from the two proposed CHP emission points lead to an ambient NO<sub>2</sub> concentration (including background) which is 39% of the maximum ambient 1-hour limit value (measured as a 99.8<sup>th</sup>%ile) and 34% of the annual limit value at the worst-case receptor.

**Table 8-26 Dispersion Model Results From The CHPs – NO<sub>2</sub> Ambient Concentrations**

Pollutant / Scenario	Annual Mean Background (µg/m <sup>3</sup> )	Averaging Period	Process Contribution (µg/m <sup>3</sup> )	Predicted Immission Concentration (µg/Nm <sup>3</sup> )	Standard (µg/Nm <sup>3</sup> ) <sup>Note 1</sup>
NO <sub>2</sub> / 2006	-( <sup>2</sup> )	99.8 <sup>th</sup> %ile of 1-hr means	67.6	75.0	200
	10	Annual Mean	3.0	13.0	40
NO <sub>2</sub> / 2007	-( <sup>2</sup> )	99.8 <sup>th</sup> %ile of 1-hr means	70.5	77.9	200
	10	Annual Mean	3.2	13.2	40
NO <sub>2</sub> / 2008	-( <sup>2</sup> )	99.8 <sup>th</sup> %ile of 1-hr means	64.0	71.4	200
	10	Annual Mean	3.2	13.2	40
NO <sub>2</sub> / 2009	-( <sup>2</sup> )	99.8 <sup>th</sup> %ile of 1-hr means	66.7	74.1	200
	10	Annual Mean	3.6	13.6	40
NO <sub>2</sub> / 2010	-( <sup>2</sup> )	99.8 <sup>th</sup> %ile of 1-hr means	68.0	75.4	200
	10	Annual Mean	3.0	13.0	40

Note 1

EU Directive 2008/50/EC

Note 2

Short-term Immission Concentrations calculated according to UK DEFRA guidance & process contributions given as NO<sub>x</sub><sup>(1)</sup> (Immission in this context is the ambient concentration at ground level).

### PM<sub>10</sub>/PM<sub>2.5</sub> Emissions

The “do something” PM<sub>10</sub> modelling results, based on the emission information outlined in Table 8.21, are detailed in Table 8.27 and Figure 8.11. The results indicate that the ambient ground level concentrations are below the relevant air quality standards for all scenarios for PM<sub>10</sub>. For the worst-case scenario, emissions from the site lead to an ambient PM<sub>10</sub> concentration (including background) which is 64% of the maximum ambient 24-hour limit value (measured as a 90<sup>th</sup>%ile) and 26% of the annual limit value at the worst-case receptor.



In terms of process contributions, emissions from the site lead to an ambient PM<sub>10</sub> concentration (excluding background) which is 2% of the maximum ambient 24-hour limit value (measured as a 90<sup>th</sup>ile) and 1% of the annual limit value at the worst-case receptor.

**Table 8-27 Dispersion Model Results –PM<sub>10</sub>**

Pollutant / Scenario	Annual Mean Background (µg/m <sup>3</sup> )	Averaging Period	Process Contribution (µg/m <sup>3</sup> )	Predicted Immission Concentration (µg/Nm <sup>3</sup> )	Standard (µg/Nm <sup>3</sup> ) <sup>Note 1</sup>
PM <sub>10</sub> / 2006	_ Note 2	90 <sup>th</sup> ile of 24-hr means	1.0	31.8	50
	10	Annual Mean	0.38	10.4	40
PM <sub>10</sub> / 2007	_ Note 2	90 <sup>th</sup> ile of 24-hr means	1.0	31.8	50
	10	Annual Mean	0.39	10.4	40
PM <sub>10</sub> / 2008	_ Note 2	90 <sup>th</sup> ile of 24-hr means	0.96	31.8	50
	10	Annual Mean	0.39	10.4	40
PM <sub>10</sub> / 2009	_ Note 2	90 <sup>th</sup> ile of 24-hr means	1.1	31.8	50
	10	Annual Mean	0.45	10.5	40
PM <sub>10</sub> / 2010	_ Note 2	90 <sup>th</sup> ile of 24-hr means	0.97	31.8	50
	10	Annual Mean	0.37	10.4	40

Note 1 EU Directive 2008/50/EC

Note 2 Short-term Immission Concentrations calculated according to UK DEFRA guidance<sup>(1)</sup>

In relation to PM<sub>2.5</sub> as detailed in Table 8.28, as a worst-case, it is assumed that all dust released from the two CHP emission points is of a particle size of 2.5 microns or less (PM<sub>2.5</sub>). In reality, particles greater than 2.5 microns may also be present and thus the mass of PM<sub>2.5</sub> release from the facility has been overestimated.

For the worst-case scenario, ambient concentrations will be 30% of the annual mean PM<sub>2.5</sub> limit value, which comes into force in 2015. Of this, the process contribution will account for less than 2% of the ambient limit value.

**Table 8-28 Dispersion Model Results – PM<sub>2.5</sub>**

Pollutant / Scenario	Annual Mean Background (µg/m <sup>3</sup> )	Averaging Period	Process Contribution (µg/m <sup>3</sup> )	Predicted Immission Concentration (µg/Nm <sup>3</sup> )	Standard (µg/Nm <sup>3</sup> ) <sup>Note 1</sup>
PM <sub>2.5</sub> / 2006	7	Annual Mean	0.38	7.4	25
PM <sub>2.5</sub> / 2007	7	Annual Mean	0.39	7.4	25
PM <sub>2.5</sub> / 2008	7	Annual Mean	0.39	7.4	25
PM <sub>2.5</sub> / 2009	7	Annual Mean	0.45	7.5	25
PM <sub>2.5</sub> / 2010	7	Annual Mean	0.37	7.4	25

Note 1 EU Directive 2008/50/EC

#### 8.1.4 MITIGATION MEASURES

##### 8.1.4.1 Construction Phase Mitigation

A dust minimisation plan will be formulated for the construction phase of the project as detailed in the Dust Section below.

##### 8.1.4.2 Operational Phase Mitigation

Stack height determination was undertaken to ensure that the appropriate stack height for the proposed biofilters was selected such that the impact on the surrounding environment would not be significant. The stack height selection process established that a stack height of 20m for each new biofilter stack and the CHP stack (consisting of two CHP emission points) was appropriate in ensuring that no adverse impact would occur in the surrounding environment in terms of air quality and odour.

The Drehid MBT Facility site will also operate an odour mitigation / management plan which includes the following:

- Air from the Mechanical Treatment Building and the Refining Building will pass through a dust filter prior to passing through a the odour abatement system;
- The biofilters will be maintained to ensure optimum performance;
- All processes will be internal within buildings under negative pressure so air will not escape buildings;
- Doors at the waste reception area will be rapid closing doors, with an opening or closing time of approximately 20 seconds. Doors for the acceptance of waste will be fitted with air curtains to minimise the escape of odorous emissions or dust when a door is opened;

- All waste delivered to the MBT facility will be in covered/enclosed vehicles. Similarly, all waste residues being removed from the MBT facility will be in covered/enclosed vehicles;
- The first stage of the biological treatment process is the most critical with respect to odour emissions, since easily biodegradable components (e.g. sugars, proteins and fats) are degraded at a high rate, thus causing gaseous by-products. This intensive phase of the biological treatment process will be undertaken in fully enclosed concrete composting/dry AD tunnels located within an enclosed building - thereby providing double containment features;
- The maturation process will be undertaken by means of negative aeration. Negative aeration draws air from within the building through the trapezoidal windrows and into the aeration ductwork. This arrangement will greatly reduce emissions from the trapezoidal windrows within the building, thereby minimising the potential for nuisance odour emissions;
- Air streams with a potential for high ammonia levels will be treated in an acid scrubbers prior to biofiltration;
- An odour management plan will be developed prior to the detailed design and construction of the facility. This plan will include management strategies for the prevention of emissions and a strict preventative maintenance and management program for ensuring that all odour mitigation techniques remain operational at optimal capacity throughout all operational scenarios;
- Critical and key odour abatement system performance parameters will be continually monitored on the SCADA control system. Should any parameter deviate outside of its accepted range, an alarm will be immediately generated. Critical alarms will be texted to selected mobile phones numbers thereby ensuring the communication of critical alarms to responsible individuals on a 24 hour basis;
- Good housekeeping practices (internally and externally) and a closed-door management strategy will be maintained at all times;
- 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;
- Normal operational practices will be such that the organic fines fraction (putrescible fraction with the highest potential for odour) generated in any day by the mechanical treatment process will be loaded into the composting/dry AD tunnels on the same day;
- Treated air from the biofilters will be emitted through 20m high stacks to facilitate appropriate residual odour dispersion;
- The organic fines fraction will be conveyed from the Mechanical Treatment Building to the biological treatment buildings in fully covered and enclosed galleys;
- 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; and

- In the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), a standby gas flare will be provided to facilitate the thermal destruction of the biogas in the event of unavailability of the CHP plants and that there is insufficient volume in the biogas storage bladders.

### 8.1.5 CONCLUSIONS

The odour dispersion modelling results for either Configuration A (MBT with Composting) or Configuration B (MBT with Dry Anaerobic Digestion and Composting) are within the odour guideline criteria and thus will not cause a nuisance at the worst-case residential receptor. The 98<sup>th</sup> percentile of mean hourly odour concentrations ranges from 0.58 – 0.82 OU<sub>E</sub>/m<sup>3</sup> at the worst-case residential receptor under Configuration A (MBT with Composting) or Configuration B (MBT with Dry Anaerobic Digestion and Composting). The worst-case odour concentration of 0.82 OU<sub>E</sub>/m<sup>3</sup> is 27% of the relevant odour criterion.

The bioaerosol dispersion modelling results for either Configuration A (MBT with Composting) or Configuration B (MBT with Dry Anaerobic Digestion and Composting) are within the bioaerosol guideline criteria and thus will not cause a health risk at the nearest residential receptor. The maximum hourly bioaerosol concentrations range from 4 – 65% of the relevant odour criterion.

The NO<sub>2</sub> modelling results from the two CHP emission points (enclosed within the one stack) indicate that the ambient ground level concentrations are below the relevant air quality standards for NO<sub>2</sub>. For the worst-case scenario, emissions from the proposed CHPs lead to an ambient NO<sub>2</sub> concentration (including background) which is 39% of the maximum ambient 1-hour limit value (measured as a 99.8<sup>th</sup> percentile) and 34% of the annual limit value at the worst-case receptor.

The PM<sub>10</sub>/PM<sub>2.5</sub> modelling results indicate that the ambient ground level concentrations are below the relevant air quality standards for all scenarios for PM<sub>10</sub> and PM<sub>2.5</sub>. For the worst-case scenario, emissions from the site lead to an ambient PM<sub>10</sub> concentration (including background) which is 64% of the maximum ambient 24-hour limit value (measured as a 90<sup>th</sup> percentile) and 26% of the annual limit value at the worst-case receptor. In terms of process contributions, emissions from the site lead to an ambient PM<sub>10</sub> concentration (excluding background) which is 2% of the maximum ambient 24-hour limit value (measured as a 90<sup>th</sup> percentile) and 1% of the annual limit value at the worst-case receptor. For the worst-case scenario, emissions from the site lead to an ambient PM<sub>2.5</sub> concentration (including background) which is 30% of the annual limit value at the worst-case receptor with process contributions accounting for less than 2% of the annual limit value at the worst-case receptor.

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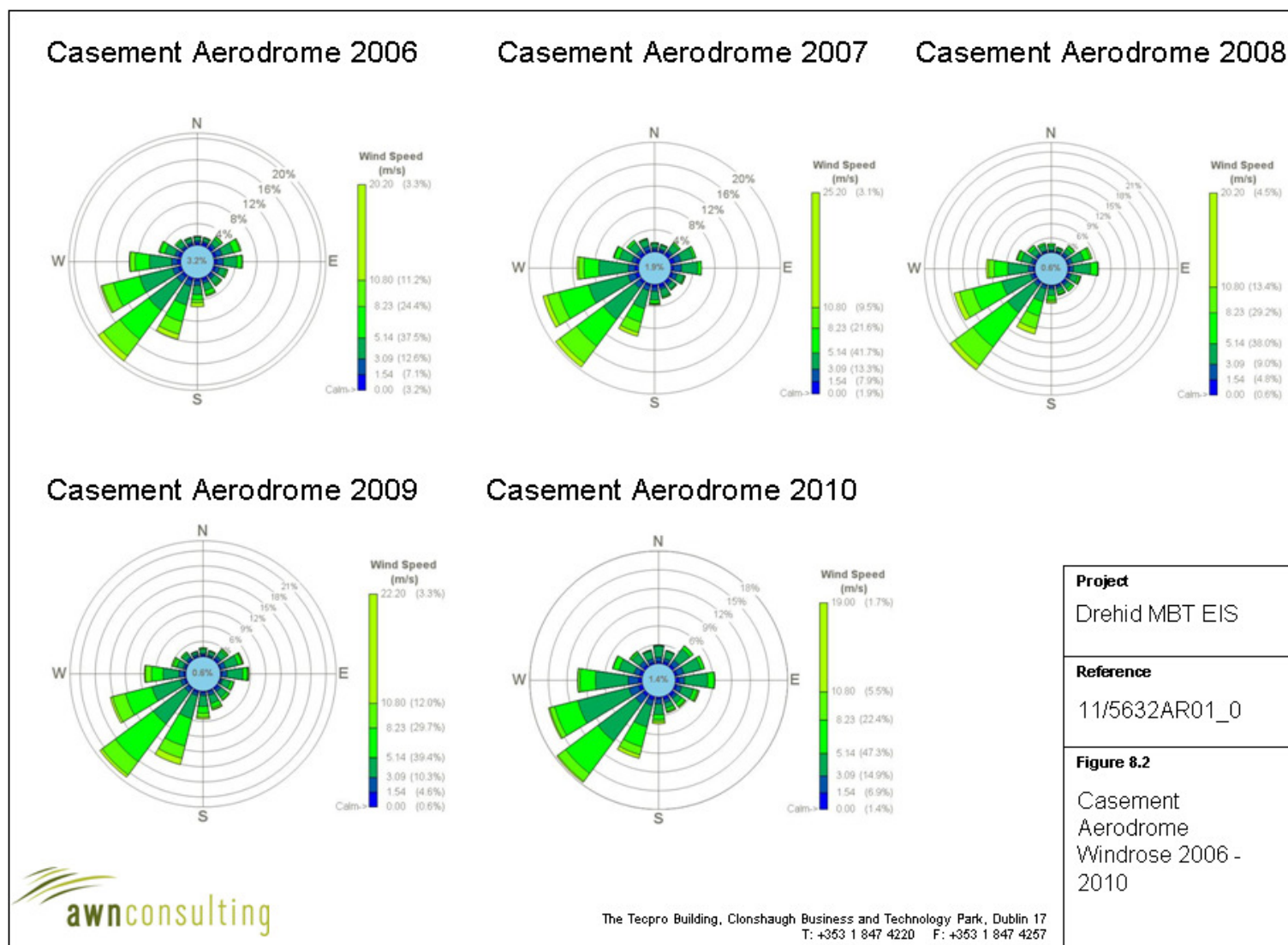


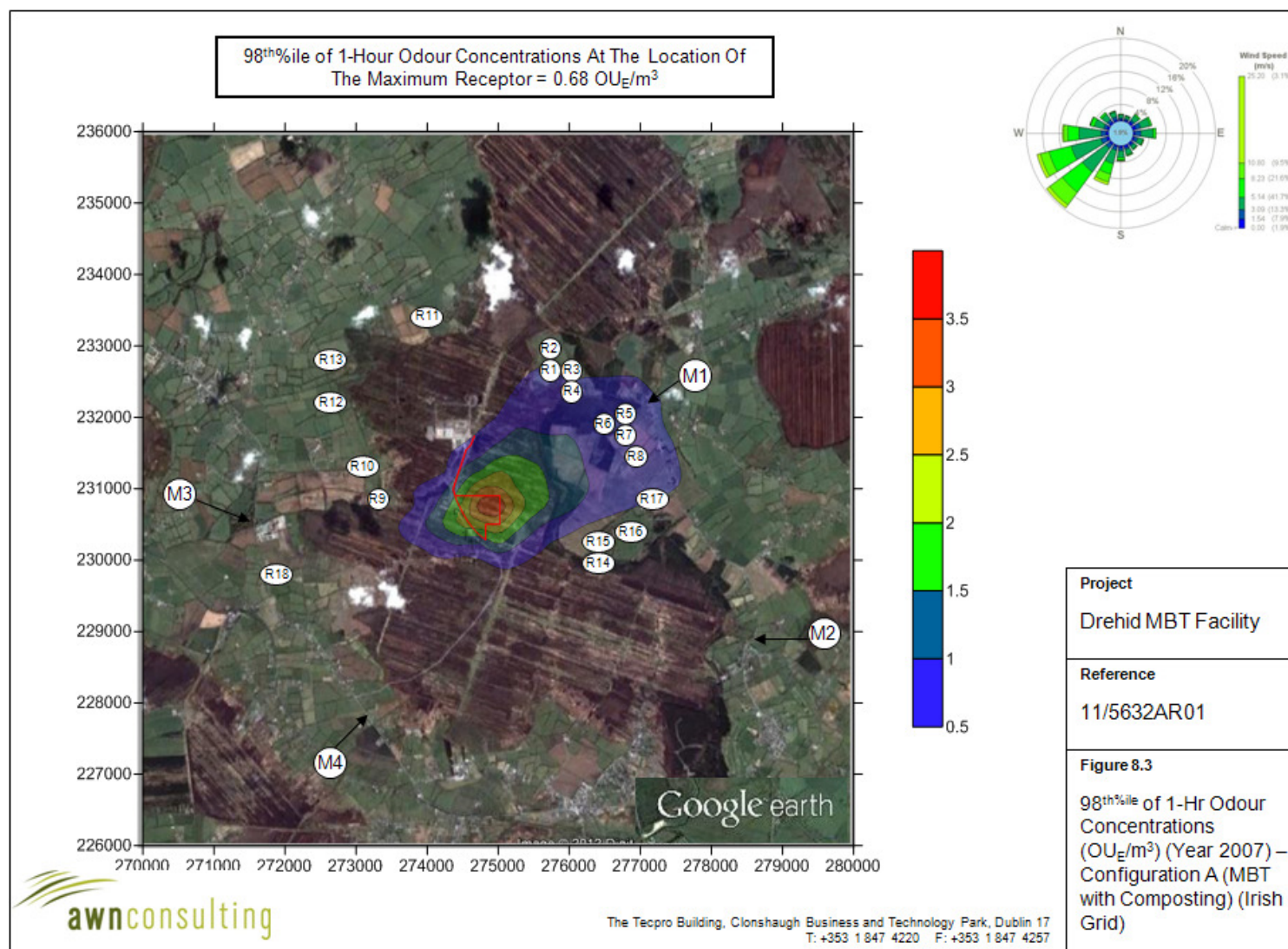
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Drehid MBT Facility
Reference
11/5632AR01
Figure 8.1
Monitoring (M) & Modelled (R) Receptor Locations

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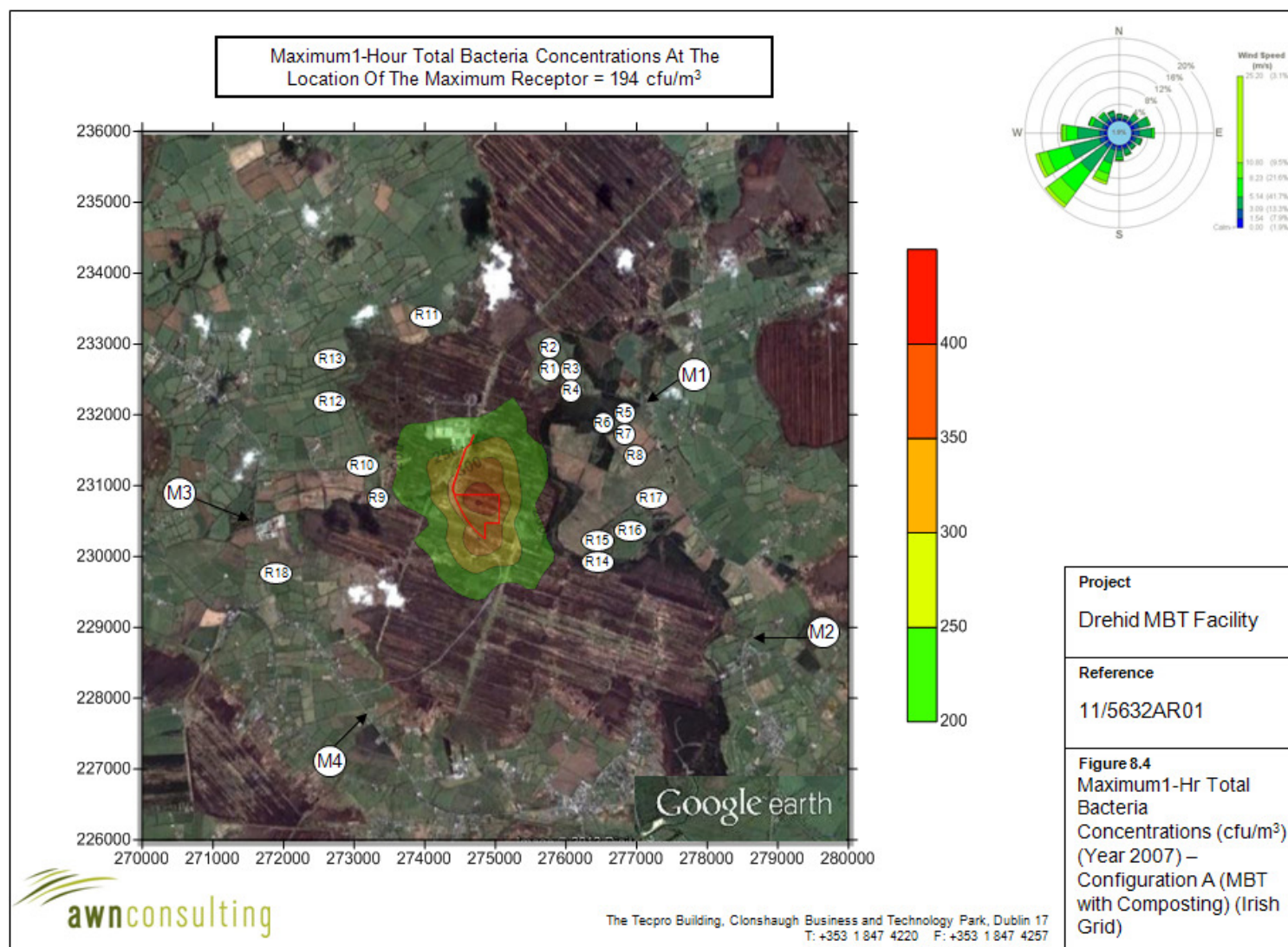
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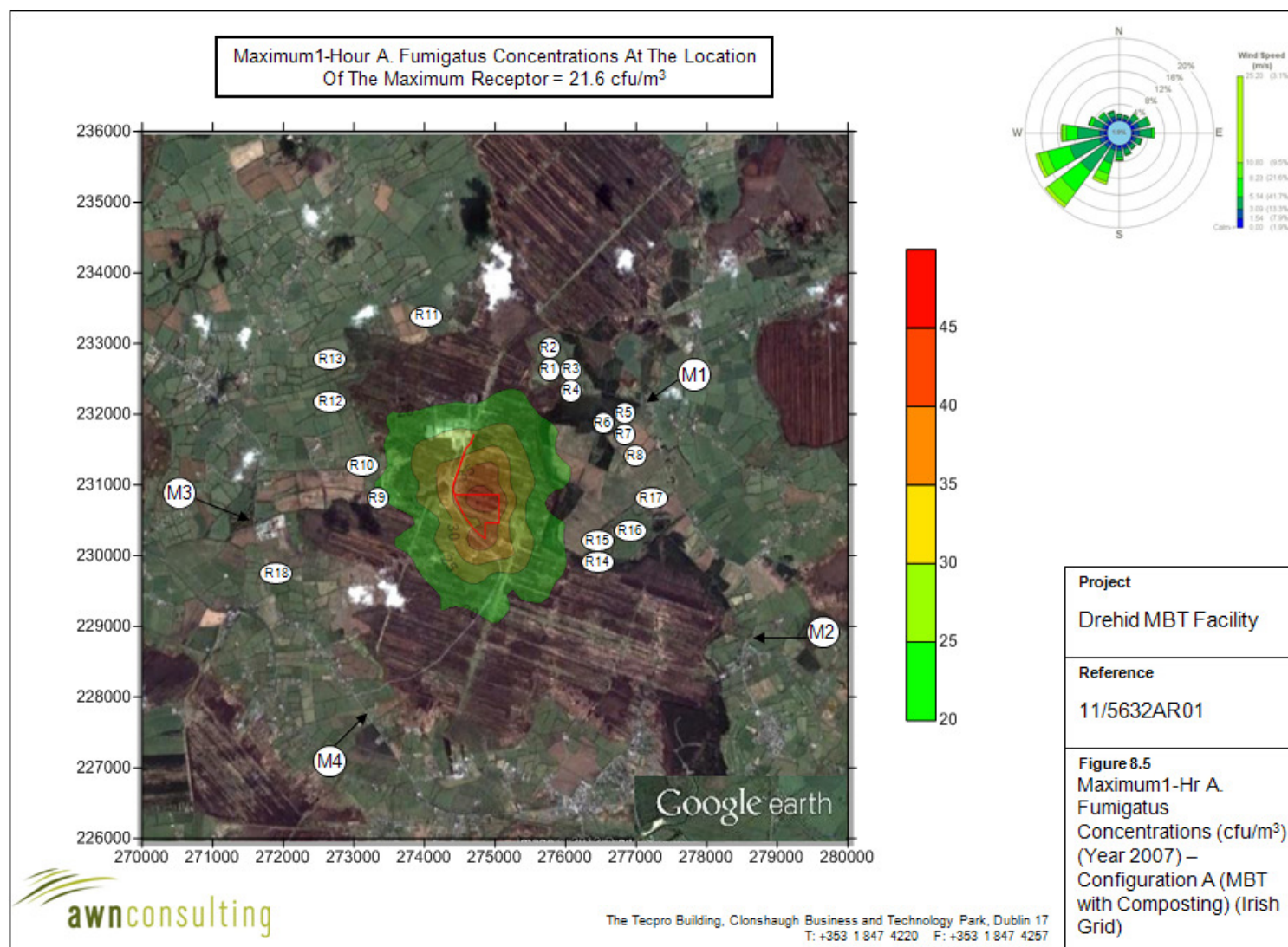
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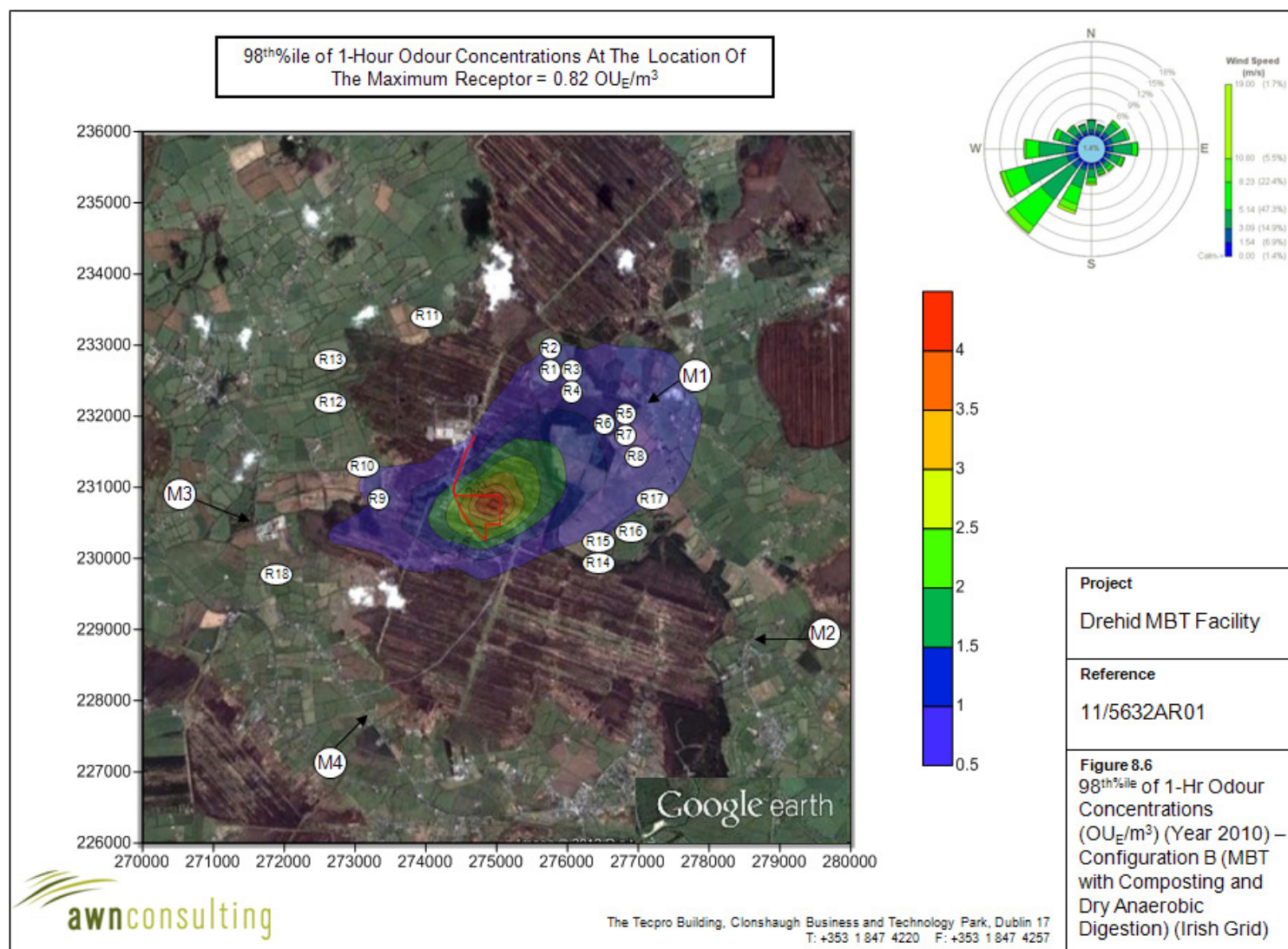




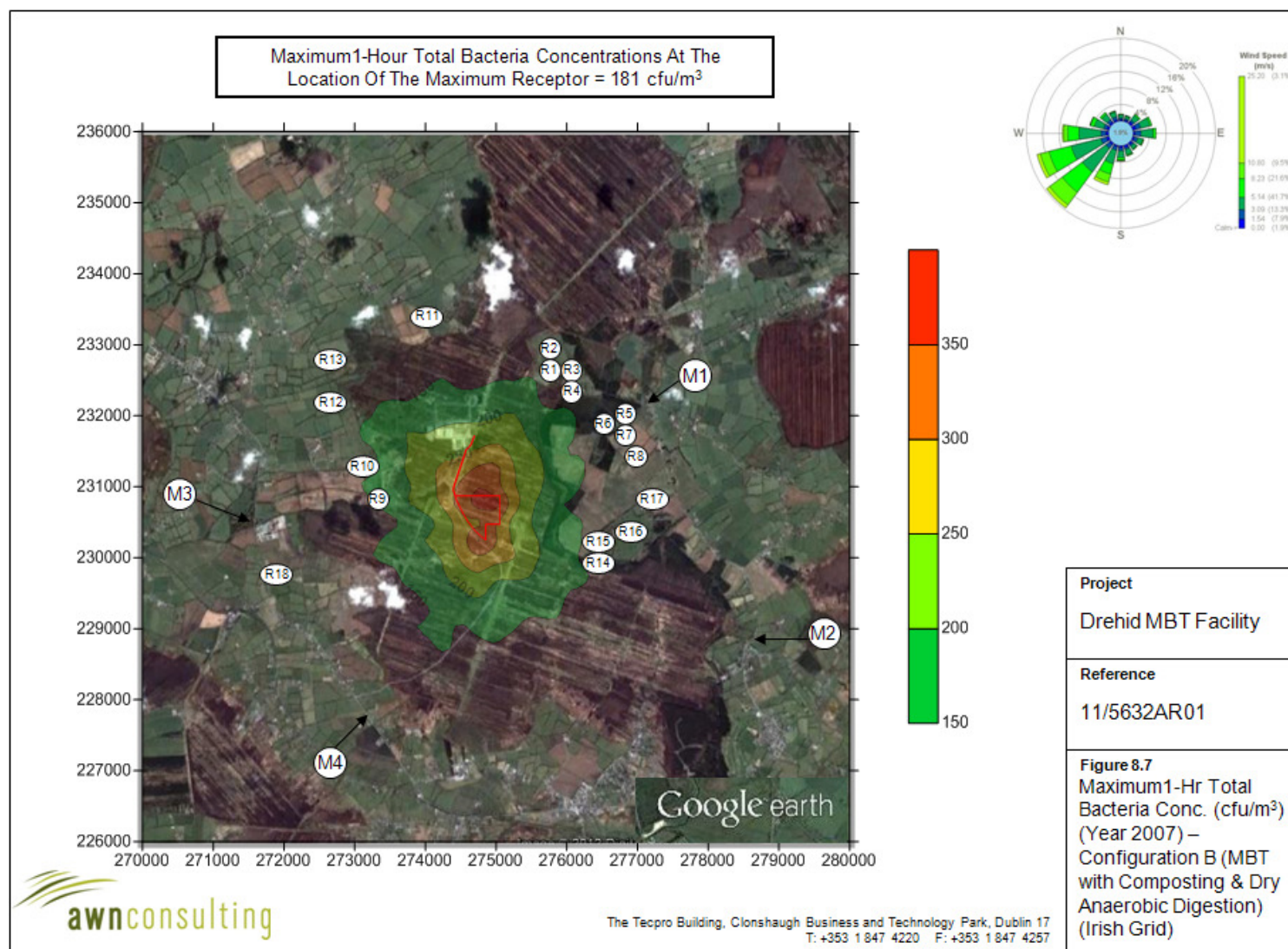


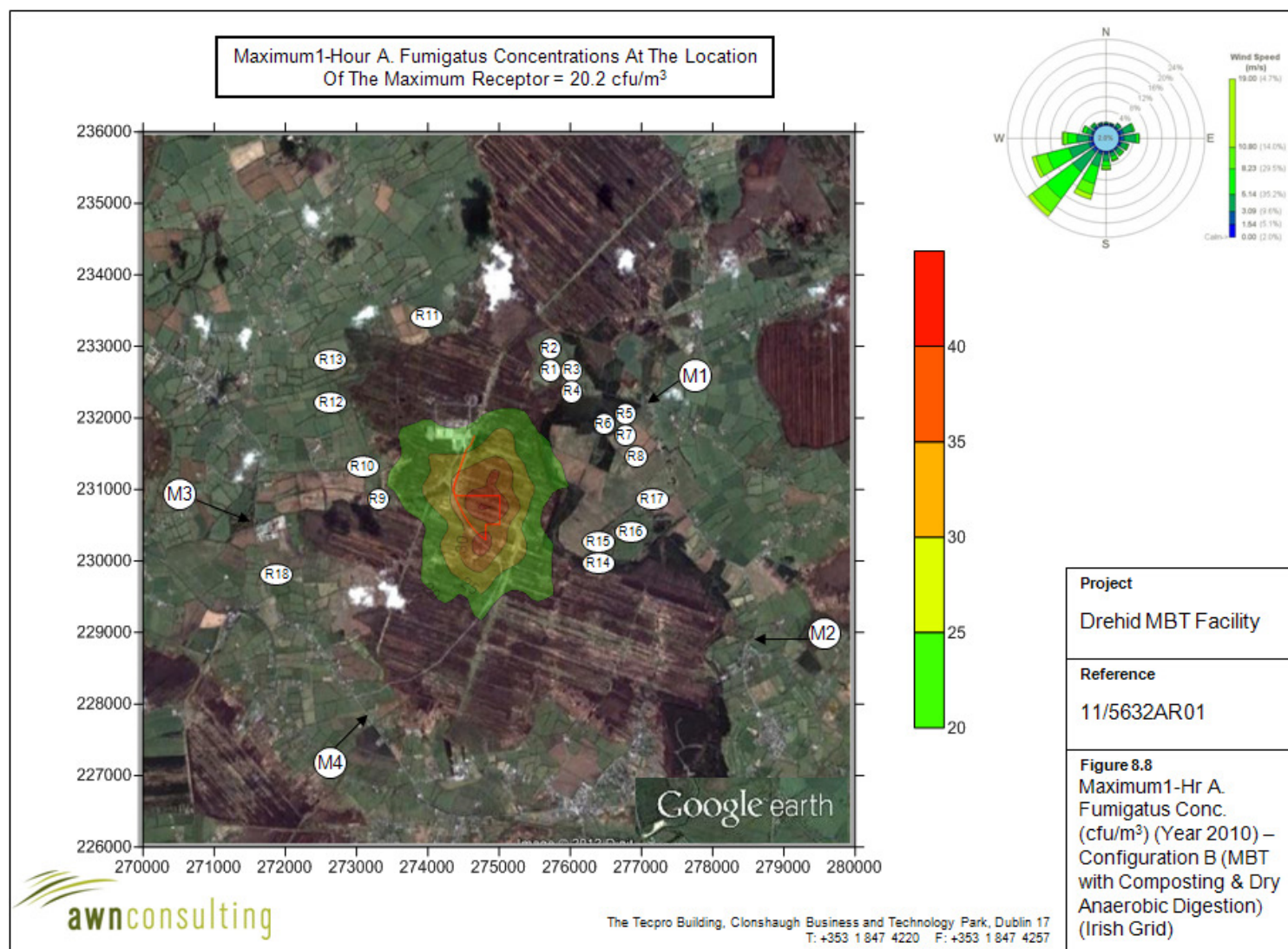




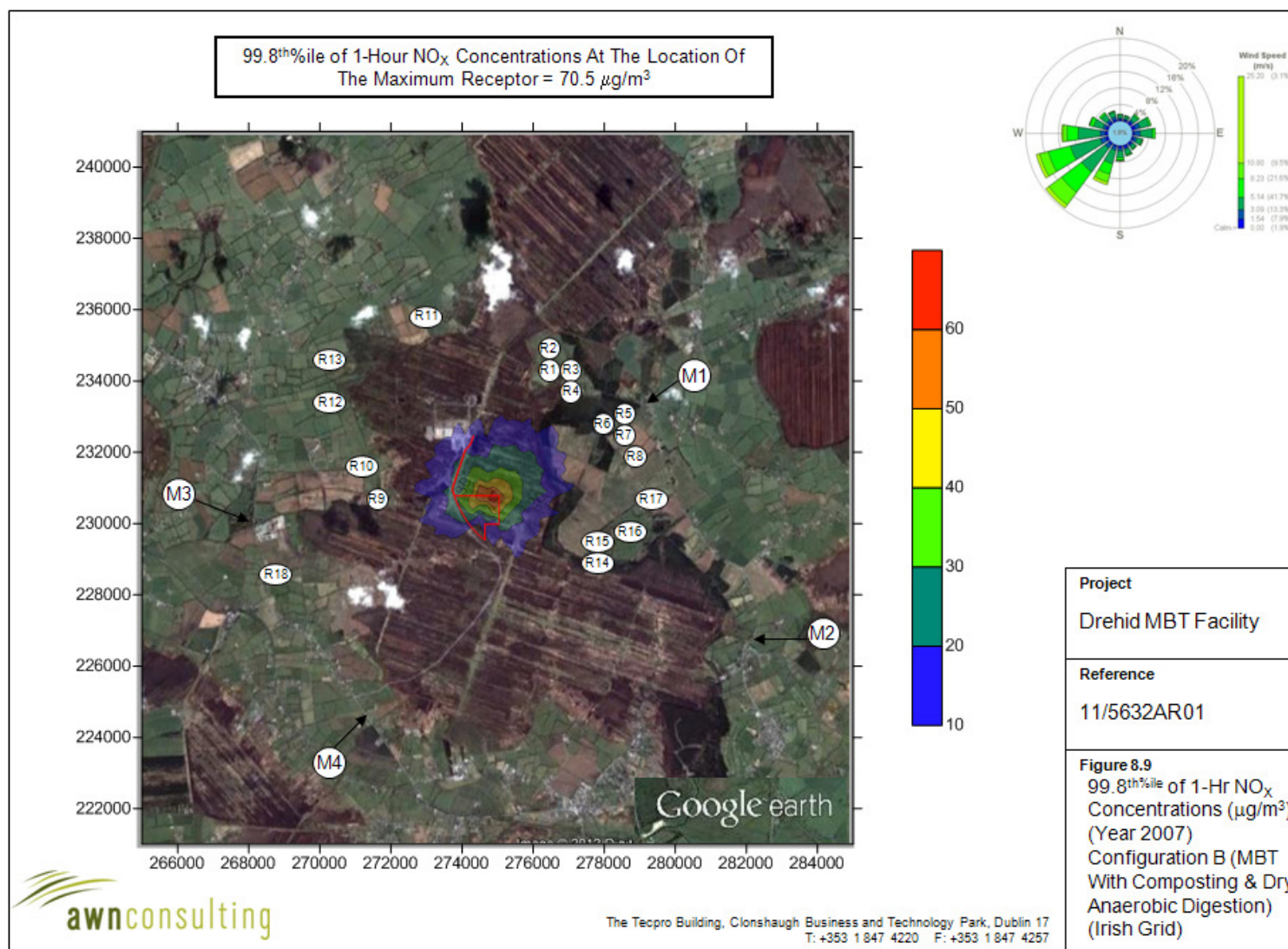


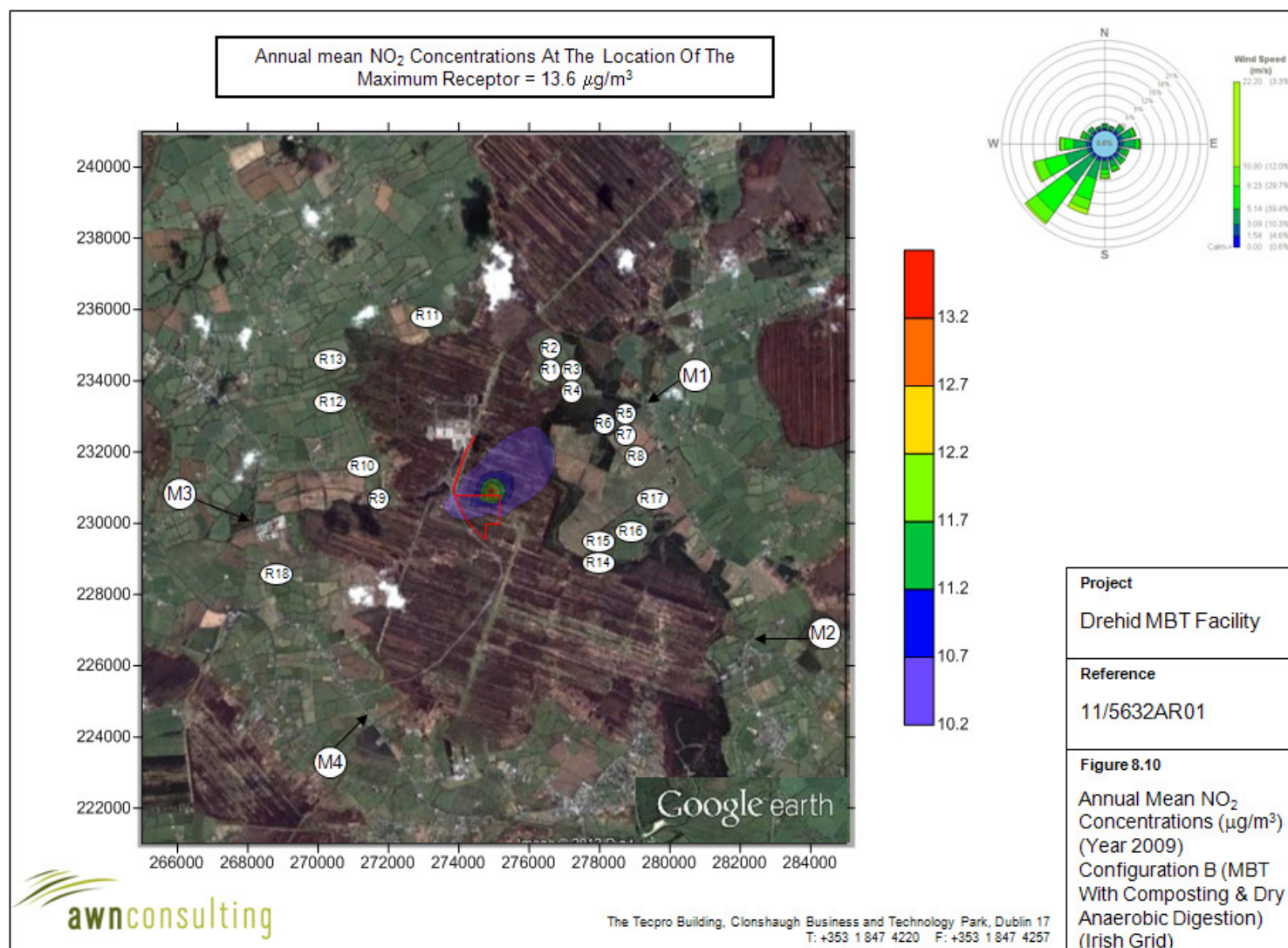




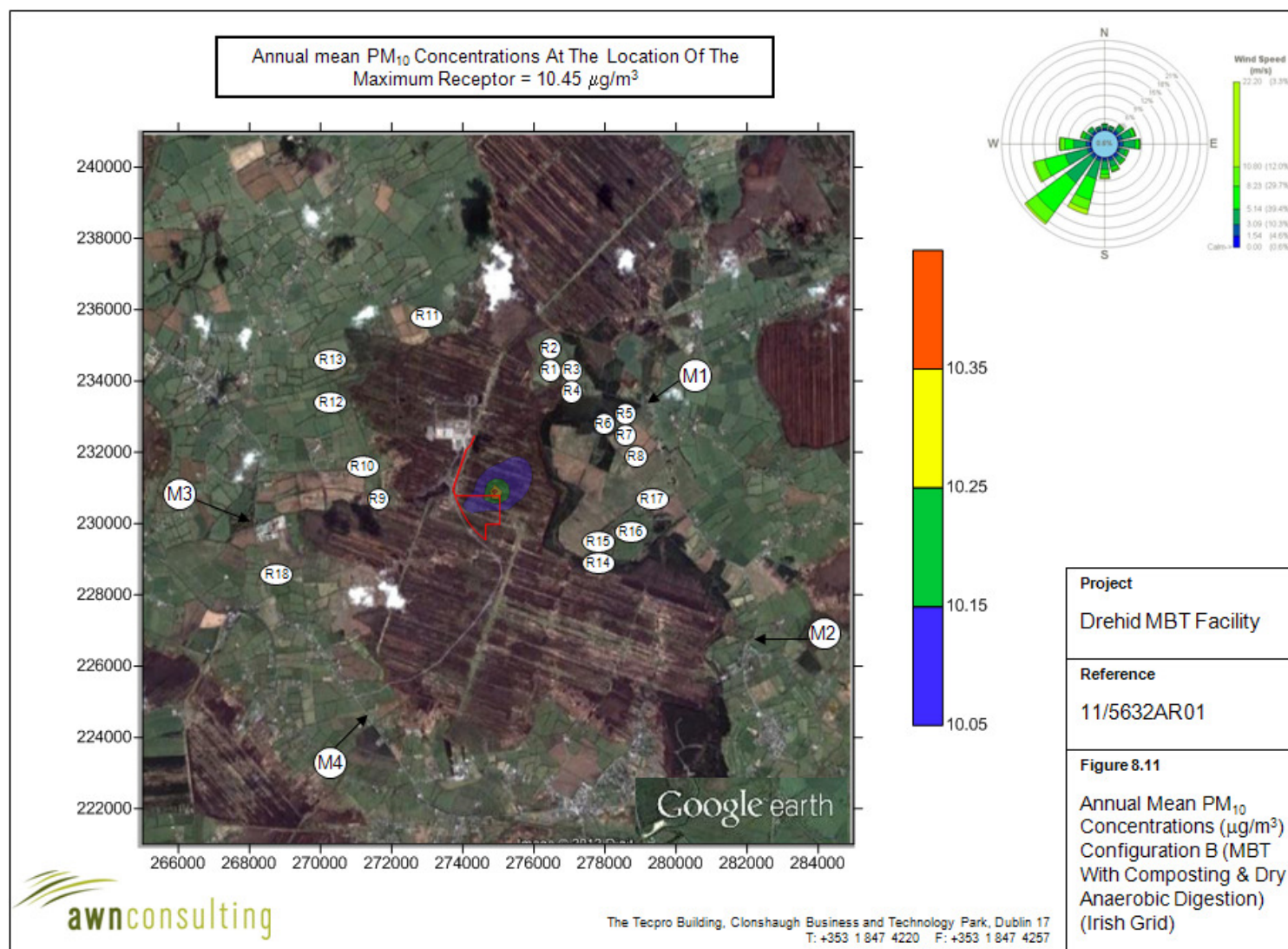
















## 8.2 DUST

### 8.2.1 *Introduction*

All developments, including waste management facilities, have the potential to adversely affect air quality within the surrounding area. Currently in Ireland there are no statutory limits for dust deposition from waste management developments. However, in recent years, the TA Luft/VDI 2119/Bergerhoff Method of dust emission monitoring has become the most commonly used method. This method involves using a direct collection pot to standardised dimensions of either glass or plastic. The system benefits from being a direct collection method i.e. less transferring of material and consequent reduction in sampling errors. This method is defined as an internationally recognised standard and has been adopted by the Environmental Protection Agency (EPA) as the method of choice for licensed facilities.

The proposed Drehid MBT Facility will be located in the townlands of Coolcarrigan, Drummond and Kilkeaskin within the confines of Bord na Móna's landholding at Carbury, Co. Kildare. The existing Drehid Waste Management Facility is also located within this landholding. Bord na Móna is required to carry out a programme of monthly dust deposition monitoring at the Drehid Waste Management Facility in compliance with Waste Licence Register No. W0201-03. The Waste Licence limit for dust deposition at the Drehid Waste Management Facility is given as 350mg/m<sup>2</sup>/day as per schedule B1 of its Waste Licence.

This section of the EIS will consider dust monitoring results for dust samples taken by Bord na Móna at the Drehid Waste Management Facility during 2011 as well as the results from specific dust monitoring undertaken in 2012 by TOBIN Consulting Engineers in the vicinity of the proposed Drehid MBT Facility site.

#### **8.2.1.1 Methodology**

Total dust deposition is measured using the Bergerhoff gauges specified in the German Engineering Institute VDI 2119 document entitled "Measurement of Dustfall using the Bergerhoff Instrument (Standard Method)". Dust gauges are set up approximately 2m above the ground surface and placed in protective cages. The jars are left open for one month. The jars are then sealed and returned to the laboratory for analysis.

### 8.2.2 *Existing Environment*

As mentioned above, Bord na Móna is required to carry out a programme of monthly dust deposition monitoring at the existing Drehid Waste Management Facility in compliance with Waste Licence Register No. W0201-03. The results of dust monitoring undertaken at the facility by Bord na Móna during 2011 are presented in Table 8.1 overleaf.

**Table 8-29 Dust Results within the Bord na Móna landholding during 2011**

Monitoring Period	Total Dust Deposition (mg/m <sup>2</sup> /day)					
	No. of days	D1	D2	D5	D6	D8
16 <sup>th</sup> Dec 2010 – 17 <sup>th</sup> Jan 2011	32	22	<16	<16	32	43
17 <sup>th</sup> Jan 2011- 17 <sup>th</sup> February 2011	31	22	22	39	50	94
17 <sup>th</sup> February 2011 – 21 <sup>st</sup> March 2011	32	27	32	27	38	70
21 <sup>st</sup> March 2011- 20 <sup>th</sup> April 2011	30	23	<17	29	29	86
20 <sup>th</sup> April 2011 – 18 <sup>th</sup> May 2011	30	92	34	*	**	75
18 <sup>th</sup> May 2011 – 16 <sup>th</sup> June 2011	29	101	107	154	196	137
16 <sup>th</sup> June 2011 – 18 <sup>th</sup> July 2011	32	65	48	27	161	183
18 <sup>th</sup> July 2011 – 19 <sup>th</sup> August 2011	32	43	22	48	134	70
19 <sup>th</sup> August 2011- 19 <sup>th</sup> September 2011	31	139	39	56	122	255
19 <sup>th</sup> September 2011 – 19 <sup>th</sup> October 2011	30	40	40	23	69	46
19 <sup>th</sup> October 2011 – 17 <sup>th</sup> November 2011	29	18	30	65	178	113
17 <sup>th</sup> November 2011 – 19 <sup>th</sup> December 2011	32	86	48	48	70	108

\*Invalid Result

\*\* Monitoring location removed due to ongoing construction works

Note: (locations as described in Bord na Móna EPA monitoring reports)

D1 – Northern boundary of Drehid Waste Management Facility

D2 - Eastern boundary of Drehid Waste Management Facility

D5 – Western boundary of Drehid Waste Management Facility

D6 - Internal

D8 – Main entrance at R403

These existing dust monitoring locations are illustrated on Figure 8.12.

It can be seen from Table 8.1 above that all dust result levels recorded at the existing Drehid Waste Management Facility during 2011 are below the compliance threshold limit of 350mg/m<sup>2</sup>/day as recommended by the TA Luft/VDI 2119/Bergerhoff Method and as per schedule B1 of the facility's Waste Licence.

For the purposes of this Report, TOBIN installed three new dust monitoring locations within the vicinity of the proposed Drehid MBT Facility development area. The locations are also illustrated on Figure 8.12 and are labelled D9, D10 and D11 so as not to confuse them with historical and existing dust monitoring locations within the Bord na Móna landholding. These monitoring locations were chosen at the boundary of the proposed Drehid MBT Facility for the purposes of providing a baseline at the particular location and are complementary to

existing dust monitoring locations. Dust monitoring was completed in January / February 2012 by TOBIN. The results of this dust monitoring period are shown in Table 8-30 and presented in Appendix 8.3.

**Table 8-30 Dust Results for January/ February 2012**  
(undertaken by TOBIN Consulting Engineers)

Monitoring Period	Total Dust Deposition (mg/m <sup>2</sup> /day)			
	No. of days	D9	D10	D11
13 <sup>th</sup> January 2012 - 10 <sup>th</sup> February 2012	29	19	8.33	11.3

Note:

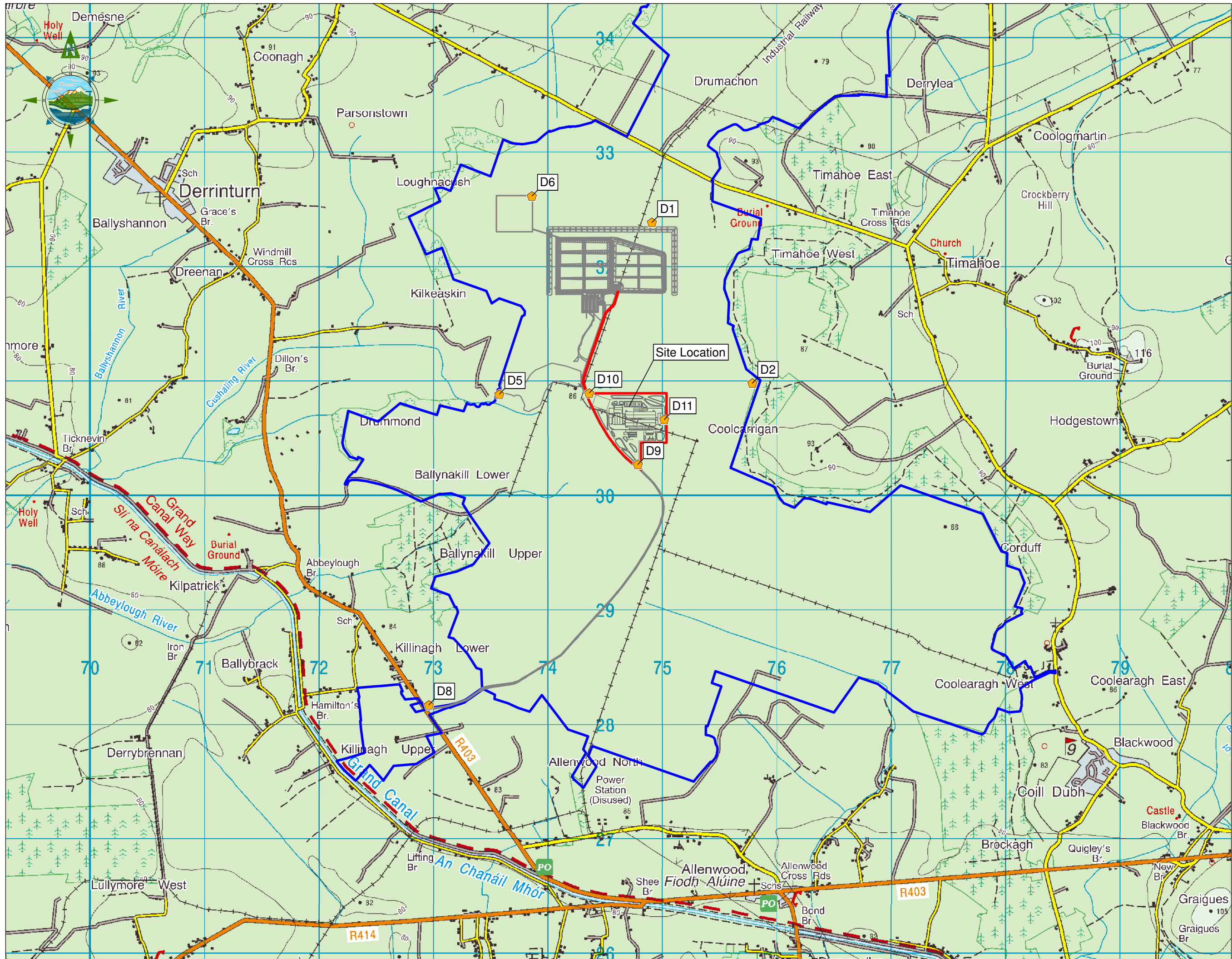
D9 – Southern boundary of proposed MBT Facility

D10- North-western boundary of proposed MBT Facility

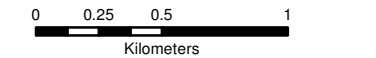
D11- Eastern boundary of proposed MBT Facility

It can be seen from Table 8-30 above that dust levels at all monitoring locations are below the compliance threshold limit of 350mg/m<sup>2</sup>/day, when measured using the TA Luft Bergerhoff Method.

These levels are also in compliance with the Waste Licence (No. W0201-03) limit set at the nearby Drehid Waste Management Facility.



- Legend**
- Dust Monitoring Locations
  - Site Boundary
  - Landownership 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 TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
  4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	05-06-12	Issued	G.F.	J.D.

Client:  
**BORD NA MÓNA**

Project:  
**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:  
**DUST MONITORING LOCATIONS**

Scale @ A3: 1:30,000

Prepared by: G.Fill Checked: S.Tinnelly Date: May 2012

Project Director: D.Grehan

**TOBIN**  
Patrick J. Tobin & Co Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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Figure 8.12  
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A

### 8.2.3 *Potential Impacts*

#### 8.2.3.1 **Potential Impacts of Configuration A (MBT with Composting)**

The primary potential for dust emissions at the proposed Drehid MBT Facility is during the construction of the proposed development. Wind blown dust emissions may arise during the construction phase of the proposed development, which may impact upon the surrounding environment. The deposition of dust and mud on the local roads is also both unsightly and dangerous. It is also recognised that dust may be a particular problem during periods of dry windy weather.

Potential sources of dust during construction include the following:

- Vehicles carrying dust on their wheels;
- Initial excavation works especially in periods of dry weather;
- Un-vegetated soil stockpiles; and
- The handling of construction materials such as soils, cement etc for the construction phase of the development.

Once the Drehid MBT Facility is operational all treatment processes will take place within enclosed buildings thereby significantly reducing the potential for dust emissions arising at the facility.

The main potential source of dust during the operational phase will be from traffic entering and existing the MBT Facility.

#### 8.2.3.2 **Potential Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

The potential dust impact of Configuration B (MBT with Dry Anaerobic Digestion and Composting) is the same as that outlined for Configuration A (MBT with Composting) above. If anaerobic digestion is included within the development this process will also take place indoors within the enclosed biological treatment buildings thereby reducing the potential for dust emissions arising at the facility. The feedstock to the anaerobic digestion process will have a high moisture content as will the digestate exiting the anaerobic digestion process therefore the potential dust emissions arising from the anaerobic digestion process will be negligible.

### 8.2.4 *Mitigation Measures*

#### 8.2.4.1 **Mitigation Measures for Configuration A (MBT with Composting)**

Bord na Móna will endeavour to ensure that dust emissions are kept to a minimum at all locations and will take all reasonable steps as far as is practical to minimise dust emissions during both the construction and operational phases of the proposed development.



The following mitigation measures are proposed during the construction phase:

- Material handling systems and stockpiling of materials shall be designed and laid out to minimise exposure to wind.
- Vehicles using site roads shall have their speed restricted, and this speed restriction will be enforced rigidly by site management. Indeed, on any un-surfaced site road, this shall be 20 km per hour, and on hard surfaced roads as site management dictates.
- Vehicles carrying material with dust potential shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only.
- Public roads outside the site shall be regularly inspected for cleanliness, and cleaned as necessary.
- All internal hauls roads and access routes will be sprayed with water in periods of dry weather to help suppress dust emissions.

The following mitigation measures are proposed during the operational phase:

- All waste delivered to the MBT Facility will be in covered/enclosed vehicles. Similarly, all waste residues being removed from the MBT Facility will be in covered/enclosed vehicles.
- All waste delivered to the MBT Facility will be treated within enclosed buildings.
- Doors at the waste reception area will be rapid closing doors, with an opening or closing time of approximately 20 seconds. Doors for the acceptance of waste will be fitted with air curtains to minimise the escape of odorous emissions and dust when a door is opened.
- In the composting tunnels, negative pressure will be maintained throughout the process in order to prevent uncontrolled air emissions (including dust) from being released inside the buildings.
- Negative pressure will also be created in all of the facility buildings to force odorous air to the odour abatement system thereby preventing uncontrolled emissions (including dust) from the MBT Facility.
- Air extracted from facility buildings, where there is a likelihood of dust generation, will be processed through a dust filter prior to being re-circulated within other facility buildings thereby preventing dust emissions and maintaining appropriate working conditions. It is envisaged that pulse jet bag filters will be used for this purpose.
- The air exhausted from the SRF thermal dryer will be processed through cyclones (to remove dust and particulates) prior to treatment in a humidifier and biofilter.
- Before odorous air flows through biofilters, it will be moistened to reduce the dust content of the process airstream.
- Good housekeeping practices (internally and externally) and a closed-door management strategy will be maintained at all times



- Waste delivery vehicles leaving the facility will be required to use the wheelwash which will be located on an internal access road at the MBT Facility site as shown on Figure 2.2.

It is anticipated that with the implementation of the above mitigation measures the potential for dust emissions will be significantly reduced and any residual dust emissions will not cause a nuisance. This will be verified by measurement using the TA Luft/VDI 2119/Bergerhoff Method at dust monitoring locations and demonstration of compliance with the limit value set in the waste licence to be granted by the EPA for the proposed MBT Facility.

The proposed MBT Facility activity boundary is located approximately 0.75km west and 0.6km east from the Bord na Móna landownership boundary and approximately 1km west and 1.4km east from the nearest sensitive receptor. Considering these distances and the fact that existing dust mitigation measures are already in place at the nearby Drehid Waste Management Facility, it is considered there will not be a significant cumulative impact from dust emissions once the mitigation measures detailed in this chapter are applied.

#### **8.2.4.2 Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

Mitigation measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting) are the same as for Configuration A (MBT with Composting) as all treatment processes will take place indoors.

#### *8.2.5 Conclusion*

The proposed Drehid MBT Facility development will be located within the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare

There is the potential for dust emissions during the construction and operation of the proposed MBT Facility development. However, it is anticipated that with the implementation of the proposed mitigation measures, dust emissions from the proposed MBT Facility will be in compliance with recommended limits when measured using the TA Luft/VDI 2119/Bergerhoff Method and will not have a perceptible impact on the local or regional environment.

## 9 NOISE AND VIBRATION

### 9.1 INTRODUCTION

This assessment will address the potential noise and vibration impacts associated with the proposed Drehid Mechanical Biological Treatment (MBT) Facility. The Drehid MBT Facility will be located within the confines of the Bord na Móna landholding in the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare. Bord na Móna also operates the permitted Drehid Waste Management Facility within this landholding, approximately 1km north of the proposed MBT Facility location.

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

#### 9.1.1 Methodology

This assessment will take cognisance of the existing and future landfill operations within the Bord Na Móna landholding in addition to the operation of the composting facility.

As the composting facility had only commenced operating (at a capacity less than design capacity) when baseline noise monitoring was undertaken for this EIS, the operational phase noise predictions from the EIS which accompanied the Planning Application for the composting facility will be used in combination with the measured baseline noise recordings and predicted noise for the Drehid MBT Facility to forecast the future cumulative impact of all operational activities on the Bord na Móna landholding (post construction of the proposed MBT Facility). An assessment of additional road traffic noise generated by the proposed MBT Facility will also be undertaken herein.

The existing Drehid Waste Management Facility's current planning permission to accept waste is due to expire in 2028 so this study represents the worst case scenario during the operation of the proposed MBT Facility (which will extend beyond 2028).

#### **Outline of Acoustics Terminology**

Sound is produced by a mechanical disturbance emanating as a wave motion in air at a speed of about 330 metres per second (the speed of sound in air). Sound waves entering the ear evoke a physiological response, which causes nerve impulses to be transmitted to the brain. The brain interprets these impulses and perceives them as sound. This is characterised by its amplitude, measured in decibels (dB) and its frequency, measured in Hertz (Hz). Noise is unwanted or undesirable sound, it does not accumulate in the environment and is usually localised.

#### **The Decibel Scale**

The difficulty in assigning a unit of measurement to sound is the sensitivity of the human ear. Audible sound pressures range from the threshold of hearing and the threshold of pain, which corresponds to a ratio of 1:1,000,000. In order to cover this vast range a logarithmic unit: the

decibel (dB) is used. The decibel scale corresponding to the threshold of hearing and the threshold of pain ranges from 0 to 140dB. A decibel is defined as ten times the base-ten logarithm of a power ratio.

**Table 9-1** Decibel scale with indicative noise examples

Decibel	Pressure	Analogy
140dB	200Pa	Threshold of Pain
120dB	20Pa	Jet taking off
100dB	2Pa	Pneumatic Drill
80dB	0.2Pa	Heavy Truck
60dB	0.02 Pa	Business Office
40dB	0.002 Pa	Library
20dB	0.0002 Pa	Quiet Woodland
0dB	0.00002 Pa	Threshold of Hearing

### Frequency

The size of the pressure fluctuation is measured using the Decibel, the rate of these fluctuations is measured by cycles per second or Hertz (Hz). Human ears are most sensitive to mid frequencies in the range between 500 Hz to 6 kHz. Sounds with a frequency less than 20 Hz are generally not audible, this type of sound is said to be infrasonic. Above 20 kHz sounds are generally inaudible and the sounds are described as ultrasonic.

### 'A' Weighting

The human ear can tolerate low frequencies more than middle to high frequencies and one must ensure that any measurement device elicits a numerical value, which matches the ear's response. This is achieved by introducing an electronic filter (called an 'A' weighted filter) into the measuring system. This weighting characteristic provides good correlation with loudness and since its maximum lies in the frequency region where the ear is most sensitive, it takes into account the hearing damage potential of the noise. For this reason environmental noise levels are generally measured in terms of 'A' weighted decibels, dB (A).

A noise level in excess of 85 dB (A) gives a significant risk of hearing damage. A noise level increase of 3 dB (A) is barely perceptible; while an increase in noise level of 10 dB (A) is perceived as a twofold increase in 'loudness'.

Where noise levels vary in time, statistical analysis of the variation can be carried out. The results are usually stated in the form  $L_N$  (L for level), where N is the percentage of time a level is equalled or exceeded. Hence if  $L_{90} = 40$  dB (A), the noise level equals or exceeds 40 dB (A) for 90% of the time measured period i.e. background noise level is 40 dB (A).

In addition to the statistical units, the equivalent continuous level is also measured. The equivalent continuous level,  $L_{eq}$ , is measured in dB (A) and is a notional steady level that has the same sound energy as the real fluctuating sound over the same measurement period. It is

measured using an integrating sound level meter (SLM).  $L_{eq}$  is often described as the total noise level for a specified period.

### **Baseline Survey**

Baseline noise refers to the existing noise environment in an area that may be affected by the construction and operation of the proposed development. The baseline noise survey was conducted to provide a context for the assessment of potential future noise impact associated with the proposed MBT Facility.

In order to assess the surrounding environmental noise levels, a daytime and night time noise survey was carried out on the 9<sup>th</sup> of January 2012 at six noise sensitive locations, as shown on Figure 9.1.

Thirty minute measurements were recorded during the daytime at each monitoring location and 15 minute measurements were carried out during the night period. The measurements taken were deemed to be representative of typical noise levels in the vicinity of the proposed development site during daytime and night time scenarios. The equipment used during this survey was a Larson Davis Type 1, 824 sound level meter.

All measurements were carried out in general accordance with ISO 1996: '*Acoustics-Description and measurement of environmental noise*'. Measurements were made placing the microphone at a height of 1.5m above ground level and were free field, measured >2m from reflecting surfaces. Before and after the survey the measurement apparatus was checked and calibrated using a Brüel and Kjaer 4231 calibrator to an accuracy of +/- 0.3dB. Weather conditions during the surveys were in line with the conditions described within ISO 1996, Acoustics '*Description and Measurements of Environmental Noise*'.

The measurement results were noted onto survey record sheets immediately following each measurement and also stored in the instrument's internal memory for subsequent analysis, notes were taken in relation to the primary contributors to noise build-up at each location.

Five environmental noise parameters were measured which are defined below.

$L_{Aeq}$  is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value.

$L_{Amax}$  is the maximum A-weighted sound level measured during the measurement period.

$L_{Amin}$  is the minimum A-weighted sound level measured during the measurement period.

$L_{A10}$  is the A-weighted sound level that is equalled or exceeded for 10% of the measurement period and is used to quantify road traffic noise.

$L_{A90}$  is the A-weighted sound level that is equalled or exceeded for 90% of the measurement period and is used to quantify background noise level.

**A-weighting** is the process by which noise levels are corrected to account for the non-linearity of human hearing. All noise levels quoted are relative to a sound pressure of  $2 \times 10^{-5}$  Pa.

## 9.2 EXISTING ENVIRONMENT

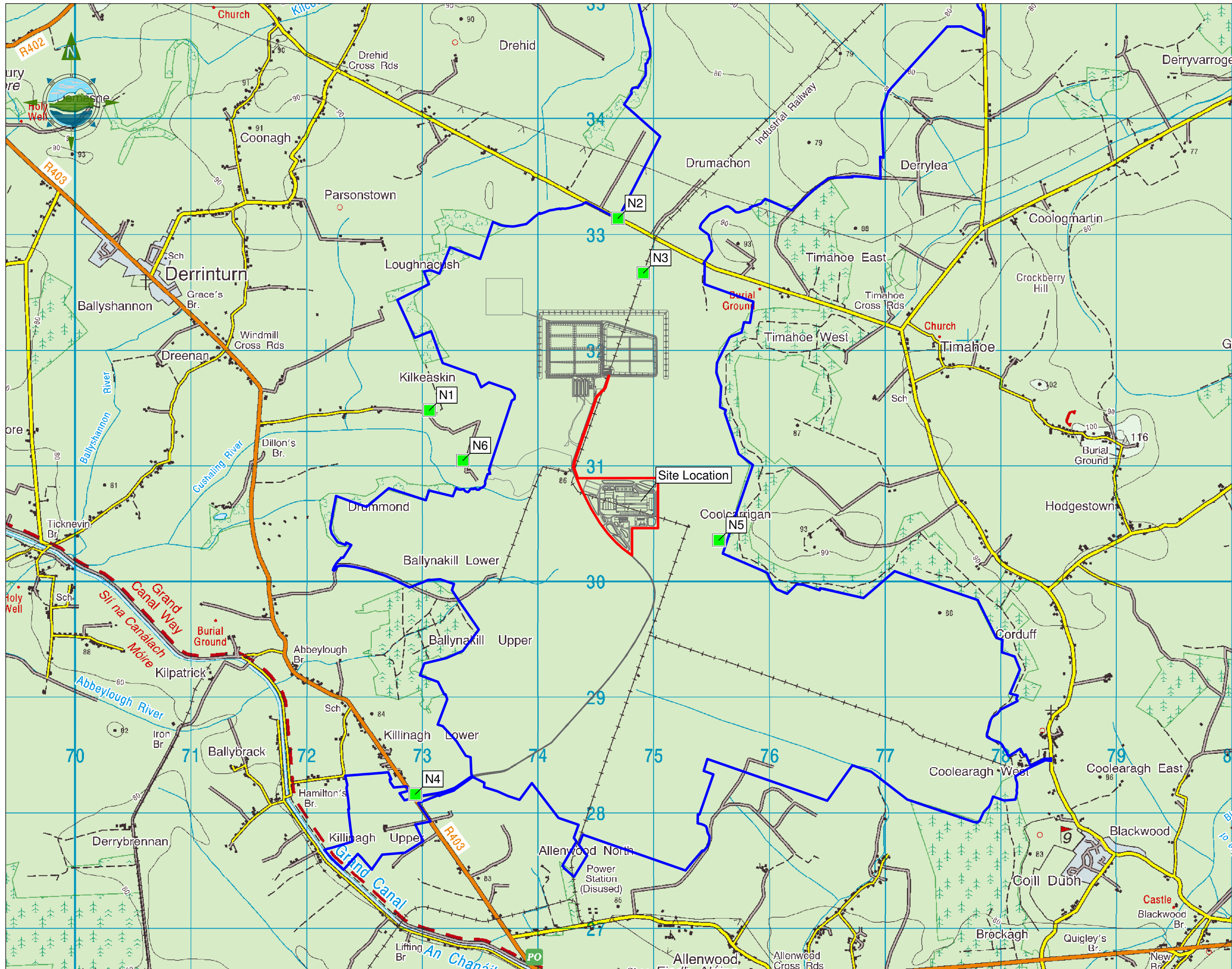
The existing environment within the Bord Na Móna landholding is a remote location, containing an operational landfill with associated infrastructure and a composting facility. The baseline locations assessed for the purposes of the noise survey are included in Table 9.2 below and in Figure 9.1 and are the same locations as those currently employed for the waste license monitoring and reporting of noise emissions from the Drehid Waste Management Facility to the EPA. These locations include the closest sensitive receptors to the proposed MBT Facility.

**Table 9-2 Baseline Noise Survey Locations**

Noise Monitoring Point	Grid Reference	Location
N1	273095, 231446	Noise sensitive receptor located to the west of the landholding (and south west of the existing Drehid Waste Management Facility). The monitoring equipment was installed adjacent to a farmyard next to an occupied dwelling house.
N2	274374, 233202	This monitoring point is located within the Bord na Móna landholding, close to the nearest occupied dwelling along the L5025 road.
N3	274933, 232734	This monitoring point is located within the Bord na Móna landholding, to the north east of the existing Drehid Waste Management Facility.
N4	272974, 228094	This monitoring point is located to the south of the Bord na Móna landholding, along the R403 regional road at the entrance to the Drehid Waste Management Facility.
N5	275563, 230238	This monitoring point is located to the east of the MBT Facility activity boundary.
N6	273254, 231287	This noise sensitive receptor is located at a dwelling house, south of N1 to the west of the Bord na Móna landholding.

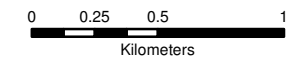






**Legend**

- Site Boundary
- Landownership Boundary
- Noise Monitoring Locations



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
  2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
  3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
  4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	05.06.12	Issued	G.F.	S.T.

Client:  
**BORD NA MÓNA**

Project:  
**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:  
**NOISE MONITORING  
LOCATIONS MAP**

Scale @ A3: 1:30,000

Prepared by:	Checked:	Date:
M. Nolan	S. Tinnelly	May 2012
Project Director: D. Grehan		

**TOBIN**  
Patrick J. Tobin & Co Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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**Figure 9.1**  
**A**

**Table 9-3 Baseline Noise Survey Results 09/01/2012**

Location	Time	L <sub>Aeq</sub>	L <sub>AMax</sub>	L <sub>AMin</sub>	L <sub>A10</sub>	L <sub>A90</sub>
N1	12:03	39.2	61.4	32.0	37.6	32.9
	23:27	35.7	55.8	32.2	37.2	33.3
N2	13:51	50.7	77.2	31.2	47.9	32.2
	00:30	50.2	78.9	31.5	35.5	32.0
N3	14:22	52.7	76.2	32.1	53.8	33.2
	00:15	33.8	58.2	31.4	34.6	31.8
N4	15:56	61.1	89.2	35.1	62.4	40.6
	23:00	54.4	81.7	31.0	53.9	31.6
N5	15:16	38.2	56.4	32.4	40.9	33.4
	22:15	34.6	57.8	31.2	35.7	31.2
N6	12:36	35.2	61.3	32.1	35.8	32.5
	23:44	35.0	57.0	32.0	36.5	33.1

**Location N1**

During the daytime survey the noise climate at Location N1 was dominated by distant road traffic, distant plant noise from the Drehid Waste Management Facility, birdsong and an aircraft overhead. In the night period, the Bord Na Móna activities were inaudible and the distant road traffic noise was the dominant noise source.

**Location N2**

During the daytime noise surveys at Location N2, occasional passing traffic on the local road was the dominant noise source. Birdsong and distant plant noise (possibly from the Drehid Waste Management Facility) were audible. The traffic on the local road comprised a number of HGVs passing at speed. These HGVs were not derived from the Drehid Waste Management Facility.

In the night-time period, infrequent passing local traffic, birds and distant traffic noise were the dominant sources, there was noise audible from the Drehid Waste Management Facility.

**Location N3**

The daytime noise climate at Location N3 is characterised by infrequent passing traffic on the local road and distant plant noise from the Drehid Waste Management Facility. Two people on a large quad bike were scrambling on the bog trails, which was a significant noise source.

At night the area was quiet, with infrequent traffic being the main noise source.

**Location N4**

Road traffic with a significant HGV proportion dominated the noise climate during the daytime survey at Location N4. Some of this was entering/leaving the Drehid Waste Management Facility and some was transiting past on the R403, as the entrance is located on a regional road. Car traffic that passed the site entrance was travelling quite fast at this location and added to measured noise levels.

At night there was no audible noise from the Drehid Waste Management site. A series of loud modified cars travelling up and down the road dominated the night time noise survey.

**Location N5**

At Location N5, the daytime noise climate was comprised of distant traffic noise, birdsong and overhead aircraft. There was no significant noise from the Drehid Waste Management Facility at this location. The night survey comprised the same scenario.

**Location N6**

Distant road traffic noise and birdsong were the main noise sources during the daytime noise survey at this location. There was no significant audible noise from the Drehid Waste Management Facility.

Similarly at night, distant road traffic noise was the main source, the Drehid Waste Management Facility was not audible.

### 9.3 POTENTIAL IMPACTS

There is potential for noise and vibration impacts during both the construction and operational phases of the proposed development.

#### *9.3.1 Potential Construction Phase Impacts of Configuration A (MBT with Composting)*

Impact from the construction phase will depend on the number and type of equipment used during the construction of the development. Construction noise sources will result in a temporary impact on the noise climate in the area.

Predicted noise levels have been estimated using the methodology described in *BS: 5228: Noise and control on construction and open sites, 1997*. Predictions are based on typical equipment used during various constructive stages of the development. Predictions are based on an  $L_{Aeq}1$ hour value with all machinery listed below operating for a continual period of 1 hour. Updated, modern noise levels for all plant assessed, as published in a 2009 addendum to BS 5228, have been used in this assessment.

This may be considered a worst-case scenario as machinery may operate for shorter periods and may not work simultaneously.

Additionally, calculations are based on minimum distances between site activities and the nearest noise sensitive locations. The effects of vegetative screening have not been taken into account in calculations.

**Table 9-4 Predicted Construction Phase Noise Impacts**

CONSTRUCTION PHASE						
BS5228 Calculations	Estimated Construction noise levels at varying distances LAeq 1 hour					
Plant	N1	N2	N3	N4	N5	N6
Dump Truck (x2)	36	31	34	29	46	37
Tracked Crane	18	13	16	11	28	19
Dozer (x2)	32	27	30	25	42	33
Road Lorry (x2)	30	25	28	23	40	31
Tracked Excavator (x2)	35	30	33	28	45	36
Piling - Hammer rig (x2)	37	32	35	30	47	38
<b>Combined Level LAeq 1hour</b>	<b>41</b>	<b>37</b>	<b>39</b>	<b>35</b>	<b>52</b>	<b>43</b>

In Ireland, there are no statutory guidelines relating to noise limits for construction activities. These are generally controlled by local authorities and commonly refer to limiting working hours to prevent a noise nuisance. The National Roads Authority (NRA) report entitled '*Guidelines for the treatment of noise and vibration in national road schemes*' 2004, has outlined recommended noise levels for construction noise during road works.

Although these guidance documents refer to the construction of road projects, they have been developed in line with typical construction noise limits on general construction projects used previously in Ireland. The limits outlined represent a reasonable compromise between the practical limitations during a construction project and the need to ensure an acceptable ambient noise level for local residents.

As a result, these limits have become the most acceptable standard for construction noise limits for EIS assessments to date. The National Roads Authority does note however that where pre-existing noise levels are particularly low, more stringent levels may be more appropriate. Table 9.5 below details these recommended limits. The recommended levels presented in Table 9.4 are considered reasonable when compared against existing baseline levels.

**Table 9-5 Typical maximum permissible noise levels at the façade of dwellings during construction activities (NRA Draft guidelines for the treatment of noise and vibration in national road schemes 2004)**

Day & Times	L <sub>Aeq</sub> (1hr) dB	L <sub>Amax</sub> dB
Monday – Friday (07:00 to 19:00 hrs)	70	80
Monday – Friday (19:00 to 22:00 hrs)	60 <sup>1</sup>	65 <sup>1</sup>
Saturday (08:00 to 16:30 hrs)	65	75
Sundays and Bank Holidays (08:00 to 16:30 hrs)	60 <sup>1</sup>	65 <sup>1</sup>

<sup>1</sup> Construction activities at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority.

The predicted construction noise levels in Table 9.4 are in compliance with the recommended noise levels for construction projects. These predicted values are a worst-case assessment, as no screening, or proprietary noise barrier mitigation is included for in the assessment, therefore the actual noise impact from construction activities is likely to be moderate on noise sensitive locations. The temporary nature of the construction period and the variety of machinery used should ensure that no construction activity is operational for long periods. This phase will therefore result in short term noise impacts. With regard to potential vibration impacts the NRA guidance document described above states that:

*“In order to ensure that there is no potential for vibration damage during construction, the Authority recommends that vibration from road construction activities be limited to the values set out in Table 9.5 [sic]. These values have been derived through consideration of the various standards discussed above; compliance with this guidance should ensure that there is little to no risk of even cosmetic damage to buildings”.* Table 9.6 below describes these limit values:

**Table 9-6 NRA Allowable vibration during road construction in order to minimise the risk of building damage**

Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

Distance separation of approximately one kilometre from the proposed site of the MBT Facility to the nearest sensitive receptor should ensure that these limit values are complied with.



### 9.3.2 *Potential Construction Phase Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The potential noise and vibration impact arising from the construction of the MBT Facility to include dry anaerobic digestion and composting will be the same as that for Configuration A (MBT with Composting).

### 9.3.3 *Potential Operational Phase Impacts of Configuration A (MBT with Composting)*

The operational phase noise emission data for all noise emitting plant proposed for use in the proposed MBT Facility have been used to facilitate this assessment. This data, in addition to the attenuation level provided for by the walls of the various buildings and the sound attenuation provided by distance separation, have all been used to calculate a worst case operational phase noise level at each sensitive receptor. Potential noise impact from diesel generators proposed to be used in the event of a loss of power is also included for in these calculations. The calculations have been carried out using spreadsheet modelling employing the methodologies outlined in *BS: 5228: Noise and control on construction and open sites, 1997*, using the updated noise level data as contained in the UK Department for Environment Food and Rural Affairs Document; *Database of noise emissions from equipment used on construction and open sites, 2008*

No attenuation by proposed buildings situated between the source building and the receptor have been accounted for in this assessment, other than the attenuation provided by the walls of the building containing each individual piece of plant, and as such the actual operational noise levels will be less than those described in Table 9.7, and Table 9.8 below.

The target level criterion for the operational phase of the proposed MBT Facility will be set at 55 dB  $L_{Aeq}$  for daytime and 45 dB  $L_{Aeq}$  for the night period at the façade of the nearest sensitive receptor. The maximum noise level during the operational phase at the most affected nearest sensitive receptor, located at N6 is predicted to be 37 dB (A)  $L_{Aeq}$ . The proposed MBT Facility will operate in two shifts, with the second shift finishing at 02:00. SRF drying within the SRF building, and the biological treatment process within the Biological Treatment Building will take place on a 24 hour basis, 7 days a week. The daytime noise levels assessed in Tables 9.7 and 9.8 above are inclusive of all plant operating. While the daytime predicted noise levels will comfortably meet both the day and night time noise limit, the actual night time noise level will be less than that presented in Table 9.8. Cumulative impacts at sensitive receptors will be below the target criterion for both day and night time operations in all scenarios.



**Table 9-7 Predicted Daytime cumulative exterior noise levels from the proposed MBT Facility at 10m from each building (Configuration A (MBT with Composting))**

ITEM	Exterior At 10m (dB LAeq)
Mechanical Treatment Building	66.3
SRF Building	66.6
SRF Storage Area	56.0
Biofilter/ Odour Abatement Area No.1 Plant Room	57.3
Biofilter/Odour Abatement Area No.2 Plant Room	57.3
Composting Building No.1 (part of Biological Treatment Building No.1)	38.8
Composting Building No.2 (part of Biological Treatment Building No.2)	38.8
Maturation Building No.1 (part of Biological Treatment Building No.1)	52.1
Maturation Building No.2 (part of Biological Treatment Building No.2)	52.1
Biofilter/Odour Abatement Area No.3 Plant Room	54.9
Refining Building	48.4
Dust Filters	52.8
<b>TOTAL</b>	<b>70.5 dB LAeq</b>

**Table 9-8 Predicted noise levels at nearest sensitive receptors (including operating composting facility and operating landfill)**

Proposed MBT Configuration A LAeq	N1 (1650m)	N2 (2475m)	N3* (1970)	N4 (2950m)	N5* (625m)	N6 (1150m)
	29	27	29	25	38	33
Composting Facility and Landfill LAeq	N1 (1425m)	N2 (1468m)	N3 (1049)	N4 (3900m)	N5 (1753m)	N6 (1425m)
	36	38	44	30	32	35
<b>Cumulative LAeq</b>	<b>37</b>	<b>38</b>	<b>44</b>	<b>31</b>	<b>39</b>	<b>37</b>

**\*Note: While Noise monitoring locations N5 and N3 are noise monitoring points, they are not sensitive receptors**

### **Road Traffic Noise**

The road traffic generated by the proposed MBT Facility is assessed in the Traffic Chapter (Chapter 11). There is a maximum projected increase above current daily activity of 124% for cars and 18% for HGV traffic, within the Drehid Waste Management Facility Boundary.

On the R403 in the vicinity of the site entrance, which is the closest point a receptor will be to the traffic noise, the HGV traffic will increase by a maximum of 5.4% daily and the car

traffic will increase by a maximum of 3.4% daily. Due to the logarithmic nature of the decibel scale, an increase of 100% equates to a decibel increase in decibel level of 3dB, which is perceived by the human ear as a slight increase. This implies that the impact that vehicles associated with the proposed development will have, in terms of traffic noise, can be considered negligible and imperceptible. There will be no perceptible increase in road traffic generated ground vibration. Road traffic generates low levels of ground vibration (<0.1mm peak particle velocity at 20m and these are indistinguishable by humans).

#### 9.3.4 Potential Operational Phase Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)

The potential noise and vibration impact of this MBT Facility with dry anaerobic digestion and composting is assessed as outlined in Table 9.9 below. For the development of the MBT Facility without dry anaerobic digestion noise levels would be slightly less. If dry anaerobic digestion is included within the development, this process (similar to all other processing steps) will take place indoors and the enclosed building will reduce noise emissions arising at the MBT Facility.

**Table 9-9 Predicted Daytime cumulative exterior noise levels from the proposed MBT Facility at 10m from each building (Configuration B (MBT with Dry Anaerobic Digestion and Composting))**

ITEM	Exterior At 10m (dB L <sub>Aeq</sub> )
Mechanical Treatment Building	66.3
SRF Building	66.6
SRF Storage Area	56.0
CHP Plant	68.0
GAS Flare Compound	48.0
Biofilter/ Odour Abatement Area No.1 Plant Room	57.3
Biofilter/Odour Abatement Area No.2 Plant Room	57.3
Dry AD/Composting Building No.1 (part of Biological Treatment Building No.1)	38.8
Dry AD/Composting Building No.2 (part of Biological Treatment Building No.2)	38.8
Maturation Building No.1 (part of Biological Treatment Building No.1)	52.1
Maturation Building No.2 (part of Biological Treatment Building No.2)	52.1
Biofilter/Odour Abatement Area No.3 Plant Room	54.9
Refining Building	48.4
Dust Filters	52.8
<b>TOTAL</b>	<b>72.5 dB L<sub>Aeq</sub></b>

**Table 9-10 Predicted noise levels at nearest sensitive receptors (including operating composting facility and operating landfill)**

Proposed MBT Configuration B	N1 (1650m)	N2 (2475m)	N3* (1970)	N4 (2950m)	N5* (625m)	N6 (1150m)
L <sub>Aeq</sub>	31	29	31	27	40	35
Composting Facility and Landfill	N1 (1425m)	N2 (1468m)	N3 (1049)	N4 (3900m)	N5 (1753m)	N6 (1425m)
L <sub>Aeq</sub>	36	38	44	30	32	35
Cumulative L <sub>Aeq</sub>	<b>37</b>	<b>39</b>	<b>44</b>	<b>32</b>	<b>41</b>	<b>38</b>

**\*Note: While Noise monitoring locations N5 and N3 are noise monitoring points, they are not sensitive receptors**

The target level criterion for the operational phase of the proposed MBT Facility will be set at 55 dB <sub>L<sub>Aeq</sub></sub> for daytime and 45 dB <sub>L<sub>Aeq</sub></sub> for the night period at the façade of the nearest sensitive receptor. The maximum noise level during the operational phase at the most affected nearest sensitive receptor, located at N6 is predicted to be 38 dB (A) L<sub>Aeq</sub>. The proposed MBT Facility will operate in two shifts, with the second shift finishing at 02:00. SRF drying within the SRF building, and the biological treatment process within the Biological Treatment Building will take place on a 24 hour basis, 7 days a week.

The daytime noise levels assessed in Tables 9.9 and 9.10 above are inclusive of all plant operating. While the daytime predicted noise levels will comfortably meet both the day and night time noise limit, the actual night time noise level will be less than that presented in Table 9.10. Cumulative impacts at sensitive receptors will be below the target criterion for both day and night time operations in all scenarios.

#### 9.4 MITIGATION MEASURES

The following mitigation measures for potential noise and vibration impacts include both the construction and operational phases of the proposed development.

##### 9.4.1 Construction Phase Mitigation Measures for Configuration A (MBT with Composting)

With regard to construction activities, all plant items used during the construction phase should comply with standards outlined in 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1998. Reference should be made to BS5228: *Noise control on construction and open sites*, which offers detailed guidance on the control of noise from construction activities.

It is proposed that various practices be adopted during construction, including:

- Limiting the hours during which noisy site activities are permitted to 07.00 – 20.00 Monday – Saturday inclusive);
- Appointing a site representative responsible for matters relating to noise; and
- Establishing channels of communication between the contractor/developer, Local Authority and residents.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- selection of plant with low inherent potential for generation of noise and/or vibration;
- erection of temporary barriers around items such as generators or high duty compressors. For maximum effectiveness, a barrier should be positioned as close as possible to either the noise source or receiver. The barrier should be constructed of material with a mass of  $> 7\text{kg/m}^2$  and should have no gaps or joints in the barrier material. As a rough guide, the length of a barrier should be 5 times greater than its height. A shorter barrier should be bent around the noise source, to ensure no part of the noise source is visible from the receiving location; and
- siting of noisy plant as far away from sensitive properties as permitted by site constraints.

#### *9.4.2 Construction Phase Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The mitigation measures for noise and vibration for the construction phase of the MBT Facility with dry anaerobic digestion and composting will be the same as outlined for the development of Configuration A (MBT with Composting)..

#### *9.4.3 Operational Phase Mitigation Measures for Configuration A (MBT with Composting)*

During the operational phase of the proposed MBT Facility, the design and layout of the MBT facility buildings will in itself serve as a mitigation measure by virtue of the fact that all MBT processing equipment will be located within fully enclosed buildings. Potential noise emitting plant will be acoustically treated to prevent a noise nuisance at the nearest noise sensitive properties. This phase of the development is not anticipated to significantly increase noise on its surrounding environment. With regards to noise from possible services plant and sanitary plant (road sweeper etc.) there are various practicable measures, which will be taken into account:

- Siting of noisy plant items away from direct line of sight to noise sensitive locations;
- Siting of outdoor extraction fans at roof level to reduce ground level noise disturbance;
- Ensuring any such external plants (fans etc) has no pure tonal component;
- Duct mounted attenuators on the atmosphere end of all acoustically offending air moving plant;

- Splitter attenuators or acoustic louvers providing free ventilation to internal plant areas;
- Solid barriers screening external ground level plant from sensitive receptors;
- Anti vibration mounts on reciprocating plant; and
- Training of staff to switch off machinery not in use and to operate machinery with potential noise impact in mind.

#### *9.4.4 Operational Phase Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The mitigation measures for noise and vibration for the operational phase of the MBT Facility with dry anaerobic digestion and composting will be the same as outlined for the development of Configuration A (MBT with Composting).

### **9.5 CONCLUSION**

The proposed MBT Facility is predicted to be in full compliance with all applicable noise and vibration limit values during both the construction and the operational phases of the development during both the day and night scenarios. As such no significant noise and vibration impact is predicted from the proposed scheme.

## 10 LANDSCAPE AND VISUAL

### 10.1 INTRODUCTION

#### 10.1.1 *Methodology*

The landscape and visual impact assessment of the proposed Drehid Mechanical and Biological Treatment (MBT) Facility in the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare, will describe the existing landscape character, identify potential sensitive viewpoints and assess the potential effects on viewpoints and general landscape character. The Report is illustrated with Plates and an Analysis Map - Figure 10.1.

There are no significant external differences between Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting), and therefore this assessment of potential landscape and visual effects applies to both configurations.

The methodology of this assessment is based on best practice as described in the guidelines listed in Section 10.1.2.

Firstly, a desk based review was carried out to ascertain an appropriate landscape and visual study area based on the location of the proposed MBT Facility and to identify potential landscape and visual effects.

Fieldwork was then carried out in order to assess and appraise the landscape character of the area. While the Kildare Development Plan was referenced for existing work on landscape character in the area, fieldwork identified smaller scale local landscape character.

A site survey on December 20<sup>th</sup> 2011 identified the potential visibility of the proposals within the wider landscape, taking into account topography, existing screening vegetation and other localised factors. It should be noted that identified visual effects in this Report represent the ‘worst case scenario’ as they assess visibility during the winter months. The magnitude of visual effects is often lower during periods of foliage.

#### 10.1.2 *Guidance Documents*

The following guidelines and documents have determined the methodology, terminology and assessment approach used within this Chapter.

- “Advice Notes on Current Practice in the preparation of EIS” 2003, Environmental Protection Agency, Republic of Ireland;
- “Guidelines for Landscape and Visual Assessment”, Second Edition (2002), edited by The Landscape Institute and Institute of Environmental Management and Assessment;



- “Photography and Photomontage in Landscape and Visual Impact Assessment”, Landscape Institute, Advice Note 01/11, March 2011;
- “Landscape and Landscape Assessment; Consultation Draft of Guidelines for Planning Authorities”, (2000), DoEHLG; and
- Kildare County Development Plan, 2011-2017.

#### 10.1.3 Definition of Terms – Landscape and Visual Effects

**Landscape effects** are defined as the result of physical changes to the fabric of the landscape resulting from new development. Such physical changes may include the addition, alteration or removal of structures or vegetation. Landscape effects can be temporary and include those caused by temporary access routes, compounds and construction traffic.

**Visual effects** relate closely to landscape effects but concern changes in views. Visual assessment concerns people’s perception and response to visual amenity. Effects may result from new elements located in the landscape that cause visual intrusion (i.e. interference with or interruption of the view).

#### 10.1.4 Definition of Magnitude and Likelihood of Effects

**Table 10-1** Criteria for the assessment of magnitude of effects on landscape character

Level	Typical criteria
<b>Negligible</b>	Very minor loss or alteration to one or more key developments / features / characteristics of the baseline i.e. pre-development landscape or view, and / or introduction of elements that are not uncharacteristic with the surrounding landscape – approximating the “no change” situation.
<b>Low</b>	Minor loss of / or alteration to one or more key elements / features / characteristics of the baseline i.e. pre-development landscape or view, and / or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.
<b>Moderate</b>	Partial loss of / or alteration to one or more key elements / features / characteristics of the baseline i.e. pre-development landscape or view, and / or introduction of elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving landscape.
<b>High</b>	Total loss of, or major alteration to key elements / features / characteristics of the baseline i.e. pre-development landscape or view, and / or introduction of elements considered as being totally

uncharacteristic when set within the attributes of the receiving environment.

**Table 10-2** Definition of magnitude/degrees of visual effects resulting from the proposal

Level	Typical criteria
<b>None</b>	No part of the development, or work or activity associated with it, is discernible
<b>Negligible</b>	Only a small part of the proposals is discernible and / or they are at such a distance that they are scarcely appreciated. Consequently they have very little effect on the scene.
<b>Slight</b>	The proposals constitute only a minor component of the wider view, which might be missed by the casual observer or receptor. Awareness of the proposals would not have a marked effect on the overall quality of the scene.
<b>Moderate</b>	The proposals may form a visible and recognisable new element within the overall scene and may be readily noticed by the observer or receptor.
<b>Substantial</b>	The proposals form a significant and immediately apparent part of the scene that affects and changes its overall character.
<b>Severe</b>	The proposals become the dominant feature of the scene to which other elements become subordinate and they significantly affect and change its character.

#### 10.1.5 Definition of Nature of Effects

The description of the *magnitude* of an effect, as defined above, relates to how much the proposals will alter the landscape character, or the extent of visibility from a particular viewpoint. The *nature* of this alteration can be described as positive (beneficial), negative (adverse) or neutral (no overall change or a balance of positive and negative effects).

#### 10.1.6 *Duration of Effects*

The Duration of effects is defined as follows:

- **Temporary** Effects lasting one year or less
- **Short Term** Effects lasting one to seven years
- **Medium Term** Effects lasting seven to fifteen years
- **Long Term** Effects lasting fifteen to sixty years
- **Permanent** Effects lasting over sixty years

also

- **Occasional**
- **Intermittent**
- **Continuous**

#### 10.1.7 *Summary*

In summary, this Report employs recognised guidelines as the basis for landscape assessment, and recognises the assessment process as being a combination of assessment of effects on views from key receptors, and of responses towards the effects of the development on landscape character.

To ensure clarity, it is deemed important to use stated terminology to define effects arising from the proposed development.

### 10.2 RECEIVING ENVIRONMENT

#### 10.2.1 *Site Context*

The proposed site is located in the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare within a Bord na Móna landholding. The proposed MBT Facility site is located approximately 1km south of the existing Drehid Waste Management Facility, 3km west of Timahoe, approximately 3.5km north of Allenwood and approximately 3km east of Derrinturn.

A local road (L5025) traverses the Bord na Móna landholding approximately 0.8km north of the existing Drehid Waste Management Facility (see Plate 10). Minor roads and tracks extend inwards on the Bord na Móna landholding on both sides of this local road. An access road to the existing Drehid Waste Management Facility enters the landholding directly from the R403 regional road and will also facilitate access to the site of the proposed MBT Facility. The R403 regional road runs to the west and south of the lands, via Derrinturn and Allenwood. The R402 regional road runs to the northwest, and the remainder of the study area is served by a local road network. There are residential and farm properties along all of the surrounding roads, with a higher density of settlement around Derrinturn and Allenwood.

The Grand Canal runs 3-4km to the south and southwest of the Bord na Móna landholding, via Allenwood and Robertstown.

### *10.2.2 Landscape Character*

#### **General**

Lands surrounding the application site are relatively flat, generally averaging 80-90mOD. The maximum height of land within the study area is 142mOD (Carbury Hill, 7km to the west). The Hill of Allen (219mOD), a landmark within the wider landscape, is located approximately 10km south of the proposed development and is outside of the study area.

The Bord Na Móna landholding is flat (apart from an existing landfill mound) with regenerating vegetation of varying heights (see Plates 3, 4, 7, 8, 10). The existing Drehid Waste Management Facility has opened up the lands at this location via a private access road (4.8km in length) primarily used by trucks. The bog has relatively large continuous land cover and its primarily open nature contrasts with the surrounding agricultural pattered landscape (see Plates 7 and 8). Regenerating vegetation is beginning to enclose some of the views within the bog as shown in Plates 3 and 4.

The Bord na Móna landholding is surrounded on all sides by agricultural pastureland with a well-developed pattern of medium-sized and larger fields and an established hedgerow infrastructure. Field hedgerows are predominantly tall and sparse, although lower in some areas, consisting largely of mature trees, including ash. The bogland also continues to the north and a network of bog train tracks remain. The eastern bog edge is bordered along much of its length by mixed coniferous and deciduous tree belts (Plate 9), and there are isolated tree plantations to the west. The site falls within the Western Boglands Landscape Character as indicated in the Kildare County Council County Development Plan 2011-2017.

There are three occupied properties lying within a 1.5km radius of the application site. Within a 4km offset there are numerous properties, in particular to the west and south of the site.

#### **Site Description**

Plates 3 and 4 look over the site from the east. The cutover bog at this location is flat and consists predominantly of regenerating scrub, including gorse and birch.

#### **Site Access**

The main access to the proposed location site for the MBT Facility is the previously constructed dedicated access road from the R403 regional road to the existing Drehid Waste Management Facility (as shown in Figure 10.1). Site Access and security is detailed in Chapter 2 of this EIS.

### *10.2.3 Site visibility – General*

Visibility of the MBT Facility site is primarily determined by local topography and local screening vegetation both on the boundary of the landholding and in the adjacent areas.

Figure 10.1 shows the location of the application site within the existing landscape and indicates the areas from within which the proposed development could potentially be seen. (Note that the MBT Facility site may not be visible from some residences and roads within these areas, owing to localised screening topography and vegetation). While visibility may be indicated on Figure 10.1, the effects of distance (greater than 3km) would greatly limit visibility of the proposal.

#### *10.2.4 Site visibility*

The main groups which could experience visual effects arising from the proposed development will be residential and farm properties located within the vicinity of the landholding, road users within parts of the study area and users of or workers at the existing Drehid Waste Management Facility. Areas with potential visibility of the proposed development are indicated by a red line on Figure 10.1.

The following currently have views of the proposed location of the MBT Facility Site:

##### **North**

Road users and properties on the L5025 road between Timahoe and Drehid Cross Roads where there is no screening intervening vegetation, see Plate 10.

##### **East**

The most western end of properties, where there is no screening intervening vegetation, at the end of access tracks leading from the L1019 road south of Timahoe.

##### **West**

Road users and properties on the L50222 road.

leading from the R403 regional road to Kilkeaskin townland, where there is no screening intervening vegetation. Some properties along the R403 regional road, including those located on minor roads with access from the regional road. Some roads and properties on higher ground to the northwest including the upper parts of Carbury Hill (although the effects of distance would greatly reduce visibility from these locations)

##### **South**

Some properties along local roads (mainly L1020) north of Allenwood, where there is no intervening vegetation between the property and the proposed site for the MBT Facility.

#### *10.2.5 Vulnerability / Sensitivity of existing views*

Existing views are on the whole important, representing a gradually changing local, predominantly agricultural and bogland environment. The greatest cause of visual change in the landscape is the regeneration occurring on the cutover bog, house building and the construction of the Drehid Waste Management Facility.

The views described in 10.2.4 above could on average be deemed to be sensitive to development of the type proposed. Where visible, the MBT Facility will represent high levels of change to existing views when seen from residential and farm properties and from roads located within a radius of 1-2km from the centre of the site.

#### *10.2.6 Planning Context*

##### **Western Boglands Landscape Character Area**

The site falls within the Western Boglands landscape character area and is described in the Kildare Development Plan as being of Medium Sensitivity. The Development Plan states that “medium sensitivity landscapes can accommodate development pressure but with limitations in the scale and magnitude.” Landscape policies in relation to the Boglands character area are listed below:

LL 1: To recognise that the lowlands are made up of a variety of working landscapes, which are critical resources for sustaining the economic and social well-being of the county.

LL 2: To continue to permit development that can utilise existing structures, settlement areas and infrastructure, whilst taking account of the visual absorption opportunities provided by existing topography and vegetation.

LL 3: To recognise that this lowland landscape character area includes areas of significant landscape and ecological value, which are worthy of protection.

LL 4: To recognise that intact boglands are critical natural resources for ecological and environmental reasons.

LL 5: To recognise that cutaway and cut-over boglands represent degraded landscapes and/or brownfield sites and thus are potentially robust to absorb a variety of appropriate developments.

##### **Scenic Routes**

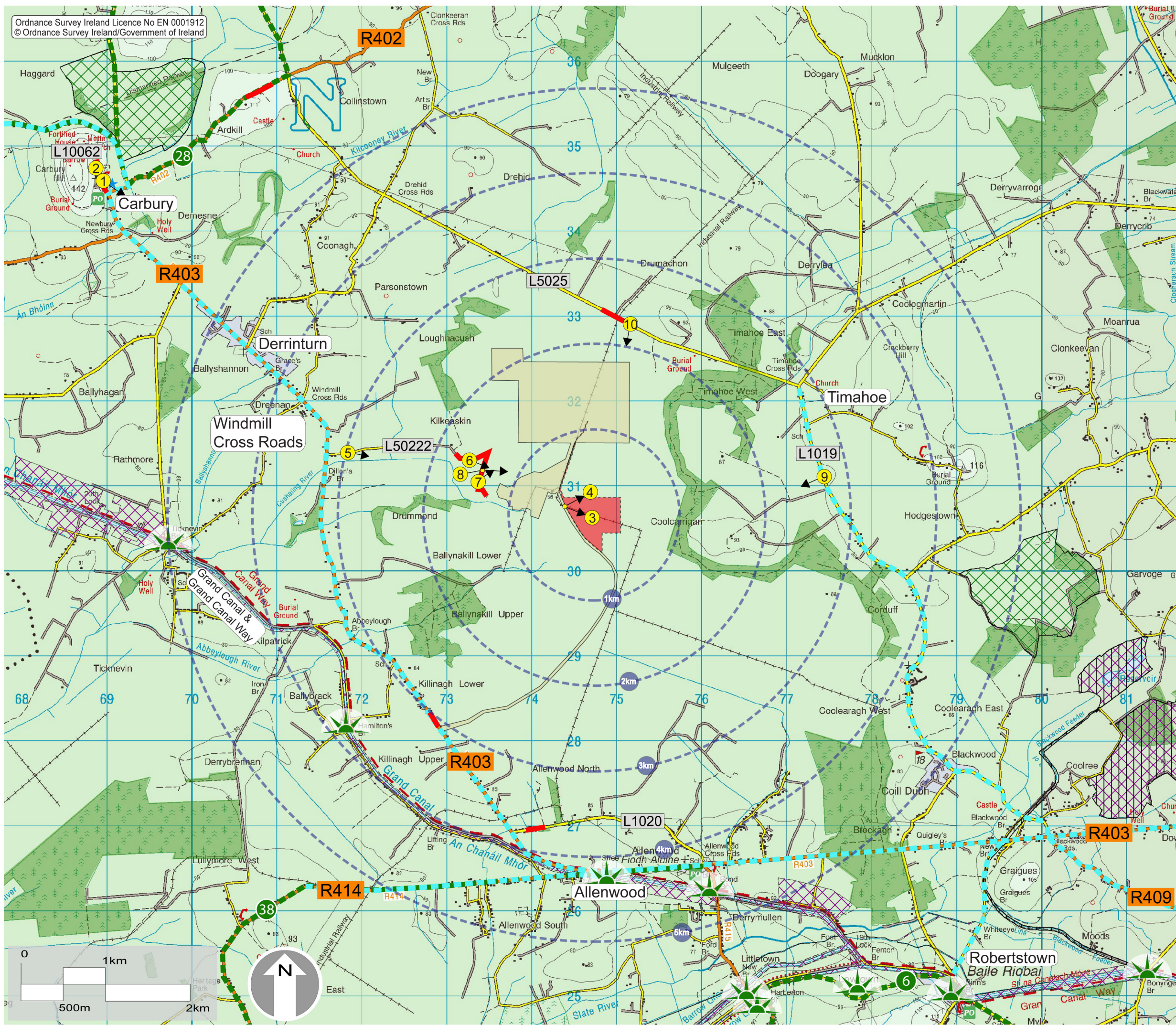
**The following scenic routes as described in the Kildare County Development Plan 2011-2017 have been identified within the study area and are indicated on Figure 10.1:**

- Scenic Route No. 6 - Views of Robertstown Countryside and Views across the canal;
- Scenic Route No. 28 – Views from county roads (L5017 and L26) of Carbury Castle and Hill: Teelough road junction with the R402 regional road and upland area at Mylerstown;
- Scenic Route No. 38 – Views of Allenwood to Lullymore Local Road; and



- North Kildare Tourist Route - The North Kildare Tourist Route is signposted along some of the roads in the study area and indicated on Figure 10.1.





**KEY**

3

Viewpoint location (VP 1-10)

Kilometres distance from centre of site

Open views towards the site

Proposed site location

Existing Waste Management Facility

6

Scenic Route and views as outlined in Kildare County Development Plan 2011 - 2017

Scenic Viewpoints as outlined in Kildare County Development Plan 2011 - 2017

North Kildare Tourist Route

**Natura 2000 sites**  
according to National Parks and Wildlife Service (NPWS)

Natural Heritage Area (NHA)

Proposed Natural Heritage Area (pNHA)

Special Area of Conservation (SAC)

**URS**

URS Ireland Limited  
6-8 Iveagh Court  
Harcourt Road  
Dublin 2  
  
Tel 00353 1 451 5100  
Fax 00353 1 451 5101  
www.ursglobal.com

DREHID MECHANICAL  
BIOLOGICAL TREATMENT  
(MBT) FACILITY

VISUAL IMPACT  
AND PLATE LOCATIONS

FIGURE 10.1

April 2012

Drawn: MS

Checked: DB





**Plate 1 (Panoramic):** View southeast from the L10062, at the entrance to Carbury Church of Ireland Parish Church.



**Plate 2 (Panoramic):** View southeast from the L10062, at the entrance to Carbury Hill site.





**Plate 3 (Panoramic):** View southeast towards the proposed site from the Waste Management Facility access road.



**Plate 4 (Panoramic):** View northeast towards the proposed site from the Waste Management Facility access road.





**Plate 5 (Panoramic):** View east from the L50222.



**Plate 6 (Panoramic):** View southeast from the L50222.





**Plate 7 (Panoramic):** View northeast from the L50222. Note existing Waste Management Facility on the horizon.



**Plate 8 (Panoramic):** View east from the L50222 towards proposed facility site.





**Plate 9 (Panoramic):** View west from the L1019, 1km south of Timahoe. Note screening effects of bands of tree plantations in distance.



**Plate 10 (Panoramic):** View south from the L5025, 2km west of Timahoe towards proposed MBT site. Note existing Waste Management Facility on right side of photograph.



### Scenic Viewpoints

The following scenic viewpoints as described in the Kildare County Development Plan 2011-2017 have been identified within the study area and are indicated on Figure 10.1:

- Views to and from bridges on the Grand Canal.

As well as these specific viewpoints, the Kildare County Development Plan also mentions the sensitivity of views to and from waterways and to and from hills.

### Areas designated for Ecological Importance – Natura 2000 sites

Special Areas of Conservation (SACs), proposed Natural Heritage Areas (pNHAs), and Special Protection Areas (SPAs) produced by the NPWS for County Kildare were taken into consideration in relation to designations at national level. While these designations are primarily concerned with ecological issues, their potential amenity value warrants assessment in terms of landscape value. The following Natura 2000 sites are located within the study area and are indicated in Figure 10.1:

#### Special Areas of Conservation (cSAC)

Ballynafagh Bog	000391
Ballynafagh Lake	001387

#### Proposed Natural Heritage Areas (pNHAs)

Ballynafagh Bog	001391
Ballynafagh Lake	001387
Grand Canal	002104

#### Natural Heritage Areas (NHAs)

Carbury Bog	001388
Hodgestown Bog	001393

### 10.3 POTENTIAL EFFECTS

The proposal is described in detail in Chapter 2 of this EIS. The following aspects of the scheme would potentially have landscape and visual effects on the site and surrounding areas:

- Buildings (maximum height 14.69m) including stacks (maximum 20m in height) and other structures;
- External hard standing areas, car parks and roads;
- Surface water management infrastructure; and
- Increase in traffic (but no physical change to the existing entrance from the R403 regional road).

#### 10.3.1 *Potential Effects of Configuration A (MBT with Composting)*

##### 10.3.1.1 Visual Effects

The extent of visibility of the proposed development is indicated with red lines on Figures 10.1.

##### **Views in the immediate vicinity of the applicant site**

The proposed MBT Facility would be visible at close range from the existing private access road to the Drehid Waste Management Facility within the Bord na Móna landholding as shown on Plates 3 and 4. The visual effects at such close range would be **substantial and negative**, but given the context of the site in the vicinity of the existing Drehid Waste Management Facility, the nature of the visual effects would be **neutral**. Long term visual effects may be mitigated by the retention of existing vegetation and the planting of new vegetation on site, see section 10.4 below.

##### **Views from within 3km of the site**

The viewpoints indicated in Plates 6, 7 and 8 and 10 would experience open or partial views of the proposed MBT Facility with resulting **negligible to moderate** visual effects.

The highest visual effects would be on views from the local road (L50222) to the immediate west of the application site. Views of the MBT Facility would be partial for most of this road, due to intervening screening and a viewing distance of over 1km (see Plates 5 and 6) with resulting **negligible** visual effects. However, views open up for the final approximate 500m of this road (see Plates 7 and 8) and as there is little intervening vegetation, open views of the MBT Facility would be possible. While this road is quite remote, there is one recently constructed house at the end of the road. The nature of visibility of the existing Drehid Waste Management Facility is indicated on Plate 7. The MBT Facility would be equally visible on the horizon, though appearing smaller. The resulting visual effects would be **moderate and negative** during construction and on completion of the MBT Facility from this location. The

long term visual effects may be mitigated by the retention of existing vegetation, see section 10.4 below.

There is a short stretch of approximately 300m of road, 2km west of Timahoe, where the roadside vegetation opens up to reveal open views of the Bord na Móna landholding, regenerating scrub and the existing Drehid Waste Management Facility as shown in Plate 10. The upper parts of the proposed MBT Facility may be visible over the existing trees in the distance, but the visual effects would be **slight and negative**.

Apart from these two areas, the remainder of the study area, within a 3km radius of the site, would generally not experience any visibility of the MBT Facility. There may be some views of the upper parts of the proposal from the properties on roads along the edges of the bog where there is no intervening vegetation of significance between the viewpoint and the MBT Facility buildings, visual effects in these areas would be **slight and negative**. The forestry plantations ringing most of the Bord na Móna landholding and the flat nature of the landscape would generally screen the MBT Facility from the surrounding areas.

#### **Views from 3km+ radius of the site**

Carbury Hill is an elevated area, 7km to the northwest of the application site, within a generally flat landscape and, as such, commands distant views in every direction. Intervening mature vegetation would screen the proposed MBT Facility. This, combined with the effects of distance would render visual effects on this location as **negligible**.

The Hill of Allen, located approximately 10km south of the proposed site, similar to Carbury Hill, commands long distance views in every direction. The visual effects on views north towards the proposed development site is considered **negligible** due to intervening vegetation and the effects of distance.

There would be a **slightly negative** visual effect as a result of an increase in traffic movements at the existing entrance to the Bord na Móna landholding from the R403 regional road. The facility itself would not be visible from the existing entrance or the R403 regional road.

#### **10.3.1.2 Landscape Effects**

The landscape contained within the study area is sensitive to change. Any new proposal should avoid significant effects on the existing character of the landscape in terms of location, design and visual prominence.

The landscape character of the Bord na Móna landholding has undergone change – from an initially intact bog, to large scale peat extraction, to a landscape of regenerating cutover bog and more recently to one which includes industrial waste management. The permitted Drehid Waste Management Facility is located approximately 1km north of the MBT Facility site. The construction of the proposed MBT Facility is therefore not significantly uncharacteristic within the context of recent landscape character change and will therefore have **low to moderate negative** localised effects on landscape character.

Views from outside of the site boundary are limited. However, due to intervening vegetation, effects on the character of the wider landscape are generally negligible. The retention of as much of the existing tree/scrub cover as possible, and minimal interference with the existing landscape outside of the MBT Facility site boundary, in conjunction with new planting will prove valuable in mitigating the landscape effects.

#### *10.3.2 Potential Effects of Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The difference in the landscape and visual effects between Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) are considered **negligible and neutral** and therefore the potential effects for Configuration B are the same as the potential effects described in 10.3.1 above.

#### *10.3.3 The do-nothing impact*

All components of the environment are constantly changing due to a combination of natural and human processes. When predicting likely effects it is important to remember that there are two available for comparison: the existing environment and the environment as it will be in the future if no development of any kind were to take place – the ‘do nothing ‘ impact.

In landscape terms, if the MBT Facility were not constructed, the bog would continue to regenerate to form an area of established woodland.

#### *10.3.4 Effects on Designated Areas*

There will be no effects on any of the designated scenic routes and views and areas listed in section 10.2.6 above.

#### *10.3.5 Construction effects*

Short term visual effects during the construction stage would occur in the vicinity of the various scheme elements and along the roads where construction traffic will travel. The effects arising during construction will result from machinery, personnel, excavations and traffic movements and occur over the same areas identified in Section 10.2.3 & 10.2.4 above. The landscape and visual effects at construction stage will be **temporary, slight to moderate and negative**.

#### *10.3.6 Cumulative effects*

The following definitions are used to determine cumulative effects on visual effects.

### Definition of types of cumulative effects

#### In combination

Where two or more features are seen together at the same time from the same place, in the same (arc of) view where their visual effects are combined.

#### In succession

Where two or more features are present in views from the same place (viewpoint) but cannot be seen at the same time, together because they are not in the same arc view – the observer has to turn to see new sectors of view whereupon the other features unfold in succession.

#### In sequence

Where two or more features are not present in views from the same place (viewpoint) and cannot, therefore, ever be seen at the same time, even if the observer moved round the arc of view, the observer has to move to another viewpoint to see the second or more of them, so they will then appear in sequence.

Views from the L50222 road located to the immediate west of the MBT Facility as indicated in Plates 7 and 8 would experience cumulative visual effects in combination as the existing Drehid Waste Management Facility and proposed MBT Facility would both be visible. The resulting cumulative visual effect would be **moderate and negative**.

Views from the L5025 road to the north of the proposed MBT Facility as indicated in Plate 10 would also experience cumulative visual effects in combination as the existing Drehid Waste Management Facility and proposed MBT Facility would both be visible though at a greater distance and with more intervening vegetation. The resulting cumulative visual effect would be **slight and negative**.

Within the Bord na Móna landholding itself, when travelling along the access road to the existing Drehid Waste Management Facility, there would be cumulative effects in combination, succession and in sequence, although given the existing land use within the overall landholding, the cumulative effect would be **moderate and negative**.



### *10.3.7 Lighting effects*

The introduction of lighting around the proposed development would bring a new element into the night landscape.

Landscape effects will be moderate to high and adverse in the immediate vicinity, as a currently dark night landscape would be replaced by a lit environment. The impact on views from longer distances would reduce as one moves further from the development due to effects of distance, the MBT Facility lighting being seen in the context of the existing lighting at the existing Drehid Waste Management Facility and the screening effects of intervening topography and vegetation.

The visual effects on relevant nearest residences (nearest residence is approximately 1km from the site) with current views of an unlit part of the landholding would be moderate and adverse. There would be no significant effects on longer distance views as the development would be seen in the context with other clusters of built up and lit areas.

### *10.3.8 Effects arising from plumes being emitted from stacks*

It is expected that white plumes will be released by the stacks on an intermittent basis. The visibility of plumes will depend on ambient air conditions and temperatures, which will also vary due to seasonal aspects. It is likely that the plumes would be more visible in winter, when ambient temperatures are lower.

The general landscape effects of the plumes would be moderate and the visual effects of the plumes would be slight-moderate, negative, and intermittent in nature.

## **10.4 MITIGATION MEASURES**

### *10.4.1 Mitigation Measures for Configuration A (MBT with Composting)*

#### **10.4.1.1 Location**

The location of the proposed MBT Facility generally provides good screening within the landscape due to its distance to sensitive receptors and the screening effects of intervening vegetation.

#### **10.4.1.2 Landscape design**

A landscape plan has been prepared for the site (Landscape Plan Dwg 601). This indicates:

- Retention of a strip of minimum 15m width around the MBT Facility Site boundary to retain and protect existing vegetation including details of fencing to protect existing trees;
- Gaps within the 15m wide strip along the site boundary are to be planted with a Native Woodland Planting Mix as per schedule to enhance existing screening of

the site, and to establish a continuous band of woodland around the proposed MBT Facility Site to mitigate potential visibility from surrounding areas;

- Retention of excavated peat and subsoil on site and laid out as low mounds with sloping berms (Minimum slope 1:3). Mounds are to be left to regenerate naturally or to be planted with a Meadow Mixture (Suitable for Peatland or soil with a high peat content) or with shrubs and tree transplants. Where possible, mounding will take place in spring to allow for the longest time for vegetation to establish before the following winter. All detailed mound design will be checked by a Geotechnical Engineer for stability;
- Areas of new native tree and shrub planting in the vicinity of the Administration and Welfare Building, entrance roundabout and car park;
- Areas to be left to regenerate naturally;

The key views to be screened are from the north and west. The retention and improvement of boundary vegetation along the northern and western parts of the application site will reduce the extent of the facility and facility traffic visible from these areas.

#### **10.4.1.3 Colour, materials and lighting**

The colour of the structures will be carefully selected to minimise visibility under the site conditions. A mid brown, or mid grey would be suitable for the main buildings, security fencing and a grey colour for the part of the stacks that extend 5.30m over the buildings in order to minimise visibility at long distances. Timber post with chainlink mesh security fencing will be used. All finishes will be matt.

The lighting design of the proposed development will be designed to minimise the effects of light pollution on adjacent areas.

#### *10.4.2 Mitigation Measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The difference in the mitigation measures for potential landscape and visual effects between Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) are considered negligible and neutral and therefore the mitigation measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting) are the same as the mitigation measures described in 10.4.1 above.

### **10.5 CONCLUSION**

The most significant landscape and visual effects will occur in the immediate vicinity of the proposed MBT Facility Site, from the private access road leading to the existing Drehid

Waste Management Facility and at identified locations between approximately 1 and 2km to the west of the site and 2km to the north of the proposed site.

These localised effects will range from substantial/high in the immediate vicinity of the proposed development site within the landholding and slight/low to moderate in the identified locations within 3km of the site. It is possible to reduce these effects through retention of as much existing vegetation as possible along the site boundary within the proposed MBT Facility Site and the planting of additional native woodland. A Landscape Plan has been submitted indicating the proposed planting/mitigation proposals. The implementation of the plan will reduce the extent of the facility visible in identified views.

Overall, the site is well screened within the wider landscape and, apart from the locations identified in this Report with higher effects, landscape and visual effect arising from the proposed development is generally negligible.

## 11 TRAFFIC

### 11.1 INTRODUCTION

This Chapter assesses the potential impact that both the construction and operational phases of the proposed Mechanical Biological Treatment (MBT) Facility will have on the surrounding road network. This assessment will calculate the expected volume of traffic that will be generated by the proposed development, outline proposed haul routes that vehicles associated with the MBT Facility will follow and assess the potential impact that the generated traffic flows will have on the road network.

#### *11.1.1 Methodology*

In preparing this Chapter, TOBIN Consulting Engineers have made reference to:

- The NRA ‘Traffic and Transport Assessment Guidelines’;
- The NRA ‘Project Appraisal Guidelines’;
- The NRA Design Manual for Roads and Bridges (NRA DMRB)
- UK DMRB TA 46/97 Traffic Flow Ranges for Use in the Assessment of New Rural Roads
- Kildare County Development Plan 2011-2017; and
- NRA Traffic Counter Data available on [www.nra.ie](http://www.nra.ie).

Traffic surveys were carried out at the entrance to the Bord na Móna landholding and at 10 locations on the surrounding road network. These flows were then adjusted to take account of seasonal variation and yearly traffic growth to determine the background traffic flows for each year analysed.

Estimates for the amount of heavy goods vehicle (HGV) traffic to be generated by the construction phase of the proposed development are based on the likely number of deliveries of construction materials to the site. Estimates for the amount of HGV traffic to be generated by the operational phase of the proposed development are based on the quantities of waste and outputs that will be delivered to and from the MBT Facility. The arrival and departure of workers/staff during the construction stage and the operational stage have also been considered in this assessment. The generated traffic was then distributed onto the road network where it was combined with the background traffic flows and subsequently analysed.

As outlined in Section 11.3 herein, three traffic scenarios have been considered, two representing different operational phases of the MBT Facility and one representing the construction phase of the MBT Facility.

The existing entrance from the R403 Regional Road will also provide access to the proposed MBT Facility. This existing entrance is a priority junction and, as such, has been analysed using the Transport Research Laboratory (TRL) computer program PICADY, which is widely used for the analysis of priority junctions.

## 11.2 EXISTING ENVIRONMENT

### 11.2.1 Traffic Survey

Traffic surveys were carried out on the surrounding road network in order to determine background traffic flows on the haul routes that will be used by MBT Facility traffic. These counts were carried out by Abacus Transportation Surveys Limited, the type, location and date of which are listed below:

- Manual Classified Traffic Survey, existing site entrance on R403, Tuesday 31<sup>st</sup> January 2012 between 07:00 and 19:00
- Automated Traffic Counter, R402 East of Carbury, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R402 West of Carbury, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R403 South of Carbury, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R403 North of Canal, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R414 West of Canal, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R415 South of Allenwood, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R403 East of Allenwood, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R409 North of Goatstown, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R403 East of Prosperous, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012
- Automated Traffic Counter, R407 South of Clane, Saturday 28<sup>th</sup> January to Saturday 4<sup>th</sup> February 2012

The surveys distinguished between cars / light goods vehicles, buses and heavy goods vehicles. Details of the results of these surveys are provided in Appendix 11.1 of this Report. The locations of the traffic counts undertaken are shown in Figure 11.1.

In addition to the traffic surveys listed above, further traffic data has been sourced from Kildare County Council and the National Roads Authority.

### 11.2.2 Road Network

The proposed development is located within the townlands of Coolcorrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare within an overall landholding which is under the ownership of Bord na Móna. The site is accessible via a network of regional routes which in turn link with the National Primary Road / Motorway network. Access to the site will be provided by an existing entrance on the R403. The R403 lies south, southwest and west of the site and joins the R402 at Carbury to the northwest of the site. The permitted and operational Drehid Waste Management Facility is located within this Bord na Móna landholding approximately 1km north of the proposed site for the MBT Facility.

The haul routes to be followed by traffic associated with the proposed development are presented in Figure 11.1 and it is proposed that traffic will be dispersed over these routes. Each of these routes is via regional roads or a combination of regional roads and national primary routes. All construction contractors, and all contractors delivering waste to the proposed MBT Facility, will be issued with a map of permitted haul routes such that all materials imported into the proposed development or exported from the proposed development are transported via one of the identified haul routes. The significant majority of the roads making up the haul routes are sufficiently wide to accommodate two way HGV movement along them. Where there are narrow sections along a haul route, these sections are short in nature with ample opportunities for vehicles to pass.

Access has been provided into the previously permitted Drehid Waste Management Facility from the R403 via a previously permitted entrance and a dedicated 4.8km private access road. The existing entrance on the R403 is located within an 80km/h speed zone. The R403 has an approximate carriageway width of 6.0m in the vicinity of the site entrance. A ghost island junction with 3m wide through lanes and a 3m wide right turning lane has been provided at the existing entrance with visibility splays of 3.0 x 160m in accordance with NRA DMRB TD41-42.

The site is accessed from the north via the R402 and R403. The R402 is a Regional Road and provides access from the M4 Motorway to the site via the R403, where the existing entrance junction is located. The R402 varies in width from between approximately 5.3m and 8.8m. There are road markings and signage along this route. The junction between the R402 and R403 is a simple priority junction with adequate visibility.

The site is accessed from the south by the R407, R409 or R415/R416, which lead to the R403. The R407 is a Regional Road, which runs from the M7 to the R403 in Clane. The carriageway width of the R407 varies between approximately 6.0m and 7.0m. The junction between the R407 and the R403 is located in Clane. It is a traffic signal controlled junction with adequate visibility.

The R409 Regional Road provides access from the M7 Naas Bypass to the R403. It is a single carriageway and varies in width from approximately 5.2m to 6.4m. The junction between the R409 and the R403 is a priority crossroads with the fourth arm being a local road. Visibility at this location is restricted for cars by the horizontal and vertical geometry of the R403, however visibility is available for HGV traffic.

The R415/R416 Regional Road provides access to the R403 from the M9 Motorway. There are 2 bridges along this route at which the road width is restricted to approximately 5.3m.

### *11.2.3 Proposed Road Network Improvements*

The R402 Enfield to Edenderry Improvement Scheme is currently under construction. A section of the R402 (from Carbury to the M4 Motorway) is currently an approved haul route for the permitted and operational Drehid Waste Management Facility and is a proposed haul route for the proposed MBT Facility. The proposed works will comprise:



- The construction of approximately 10.2 km of a two-way single carriageway road;
- The construction and realignment of affected side roads along with associated junctions;
- The construction of a roundabout junction where the proposed road crosses the existing R402 south of Carbury; and
- Associated earthworks and appropriate landscape works.

### 11.3 POTENTIAL IMPACTS

Both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) will have the same footprint and will accept similar volumes of waste. It is expected that the volume of outputs produced by Configuration B (MBT with Dry Anaerobic Digestion and Composting), that will require an outward destination, will be marginally greater than the volume of outputs produced by Configuration A (MBT with Composting). As such, and as a worst case scenario, the Configuration B traffic volumes are used in this assessment.

#### *11.3.1 Existing and Proposed Development (Scenarios)*

The existing Drehid Waste Management Facility located within the Bord na Móna landholding consists of a landfill operation and a composting facility. The landfill is currently permitted to accept 360,000 tonnes of waste per annum until 1<sup>st</sup> December 2013. Thereafter the existing landfill will be permitted to accept 120,000 tonnes of waste per annum until 2028.

Given that approximately 69,617 tonnes of outputs from the proposed MBT Facility will be accepted at the existing landfill for the remainder of its operational life, there will be a corresponding reduction in the amount of waste accepted directly at the existing landfill from external sources. Following the commencement of operations at the proposed MBT Facility, it is envisaged that the existing landfill will accept approximately 50,383 (i.e. 120,000 – 69,617) tonnes per annum directly from external sources. The operation of the proposed MBT Facility during the remaining life of the existing landfill is referred to in subsequent sections as Scenario 1. This scenario is relevant from 2015 (envisaged year of commencement of operations at the MBT Facility) until 2028 (year that the existing landfill's current planning permission is due to expire).

As the existing landfill's current planning permission to accept waste is due to expire in 2028, a further scenario (Scenario 2) is considered whereby all MBT outputs are exported out of the Bord na Móna landholding to alternative destinations. This scenario is relevant from 2028 onwards.

A planning search of the areas surrounding the proposed development has been carried out. Committed development recorded consists of domestic structures. These are assumed to be accounted for within annual growth factors applied to the traffic survey data.

### 11.3.2 Traffic Generation

The volume of HGV traffic that is expected to be generated by deliveries of waste to the proposed Drehid MBT Facility, upon commencement of the operational phase of the proposed MBT Facility has been estimated, as presented in Table 11.1. Given that the envisaged year of commencement of the operational phase of the proposed MBT Facility is 2015, it should be noted that the existing landfill will have reverted from a permitted waste acceptance of 360,000 tonnes per annum to a permitted waste acceptance of 120,000 tonnes per annum at that point.

Table 11.1 below provides a breakdown of the estimated HGV traffic generated by waste deliveries to the proposed MBT Facility for both Scenario 1 (where certain MBT outputs are accepted at the existing landfill) and Scenario 2 (where all MBT outputs (excluding biogas) are transported out of the Bord na Móna landholding on to the surrounding road network). Due to the acceptance of certain MBT outputs at the existing landfill, the volume of HGV traffic delivering material directly to the existing landfill from external sources will be reduced. To account for this reduction, the landfill HGV traffic generation has been considered in Scenario 1.

**Table 11-1 Estimated Deliveries to the existing landfill and the MBT Facility from 2015**

Estimated Deliveries to the existing Landfill and the proposed MBT Facility from 2015				
Facility	Volume (tonnes per annum)	Deliveries per year <sup>1</sup>	Deliveries per day <sup>2</sup>	Deliveries per hour <sup>3</sup>
<b>Scenario 1:</b>				
<b>Deliveries to Landfill</b>				
Direct to Landfill	50,383	2,520	8	1
<b>Deliveries to Proposed MBT Facility:</b>				
MBT Plant	250,000	12,500	40	4
<b>Scenario 1 Total</b>	<b>300,383</b>	<b>15,020</b>	<b>48</b>	<b>5</b>
<b>Scenario 2:</b>				
<b>Deliveries to Proposed MBT Facility:</b>				
MBT Plant	250,000	12,500	40	4
<b>Scenario 2 Total</b>	<b>250,000</b>	<b>12,500</b>	<b>40</b>	<b>4</b>

**Notes**

- (1) Bulk Haulage Vehicles – 20 tonne payloads assumed
- (2) 312 working days assumed based on 52 weeks per year and 6 days per week
- (3) 10 hour working day assumed
- (4) Numbers of trips have been rounded up to nearest whole number. In the hourly figures presented, this may result in some overestimating of the number of vehicles

As previously outlined, the proposed MBT Facility will produce outputs that require an onward destination. Table 11.2 below provides an estimate of the volume of HGV traffic that will be generated by the departure of outputs from the proposed MBT Facility, on to the surrounding road network, upon commencement of operations at the proposed MBT Facility during both Scenario 1 and Scenario 2. As with the deliveries in Table 11.1, the existing landfill is considered in Scenario 1.

**Table 11-2 Estimated HGV Traffic Departing the existing landfill and the MBT Facility from 2015**

Estimated HGV Traffic Departing the existing Landfill and the proposed MBT Facility from 2015				
Facility	Volume (tonnes per annum)	Total Departures per year <sup>1</sup>	Departures per day <sup>2</sup>	Departures per hour <sup>3</sup>
<b>Scenario 1:</b>				
<b>Departures from Landfill</b>				
Landfill Leachate <sup>6</sup>	10,768	469	2	1
<b>Departures from Proposed MBT Facility:</b>				
Recovered Recyclables	37,397	1,870	6	1
SRF Produced	78,159	3,908	13	2
Waste Water <sup>5</sup>	3,285	329	1	1
<b>Sub – Total</b>	<b>118,841</b>	<b>6,107</b>	<b>20</b>	<b>4</b>
<b>Scenario 1 Total</b>	<b>129,609</b>	<b>6,576</b>	<b>22</b>	<b>5</b>
<b>Scenario 2:</b>				
<b>Departures from Proposed MBT Facility:</b>				
Recovered Recyclables	37,397	1,870	6	1
SRF Produced	78,159	3,908	13	2
Biostabilised Waste	50,084	2505	8	1
Rejects	19,533	977	4	1
Waste Water <sup>5</sup>	3,285	329	1	1
<b>Scenario 2 Total</b>	<b>188,458</b>	<b>9,588</b>	<b>32</b>	<b>6</b>

Notes

- (1) Bulk Haulage Vehicles - 20 tonne payloads assumed
- (2) 312 working days assumed based on 52 weeks per year and 6 days per week
- (3) 10 hour working day assumed
- (4) Numbers of trips have been rounded up to nearest whole number. In the hourly figures presented, this may result in some overestimating of the number of vehicles
- (5) Waste water will be produced by Configuration B (MBT with Dry Anaerobic Digestion and Composting) only. It is assumed the tanker used to transport this waste water off site will be capable of carrying 10m<sup>3</sup>
- (6) Landfill leachate is transported off site using 23m<sup>3</sup> tankers and collected on 5 days per week

When the baseline traffic counts were undertaken in early 2012, the traffic generated by the existing landfill was on the basis of a permitted waste acceptance of 360,000 tonnes of material per annum. Due to the interaction between the proposed MBT Facility and the existing landfill in Scenario 1, this Chapter has taken into consideration the HGV traffic associated with the existing landfill in addition to the proposed MBT Facility traffic. The net increase in HGV traffic due to the proposed MBT Facility during Scenario 1 will, therefore, be the volumes of HGV traffic presented in Tables 11.1 and 11.2 above, less the existing HGV traffic generated by the operation of the landfill.

As the existing landfill will have ceased to operate during Scenario 2, the net increase in HGV traffic for this scenario will be the volumes of traffic presented in Tables 11.1 and 11.2 above, less the existing HGV traffic generated by the operation of the landfill.

The volumes of HGV traffic generated by the existing landfill operating at a waste acceptance of 360,000 tonnes per annum are shown in Table 11.3 below.

**Table 11-3 Estimated HGV Traffic Generated by the existing landfill operating at 360,000 tonnes per annum**

Estimated HGV Traffic Generated by the existing Landfill Operating at 360,000 tonnes per Annum				
Facility	Volume (tonnes per annum)	Total Trips per year <sup>1</sup>	Trips per day <sup>2</sup>	Trips per hour <sup>3</sup>
Landfill	360,000	18,000	58	6
Landfill Leachate <sup>5</sup>	10,768	469	2	1
<b>Total</b>	<b>370,768</b>	<b>18,469</b>	<b>60</b>	<b>7</b>

Notes

- (1) Bulk Haulage Vehicles - 20 tonne payloads assumed
- (2) 312 working days assumed based on 52 weeks per year and 6 days per week
- (3) 10 hour working day assumed
- (4) Numbers of trips have been rounded up to nearest whole number. In the hourly figures presented, this may result in some overestimating of the number of vehicles
- (5) Landfill leachate is transported off site using 23m<sup>3</sup> tankers and collected on 5 days per week

A summary of the increase in daily HGV traffic as a result of the proposed MBT Facility is shown in Table 11.4 below for both Scenario 1 and Scenario 2:

**Table 11-4 Estimated Net Increase in Daily HGV Traffic Due to Proposed MBT Facility**

Estimated Net Increase in Daily HGV Traffic Due to Proposed MBT Facility		
Facility	Combined Daily Deliveries and Departures	Total Daily Increase <sup>5</sup> (HGV Movements)
<b>Scenario 1:</b>		
Drehid MBT Facility <sup>1</sup>	60	120
Net Change in Landfill Operations <sup>2</sup>	(50)	(100)
<b>Scenario 1 Total</b>	<b>10</b>	<b>20</b>
<b>Scenario 2:</b>		
Drehid MBT Facility <sup>3</sup>	72	144
Net Change in Landfill Operations <sup>4</sup>	(60)	(120)
<b>Scenario 2 Total</b>	<b>12</b>	<b>24</b>

Notes

- (1) Combined deliveries and departures for the proposed MBT during Scenario 1. Values taken from tables 11.1 and 11.2 (i.e. 40 deliveries + 20 departures daily)
- (2) Net change in landfill HGV traffic resulting from interaction between the proposed MBT Facility and the existing landfill during Scenario 1. Values taken from tables 11.1, 11.2 and 11.3 (i.e. 8 deliveries + 2 departures – 60 (daily HGV traffic generated by the existing landfill operating at 360,000 tonnes per annum))
- (3) Combined deliveries and departures for the proposed MBT in Scenario 2. Values taken from tables 11.1 and 11.2 (i.e. 40 deliveries + 32 departures daily)
- (4) Net change in landfill HGV traffic resulting from cessation of landfill operations during Scenario 2. Values taken from tables 11.3 only as the existing landfill will have ceased to operate in Scenario 2 (daily HGV traffic will reduce by the HGV traffic generated by the existing landfill operating at 360,000 tonnes per annum)
- (5) It is assumed that each delivery to and departure from the Bord na Móna Landholding will result in a corresponding empty vehicle departing or arriving at the site respectively. This is considered a worst case scenario.

The MBT is expected to employ a total of 74 operational staff. The mechanical treatment process at the Drehid MBT Facility will operate 6 days per week (Monday to Saturday inclusive) and for 16 hours per day (on a two shift basis). The SRF drying process and the biological treatment process will operate on a continuous basis (24 hours per day and 7 days per week) and will be fully automated. It is envisaged that there will be two operators required at the MBT Facility, between the hours of 02.00 and 08.00, to supervise the SRF drying process.

Staff numbers will be broken down per shift as follows:

- 40 staff in the day (includes 8 admin staff) (08.00 to 17.00)
- 32 staff in the evening (17.00 to 02.00)
- 2 staff during the night (02.00 to 08.00)

A summary of the hourly traffic (HGV and LGV) that will be arriving at and departing from the proposed MBT Facility upon commencement of operations of the MBT Facility is shown in Table 11.5 below for both Scenario 1 and Scenario 2. Due to the interaction of the proposed MBT Facility and the existing landfill during Scenario 1, the traffic associated with the landfill is included for this scenario.

**Table 11-5 Estimated Increase in Hourly Traffic Generation Operational Phase**

Estimated Increase in Hourly Traffic Generated by the Proposed MBT Facility Operational Phase				
Facility	HGVs		Cars/LGVs	
	Vehicles In	Vehicles Out	Vehicles In	Vehicles Out
<b>Scenario 1:</b>				
<b>AM Peak:</b>				
Drehid MBT Facility <sup>6</sup>	8	8	40	2
Net Change in Landfill Operations <sup>4,5,7</sup>	(5)	(5)	0	0
<b>Sub - Total</b>	<b>3</b>	<b>3</b>	<b>40</b>	<b>2</b>
<b>PM Peak:</b>				
Drehid MBT Facility <sup>6</sup>	8	8	32	40
Net Change in Landfill Operations <sup>4,5,7</sup>	(5)	(5)	0	0
<b>Sub - Total</b>	<b>3</b>	<b>3</b>	<b>32</b>	<b>40</b>
<b>Scenario 2:</b>				
<b>AM Peak:</b>				
Drehid MBT Facility <sup>8</sup>	10	10	40	2
Net Change in Landfill Operations <sup>4,9,10</sup>	(7)	(7)	(20)	(3)
<b>Sub - Total</b>	<b>3</b>	<b>3</b>	<b>20</b>	<b>(1)</b>
<b>PM Peak:</b>				
Drehid MBT Facility <sup>8</sup>	10	10	32	40
Net Change in Landfill Operations <sup>4,9,10</sup>	(7)	(7)	(1)	(20)
<b>Sub - Total</b>	<b>3</b>	<b>3</b>	<b>31</b>	<b>20</b>

Notes

- (1) 10 hour working day assumed
- (2) Numbers of trips have been rounded up to nearest whole number
- (3) For the operational phase, as a worst case scenario, it is assumed that vehicles delivering waste to the proposed MBT facility will subsequently depart empty and vehicles departing with outputs will have previously arrived empty. This is considered a worst case scenario. As such, numbers taken from Tables 11.1 & 11.2 have been included in both incoming and outgoing figures
- (4) Light vehicles associated with the existing landfill have been taken from traffic count data.
- (5) Light vehicles volumes associated with the landfill will not change during Scenario 1
- (6) Combined deliveries and departures for the proposed MBT during Scenario 1. Values taken from tables 11.1 and 11.2 (i.e. 4 deliveries + 4 departures hourly)



- (7) Net change in traffic resulting from interaction between the proposed MBT and the existing landfill during Scenario 1. Values taken from tables 11.1, 11.2 and 11.3 (i.e. 1 deliveries + 1 departures – 7 (hourly traffic generated by the existing landfill operating at 360,000 tonnes per annum))
- (8) Combined deliveries and departures for the proposed MBT in Scenario 2. Values taken from tables 11.1 and 11.2 (i.e. 4 deliveries + 6 departures hourly)
- (9) Net change in traffic resulting from cessation of landfill operations during Scenario 2. Values taken from tables 11.3 only as the existing landfill will have ceased to operate in Scenario 2 (i.e. hourly traffic will reduce by the traffic generated by the existing landfill operating at 360,000 tonnes per annum)
- (10) As the existing landfill will cease to operate in Scenario 2, light vehicles volumes associated with the existing landfill will not be generated during Scenario 2

The primary source of construction HGV traffic for the MBT Facility will be generated in the first year of construction. This will predominantly be related to earthworks as areas of peat will have to be removed and subsequently replaced with suitable fill. The peat will be reused for landscaping within the site so the main HGV traffic impact will be due to the importing of granular fill material. This is estimated to be approximately 184,000 tonnes of material. Assuming that this material is imported over 1 year (i.e. 286 working days based on a 5.5 day working week over 52 weeks) and in 20 tonne truck loads, this will result in approximately 33 trucks arriving at the site per day. Allowing for 10% additional trucks for other building materials that may be imported over this period results in approximately 37 trucks arriving at the site daily. Trucks that arrive will subsequently depart so there will be a total of 74 HGV movements (i.e. 37 vehicles arriving and 37 vehicles departing) generated by the construction of the proposed MBT Facility.

In addition to the HGV movements generated, it is estimated that 175 construction site staff will be required. It is assumed these will arrive during the AM peak and depart during the PM peak. A summary of the volumes of traffic that will be generated by the construction phase of the proposed MBT Facility during the AM and PM peak hours is shown in Table 11.6 below.

**Table 11-6 Estimated Hourly Traffic Generation Construction Phase**

Estimated Hourly Traffic Generation - MBT Facility Construction Phase				
Facility	HGVs		Cars/LGVs	
	Vehicles In	Vehicles Out	Vehicles In	Vehicles Out
<b>AM Peak:</b>				
MBT Construction	4	4	175	0
<b>Sub - Total</b>	4	4	175	0
<b>PM Peak:</b>				
MBT Construction	4	4	0	175
<b>Sub - Total</b>	4	4	0	175

Notes

- (1) 10 hour working day assumed
- (2) Numbers of trips have been rounded up to nearest whole number

### 11.3.3 Seasonal Adjustment

In order to undertake an analysis of any road network, it may be necessary to apply a correction factor to convert the surveyed traffic flows (as described in Section 11.2) into seasonally adjusted traffic flows to take account of the seasonal variation that is experienced with traffic surveys. This seasonally adjusted conversion factor was calculated using data taken from a fixed automatic traffic counter located on a regional road, R148, at Clonard, Co. Meath over two 12-month periods in 2009 and 2010. It was found that traffic volumes in January are approximately 26% lower than average. This would be accounted for by the holiday period. When compared to the average, flows in February vary, being slightly higher in 2010 and approximately 10% lower in 2009. As the counts have been undertaken across the divide of both months the 10% lower than average value is considered to be appropriate. Therefore a seasonal adjustment factor of 1.1 has been applied to the surveyed traffic volumes.

### 11.3.4 Traffic Growth

In respect of the proposed MBT Facility, this traffic assessment assumes an opening year of 2015 and a design year of 2035 (opening year + 20 years). The background traffic growths used in the analysis in this Chapter are those provided in the NRA document, Project Appraisal Document – Unit 5.5 Link-Based Traffic Growth Forecasting (Published January 2011). The growth factors used are the low growth factors for region 3. Low growth rates were chosen to reflect the fact that traffic counts undertaken in 2008 indicate that traffic flows on these roads have not increased significantly in the period between then and 2012 when the more recent counts were undertaken. As traffic count data was obtained in differing years, several growth factors have been used. Factors applied are as follows:

- Cars: 1.065 growth factor from 2007 to 2014
  - 1.074 growth factor from 2007 to 2015
  - 1.205 growth factor from 2007 to 2028
  - 1.214 growth factor from 2007 to 2029
  - 1.273 growth factor from 2007 to 2035
  - 1.055 growth factor from 2008 to 2014
  - 1.064 growth factor from 2008 to 2015
  - 1.194 growth factor from 2008 to 2028
  - 1.214 growth factor from 2008 to 2029
  - 1.262 growth factor from 2008 to 2035
  - 1.036 growth factor from 2010 to 2014
  - 1.046 growth factor from 2010 to 2015
  - 1.173 growth factor from 2010 to 2028
  - 1.214 growth factor from 2010 to 2029
  - 1.240 growth factor from 2010 to 2035
  - 1.018 growth factor from 2008 to 2014
  - 1.027 growth factor from 2012 to 2015
  - 1.152 growth factor from 2012 to 2028
  - 1.161 growth factor from 2012 to 2029
  - 1.218 growth factor from 2012 to 2035

- HGVs: 1.036 growth factor from 2007 to 2014
  - 1.041 growth factor from 2007 to 2015
  - 1.103 growth factor from 2007 to 2028
  - 1.214 growth factor from 2007 to 2029
  - 1.109 growth factor from 2007 to 2035
  - 1.030 growth factor from 2008 to 2014
  - 1.036 growth factor from 2008 to 2015
  - 1.096 growth factor from 2008 to 2028
  - 1.097 growth factor from 2008 to 2029
  - 1.104 growth factor from 2008 to 2035
  - 1.020 growth factor from 2010 to 2014
  - 1.025 growth factor from 2010 to 2015
  - 1.085 growth factor from 2010 to 2028
  - 1.086 growth factor from 2010 to 2029
  - 1.093 growth factor from 2010 to 2035
  - 1.010 growth factor from 2012 to 2014
  - 1.015 growth factor from 2012 to 2015
  - 1.074 growth factor from 2012 to 2028
  - 1.076 growth factor from 2012 to 2029
  - 1.082 growth factor from 2012 to 2035

#### 11.3.5 Trip Distribution

In order to analyse the effect that the proposed MBT Facility will have on the surrounding road network, a number of different distribution scenarios were tested. These were used in order to observe the expected percentage increase in traffic on the R403 and surrounding road network.

The haul routes to be followed are presented in Figure No. 11.1 and it is proposed that traffic will be spread over these routes. The exact distribution pattern of traffic generated by the MBT Facility is not known so a series of stress tests have been applied to the haul routes using differing distribution patterns in an attempt to illustrate both the highly unlikely scenario, where all traffic travels to and from the development in the same direction, and the more likely scenarios where generated traffic is split in some proportion. The stress tests considered in this Report are as follows:

- Stress Test 1 – 100% north & 0% south
- Stress Test 2 – 67% north & 33% south
- Stress Test 3 – 50% north & 50% south
- Stress Test 4 – 33% north & 67% south
- Stress Test 5 – 0% north and 100% south

The results of the stress tests are presented in Tables 11.7 – 11.11. These tables show the percentage increases in both total traffic and HGV traffic for operational Scenario 1 (years 2015 and 2028 considered), operational Scenario 2 (2029 and 2035

considered) and the construction phase (2014 considered) for each road forming part of the proposed haul routes.

The percentage increases in total traffic along each road forming part of the haul routes are below 10% for all operational scenarios. The NRA Traffic and Transport Assessment Guidelines uses a 10% increase in traffic resulting from a development as a threshold for undertaking a capacity assessment of non-congested roads and a threshold of a 5% increase in traffic from a development in locations with the potential to become congested. The roads forming the haul routes are not considered to be congested and as the net percentage increase in traffic during the operational scenarios is significantly below the 10% threshold (with the maximum net percentage increase recorded as 4.51%), the impact vehicles associated with the MBT Facility will have in terms of traffic flows and potential congestion will be minor. The maximum percentage increases in total traffic along each road forming part of the haul routes are below 12% for the construction phase, the majority of which is made up of LGV traffic. This impact will be greater than that of the operational phase but this is only a temporary impact. It is worth noting that, in actuality, the percentage increase in total vehicles will be less than 12% on the basis that traffic arriving from or departing to the south will be dispersed over the R415, R409 and R407. All the stress tests, involving traffic arriving from or departing to the south, consider the highly unlikely scenario of all traffic travelling along the R415, R409 and R407.

Table 11.7 - Stress Test 1 - Percentage Traffic Increase (100% traffic travels to/from the north)

														Scenario 1				Scenario 2				Construction							
		Trip Generation		Net %Total Increase				Net %HGV Increase				Trip Generation		Net %Total Increase				Net %HGV Increase				Trip Generation		% Total Increase		%HGV Increase			
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2014	2014
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27599	8.11	148	20	0.71	0.64	0.98	0.93	103	24	0.48	0.46	1.11	1.08	350	74	1.82	3.65
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	148	20	0.41	0.37	0.72	0.68	103	24	0.28	0.26	0.81	0.79	350	74	1.04	2.70
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	148	20	4.44	3.98	12.21	11.50	103	24	2.98	2.85	13.79	13.57	350	74	11.30	45.13
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	148	20	2.97	2.66	7.60	7.20	103	24	2.00	1.91	8.61	8.42	350	74	7.55	28.23
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	148	20	3.40	3.07	4.75	4.48	103	24	2.30	2.20	5.37	5.26	350	74	8.66	17.66
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00

Notes:  
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012  
Traffic counts M04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010  
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.  
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.



Table 11.8 - Stress Test 2 - Percentage Traffic Increase (67% traffic travels to/from the north, 33% traffic travels to/from the south)

														Scenario 1						Scenario 2						Construction					
		Trip Generation		Net %Total Increase				Net %HGV Increase				Trip Generation		Net %Total Increase				Net %HGV Increase				Trip Generation		%Total Increase		%HGV Increase					
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2014	2015		
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	99	13	0.48	0.43	0.66	0.62	69	16	0.32	0.31	0.74	0.72	235	50	1.22	2.44		
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	99	13	0.27	0.25	0.48	0.45	69	16	0.18	0.18	0.55	0.53	235	50	0.70	1.81		
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	99	13	2.97	2.67	8.18	7.70	69	16	2.00	1.91	9.24	9.09	235	50	7.57	30.24		
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	99	13	1.99	1.78	5.09	4.82	69	16	1.34	1.28	5.77	5.64	235	50	5.06	18.91		
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	99	13	2.28	2.05	3.18	3.00	69	16	1.54	1.48	3.60	3.53	235	50	5.80	11.83		
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	49	7	1.12	1.01	1.57	1.48	34	8	0.76	0.73	1.77	1.74	116	24	2.86	5.83		
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	49	7	1.18	1.06	1.86	1.76	34	8	0.80	0.76	2.11	2.07	116	24	3.00	6.93		
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	49	7	1.53	1.37	4.58	4.32	34	8	1.03	0.98	5.17	5.07	116	24	3.89	17.09		
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	49	7	0.79	0.71	1.86	1.76	34	8	0.53	0.51	2.10	2.06	116	24	2.01	6.90		
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	49	7	1.49	1.33	4.17	3.93	34	8	1.00	0.96	4.72	4.63	116	24	3.79	15.46		
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	49	7	0.59	0.53	2.47	2.33	34	8	0.40	0.38	2.79	2.73	116	24	1.51	9.14		
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	49	7	0.40	0.35	1.22	1.16	34	8	0.27	0.25	1.39	1.36	116	24	1.01	4.55		
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	49	7	0.76	0.69	2.01	1.89	34	8	0.51	0.49	2.27	2.18	116	24	1.95	7.45		
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	49	7	0.81	0.73	1.08	1.02	34	8	0.55	0.53	1.22	1.17	116	24	2.07	4.02		
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	49	7	0.09	0.08	0.13	0.12	34	8	0.06	0.06	0.14	0.14	116	24	0.23	0.47		
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	49	7	0.10	0.09	0.14	0.13	34	8	0.07	0.06	0.16	0.15	116	24	0.25	0.52		

Notes:  
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012  
Traffic counts M04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010  
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.  
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

Table 11.9 - Stress Test 3 - Percentage Traffic Increase (50% traffic travels to/from the north, 50% traffic travels to/from the south)

		Scenario 1												Scenario 2								Construction							
		Trip Generation		Net % Total Increase				Net %HGV Increase				Trip Generation		Net % Total Increase		Net %HGV Increase		Trip Generation		% Total Increase		%HGV Increase							
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2014	2014
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	74	10	0.36	0.32	0.49	0.46	52	12	0.24	0.23	0.56	0.54	175	37	0.91	1.82
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	74	10	0.20	0.18	0.36	0.34	52	12	0.14	0.13	0.41	0.39	175	37	0.52	1.35
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	74	10	2.22	1.99	6.10	5.75	52	12	1.49	1.43	6.90	6.78	175	37	5.65	22.57
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	74	10	1.48	1.33	3.80	3.60	52	12	1.00	0.95	4.31	4.21	175	37	3.78	14.11
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	74	10	1.70	1.53	2.38	2.24	52	12	1.15	1.10	2.68	2.63	175	37	4.33	8.83
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	74	10	1.70	1.53	2.38	2.24	52	12	1.15	1.10	2.68	2.63	175	37	4.33	8.83
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	74	10	1.79	1.61	2.82	2.67	52	12	1.21	1.15	3.19	3.13	175	37	4.55	10.51
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	74	10	2.31	2.07	6.94	6.54	52	12	1.55	1.49	7.84	7.69	175	37	5.89	25.89
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	74	10	1.19	1.07	2.81	2.66	52	12	0.80	0.77	3.18	3.13	175	37	3.04	10.46
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	74	10	2.26	2.02	6.32	5.96	52	12	1.52	1.45	7.15	7.02	175	37	5.75	23.43
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	74	10	0.90	0.80	3.74	3.53	52	12	0.60	0.57	4.23	4.13	175	37	2.28	13.85
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	74	10	0.60	0.54	1.85	1.75	52	12	0.40	0.39	2.10	2.06	175	37	1.53	6.89
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	74	10	1.16	1.04	3.04	2.87	52	12	0.78	0.74	3.44	3.30	175	37	2.95	11.29
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	74	10	1.23	1.11	1.64	1.55	52	12	0.84	0.80	1.85	1.77	175	37	3.14	6.09
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	74	10	0.14	0.12	0.19	0.18	52	12	0.09	0.09	0.22	0.21	175	37	0.35	0.71
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	74	10	0.15	0.13	0.21	0.20	52	12	0.10	0.10	0.24	0.23	175	37	0.37	0.79

Notes:  
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012  
Traffic counts M04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010  
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.  
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

Table 11.10 - Stress Test 4 - Percentage Traffic Increase (33% traffic travels to/from the north, 67% traffic travels to/from the south)

		Scenario 1												Scenario 2								Construction							
		Trip Generation		Net % Total Increase				Net %HGV Increase				Trip Generation		Net % Total Increase				Net %HGV Increase				Trip Generation		% Total Increase		%HGV Increase			
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2015	2015
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	49	7	0.24	0.21	0.32	0.31	34	8	0.16	0.15	0.37	0.36	116	24	0.60	1.20
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	49	7	0.14	0.12	0.24	0.22	34	8	0.09	0.09	0.27	0.26	116	24	0.34	0.89
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	49	7	1.47	1.31	4.03	3.79	34	8	0.98	0.94	4.55	4.48	116	24	3.73	14.89
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	49	7	0.98	0.88	2.51	2.37	34	8	0.66	0.63	2.84	2.78	116	24	2.49	9.31
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	49	7	1.12	1.01	1.57	1.48	34	8	0.76	0.73	1.77	1.74	116	24	2.86	5.83
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	99	13	2.28	2.05	3.18	3.00	69	16	1.54	1.48	3.60	3.53	235	50	5.80	11.83
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	99	13	2.39	2.15	3.78	3.57	69	16	1.62	1.55	4.28	4.20	235	50	6.09	14.08
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	99	13	3.10	2.78	9.30	8.77	69	16	2.08	1.99	10.50	10.30	235	50	7.89	34.69
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	99	13	1.60	1.43	3.77	3.57	69	16	1.08	1.03	4.27	4.19	235	50	4.07	14.02
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	99	13	3.02	2.71	8.47	7.98	69	16	2.03	1.94	9.58	9.41	235	50	7.70	31.39
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	99	13	1.20	1.08	5.01	4.73	69	16	0.81	0.77	5.67	5.54	235	50	3.06	18.55
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	99	13	0.80	0.72	2.48	2.35	69	16	0.54	0.52	2.81	2.75	235	50	2.05	9.23
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	99	13	1.55	1.39	4.07	3.84	69	16	1.04	1.00	4.61	4.43	235	50	3.95	15.12
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	99	13	1.65	1.49	2.19	2.07	69	16	1.12	1.07	2.49	2.37	235	50	4.21	8.16
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	99	13	0.19	0.17	0.26	0.24	69	16	0.13	0.12	0.29	0.28	235	50	0.47	0.95
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	99	13	0.20	0.18	0.28	0.27	69	16	0.13	0.13	0.32	0.31	235	50	0.50	1.06

Notes:  
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012  
Traffic counts M04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010  
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.  
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

Table 11.11 - Stress Test 5 - Percentage Traffic Increase (100% traffic travels to/from the south)

		Scenario 1														Scenario 2								Construction					
		Trip Generation		Net % Total Increase				Net %HGV Increase				Trip Generation		Net % Total Increase				Net %HGV Increase				Trip Generation		% Total Increase		%HGV Increase			
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2014	2014
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	148	20	3.40	3.07	4.75	4.48	103	24	2.30	2.20	5.37	5.26	350	74	8.66	17.66
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	148	20	3.57	3.21	5.65	5.34	103	24	2.41	2.31	6.38	6.26	350	74	9.09	21.01
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	148	20	4.63	4.14	13.87	13.09	103	24	3.11	2.97	15.67	15.38	350	74	11.78	51.78
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	148	20	2.39	2.14	5.63	5.32	103	24	1.61	1.54	6.37	6.25	350	74	6.08	20.92
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	148	20	4.51	4.04	12.64	11.92	103	24	3.03	2.90	14.30	14.04	350	74	11.49	46.86
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	148	20	1.80	1.61	7.47	7.05	103	24	1.20	1.15	8.46	8.26	350	74	4.57	27.69
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	148	20	1.20	1.07	3.70	3.51	103	24	0.81	0.77	4.20	4.11	350	74	3.05	13.78
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	148	20	2.32	2.08	6.08	5.74	103	24	1.56	1.49	6.88	6.61	350	74	5.90	22.57
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	148	20	2.47	2.22	3.27	3.09	103	24	1.67	1.60	3.71	3.54	350	74	6.28	12.18
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	148	20	0.28	0.25	0.38	0.36	103	24	0.19	0.18	0.43	0.42	350	74	0.71	1.42
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	148	20	0.29	0.26	0.42	0.40	103	24	0.20	0.19	0.48	0.47	350	74	0.75	1.57

Notes:  
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012  
Traffic counts M04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010  
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.  
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

### 11.3.6 Junction Analysis

As described in Section 11.1, the analysis of the existing site entrance has been carried out using PICADY. The key parameters examined in the results of the analysis are the Ratio of Flow to Capacity Value (RFC value – desirable value should be no greater than 0.85 for junctions assessed using PICADY, values over 1.00 indicate the approach arm is over capacity), the maximum queue length on any approach to the junction and the average delay for each vehicle passing through the junction during the modelled period.

PICADY requires the following input data:

- Basic modelling parameters (usually peak hour traffic counts synthesised over a 90 minute model period)
- Geometric parameters (including lane numbers & widths, visibility, storage provision etc)
- Traffic demand data (usually peak hour origin/destination table with composition of heavy goods vehicles input).

Junction analysis of the site entrance has been carried out for the critical AM and PM peak hours (the hours of peak flow experienced at the site entrance junction during the baseline traffic survey at the junction) which were identified as 07:45 to 08:45 in the AM and 16:45 to 17:45 in the PM. The analysis has been undertaken for the opening year and design year for each scenario considered in the operational phase. Junction analysis of the site entrance has also been carried out for the AM and PM peaks for 2014 with the addition of the MBT Facility construction phase traffic.

The analysis results for the existing site access junction on the R403 for the AM and PM peak hours during the operational phase Traffic Scenario 1 are summarised below in Table 11.12. The origin/destination traffic demand tables for all the different distribution scenarios tested for the analysed junction are provided in Appendix 11.2. Full outputs are provided in Appendix 11.3.



**Table 11-12 Analysis Results: Existing Site Entrance AM & PM Peak Hours operational Phase Traffic Scenario 1**

ANALYSIS RESULTS: Existing Site Entrance AM & PM Peak Hours Operational Phase Traffic Scenario 1							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 1 2015 AM	-	-	0.056	0.06	0.066	0.07	0.01
Stress Test 1 2015 PM	-	-	0.125	0.14	0.006	0.01	0.01
Stress Test 1 2028 AM	-	-	0.063	0.07	0.076	0.08	0.01
Stress Test 1 2028 PM	-	-	0.134	0.15	0.006	0.01	0.01
Stress Test 2 2015 AM	-	-	0.055	0.06	0.090	0.10	0.02
Stress Test 2 2015 PM	-	-	0.120	0.14	0.026	0.03	0.02
Stress Test 2 2028 AM	-	-	0.062	0.07	0.100	0.11	0.02
Stress Test 2 2028 PM	-	-	0.129	0.15	0.026	0.03	0.02
Stress Test 3 2015 AM	-	-	0.055	0.06	0.101	0.11	0.02
Stress Test 3 2015 PM	-	-	0.117	0.13	0.034	0.03	0.02

ANALYSIS RESULTS: Existing Site Entrance AM & PM Peak Hours Operational Phase Traffic Scenario 1							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 3 2028 AM	-	-	0.062	0.07	0.111	0.12	0.02
Stress Test 3 2028 PM	-	-	0.126	0.14	0.034	0.04	0.02
Stress Test 4 2015 AM	-	-	0.054	0.06	0.116	0.13	0.02
Stress Test 4 2015 PM	-	-	0.114	0.13	0.044	0.05	0.02
Stress Test 4 2028 AM	-	-	0.061	0.06	0.126	0.14	0.02
Stress Test 4 2028 PM	-	-	0.122	0.14	0.045	0.05	0.02
Stress Test 5 2015 AM	-	-	0.052	0.06	0.139	0.16	0.02
Stress Test 5 2015 PM	-	-	0.109	0.12	0.064	0.07	0.02
Stress Test 5 2028 AM	-	-	0.060	0.06	0.150	0.18	0.02
Stress Test 5 2028 PM	-	-	0.116	0.13	0.065	0.07	0.02

The above results indicate that the existing site access junction will operate below the desired 0.85 RFC for all years of operation with the inclusion of development-generated traffic expected for Scenario 1. The maximum queue expected at the site access junction is less than 1 vehicle. There is a ghost island with right turning lane junction at the existing site access junction which will be able to accommodate any vehicles queuing on the R403 when arriving from the South.

The analysis results for the existing site access junction on the R403 for the AM and PM peak hours during the operational phase Traffic Scenario 2 are summarised below in Table 11.13. The origin/destination traffic demand tables for all the different scenarios tested for the analysed junction are provided in Appendix 11.2. Full outputs are provided in Appendix 11.3.

**Table 11-13 Analysis Results: Existing Site Entrance AM & PM Peak Hours operational Phase Traffic Scenario 2**

ANALYSIS RESULTS: Existing Site Entrance AM & PM Peak Hours Operational Phase Traffic Scenario 2							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 1 2029 AM	-	-	0.057	0.06	0.075	0.08	0.01
Stress Test 1 2029 PM	-	-	0.098	0.11	0.006	0.01	0.01
Stress Test 1 2035 AM	-	-	0.058	0.06	0.077	0.08	0.02
Stress Test 1 2035 PM	-	-	0.100	0.11	0.006	0.01	0.01
Stress Test 2 2029 AM	-	-	0.056	0.06	0.090	0.10	0.02
Stress Test 2 2029 PM	-	-	0.095	0.10	0.025	0.03	0.01
Stress Test 2 2035 AM	-	-	0.057	0.06	0.092	0.10	0.02
Stress Test 2 2035 PM	-	-	0.097	0.11	0.025	0.03	0.01
Stress Test 3 2029 AM	-	-	0.056	0.06	0.094	0.10	0.02
Stress Test 3 2029 PM	-	-	0.093	0.10	0.033	0.03	0.01

ANALYSIS RESULTS: Existing Site Entrance AM & PM Peak Hours Operational Phase Traffic Scenario 2							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 3 2035 AM	-	-	0.057	0.06	0.097	0.11	0.02
Stress Test 3 2035 PM	-	-	0.096	0.11	0.033	0.03	0.01
Stress Test 4 2029 AM	-	-	0.056	0.06	0.102	0.11	0.02
Stress Test 4 2029 PM	-	-	0.092	0.10	0.045	0.05	0.01
Stress Test 4 2035 AM	-	-	0.056	0.06	0.105	0.12	0.02
Stress Test 4 2035 PM	-	-	0.094	0.10	0.045	0.05	0.01
Stress Test 5 2029 AM	-	-	0.055	0.06	0.117	0.13	0.02
Stress Test 5 2029 PM	-	-	0.088	0.10	0.063	0.07	0.01
Stress Test 5 2035 AM	-	-	0.055	0.06	0.119	0.13	0.02
Stress Test 5 2035 PM	-	-	0.090	0.10	0.063	0.07	0.01



The above results indicate that the existing site access junction will operate below the desired 0.85 RFC for all years of operation with the inclusion of development-generated traffic expected for Scenario 2. The maximum queue expected at the site access junction is less than 1 vehicle. There is a ghost island with right turning lane junction at the existing site access junction which will be able to accommodate any vehicles queuing on the R403 when arriving from the South.

The analysis results for the existing site access junction on the R403 for the AM and PM peak hours during the construction phase of the proposed MBT Facility are summarised below in Table 11.14. The origin/destination traffic demand tables for all the different scenarios tested for the analysed junctions are provided in Appendix 11.2. Full outputs are provided in Appendix 11.3.

**Table 11-14 Analysis Results: Existing Access Junction AM & PM Peak Hours  
Existing Traffic and MBT Construction Phase**

ANALYSIS RESULTS: Existing Access AM & PM Peak Hours Existing Traffic and MBT Construction Traffic							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 1 2014 AM	-	-	0.057	0.06	0.071	0.08	0.01
Stress Test 1 2014 PM	-	-	0.363	0.57	0.006	0.01	0.04
Stress Test 2 2014 AM	-	-	0.057	0.06	0.172	0.21	0.02
Stress Test 2 2014 PM	-	-	0.342	0.52	0.009	0.01	0.04
Stress Test 3 2014 AM	-	-	0.056	0.06	0.222	0.28	0.03
Stress Test 3 2014 PM	-	-	0.331	0.49	0.012	0.01	0.04
Stress Test 4 2014 AM	-	-	0.055	0.0.6	0.271	0.37	0.03
Stress Test 4 2014 PM	-	-	0.319	0.47	0.015	0.02	0.04
Stress Test 5 2014 AM	-	-	0.053	0.06	0.360	0.56	0.05
Stress Test 5 2014 PM	-	-	0.297	0.42	0.018	0.02	0.03

The above results indicate that the existing site access junction will operate below the desired 0.85 RFC during the construction phase. The maximum queue expected at the site access junction is less than 1 vehicle. There is a ghost island with right turning lane junction at the existing site access junction which will be able to accommodate any vehicles queuing on the R403 when arriving from the South.

#### 11.3.7 Link Capacity

A link capacity assessment was undertaken with reference to the UK DMRB TA 46/97. Using this document, the two way hourly capacities of the regional roads identified as haul routes were calculated.

In order to undertake an investigation into link capacity of the haul routes, it was necessary first to convert the raw traffic survey data, which consisted of cars and heavy vehicles, into a common index known as passenger car units (PCU's). This was undertaken by applying a factor to all surveyed traffic movements to take account of the composition of the different types of vehicle. This factoring calculation assumes 1 car / light vehicle = 1 PCU, 1 heavy vehicle = 2.3 PCU's and 1 bus = 2 PCU's.

The link capacities were calculated for 2035. Due to the growth of background traffic, and the higher volumes of traffic generated by operational Scenario 2, 2035 represents the year that will experience maximum traffic flows. These tables also assume that 100% of trips relating to the operations of the proposed MBT Facility travel along each road considered. This is a worst case scenario as, in actuality, these trips would distribute across the network. The link capacities are outlined below in Table 11.15

**Table 11-15 Link Capacity of Regional Road Network 2035**

Link Capacity 2035			
Regional Road Number	Available Capacity (pcu/hr)	Max Peak Hour Flow (pcu/hr)	Spare Capacity
R402	1790	757	58%
R403	1616	1049	35%
R407	1873	1438	23%
R409	1074	533	50%
R415	1482	464	69%

As can be seen from the table above, the regional roads in the vicinity of the proposed development will operate within capacity in 2035, the year considered that will experience the maximum traffic flows.

#### 11.3.8 Road Safety

The speed limit on the R403 at the site entrance junction is 80 km/h. The entrance is a ghost island junction constructed to the standards set out in NRA DMRB TD41/95 which was the

current standard when it was being constructed. NRA DMRB TD41/95 has now been superseded by NRA DMRB TD41-42 which sets out a requirement for visibility splays of 3.0 x 160 metres. This is a less onerous standard than the previous standard and as such the existing junction remains fully compliant.

A ghost island junction has been provided at the existing site entrance with a right turning lane. The through lanes on either side are 3.0m wide and the right turning lane is 3.0m wide. The length of the ghost island junction for the Drehid Waste Management Facility provides adequate deceleration length and turning length for a design speed of 85 kph in accordance with DMRB TD 42/95. Queuing length of 5m is also provided. As indicated in tables 11.10 to 11.12, the maximum queue length at this junction is predicted to be below 1 vehicle meaning queuing will not be an issue.

There will be some adverse impact on the pavements of the regional roads to the extent that any weak sections of the existing pavement will be subject to increased loading and may require strengthening. This will arise from the net increase in HGVs, as pavement deterioration is linked to axle loading.

In some of the more extreme stress tests considered in Section 11.3.5, some sections of the haul routes during the operational scenarios would experience a net percentage increase in HGV traffic of approximately 16% compared to predicted background HGV traffic volumes. In actuality it is more likely that one of the more balanced distributions will prevail and would result in a maximum net percentage increase in HGVs during the operational scenarios of approximately 10.5% compared to predicted background HGV traffic volumes. It is again worth noting that, in actuality, the percentage increase in HGVs will be less than 10.5% on the basis that traffic arriving from or departing to the south will be dispersed over the R415, R409 and R407. All the stress tests, involving traffic arriving from or departing to the south, consider the highly unlikely scenario of all traffic travelling along the R415, R409 and R407.

Compared with predicted background HGV traffic flows on the haul routes, the net increase resulting from the MBT Facility may have a minimal impact on the pavement condition of the haul routes.

During a site visit, it was found that, for the most part the pavements of the haul routes appear to be in good condition. Some localised pavement deterioration was noted however, but the scale of this is such that it can be dealt with by the Roads Authority under normal road maintenance programs.

A 7.5m access road has been provided with junction radii of 20m off the R403 to the development. A recessed gate has been provided at a setback of 80m from the existing entrance. The access road narrows to 6m wide on the approach to the facility. This is adequate width to allow two HGVs to pass one another with a clearance of 1.0m.

Warning signs and advance direction signs indicating the presence of the entrance to the Bord na Móna landholding and road markings are provided in the vicinity of the site entrance junction.

As part of the construction of the initial stage of the permitted Drehid Waste Management Facility, a road safety audit has been carried out in accordance with the relevant sections of the National Roads Authority standard (HD 19/04 and HA42/04) on the constructed site

entrance. The road safety audit was subsequently submitted to Kildare County Council who approved the existing site entrance.

#### *11.3.9 Pedestrians and Cyclists*

Due to the location and nature of the development, pedestrians and cyclists are not expected to be frequent users of the facility and as such no provision has been made to accommodate either.

#### *11.3.10 Car Parking*

Car parking at the MBT is provided for 101 cars, 2 delivery vans and 2 coaches adjacent to the Administration and Welfare Building. Specific guidelines for car parking at facilities such as the proposed MBT Facility are not set out in the Kildare County Council Development Plan, but considering the number of employees, the volume of parking provided is sufficient to provide adequate parking for both staff and visitors.

In addition to car parking spaces, there are 18 spaces provided for HGV parking. This is considered sufficient to cater for the number of large vehicles that will be accessing the facility at any given time.

#### *11.3.11 Public Transport*

There is no regular public transport service in operation in the immediate vicinity of the Facility; however there are public bus services that run from Allenwood to Dublin, Edenderry and Birr. Allenwood is located approximately 3.5 km from the MBT Facility. It is not expected that the number of users of this bus service will be increased by the development.

### **11.4 MITIGATION MEASURES**

As the potential traffic impacts for both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) are almost equivalent, the mitigation measures for Configuration A and Configuration B will be the same. The following are measures that will be implemented to mitigate the impact associated with the development:

- Photographic survey of haul roads prior to commencement of construction;
- Continuous monitoring of haul roads throughout both the construction and operational phase;
- All contractors, delivering waste to the facility and removing outputs from the facility, and all construction contractors will be issued with a map of the permitted haul routes such that all materials imported into the site and exported out of the site are transported via one of the identified haul routes. A penalty system will be operated by Bord na Móna to ensure haulage operators comply with these requirements;
- Wheel wash facilities at the MBT Facility during both the construction and operational phase;
- Maintenance of warning signage on the approach to the entrance;



- Monitoring of car parking requirements during the operational phase with additional spaces to be provided if required;
- Maintenance of site entrance ensuring visibility splays remain intact; and,
- Monitoring of haul routes for problems such as congestion and refining the routes where required.

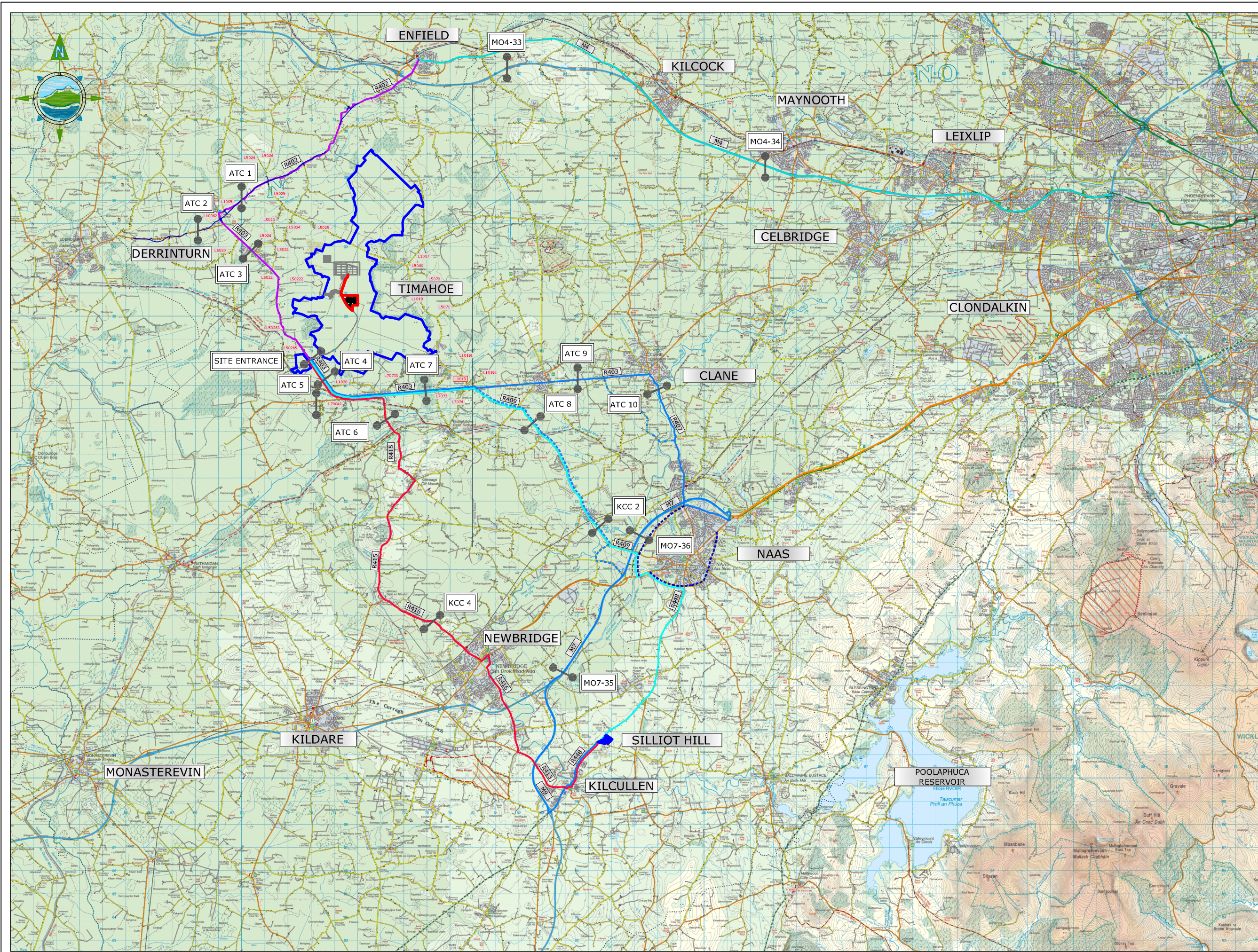
## 11.5 CONCLUSION

The conclusions of this assessment are as follows:

- The volumes of traffic that will be generated by the proposed Drehid MBT Facility will have no significant impact on traffic flows on the haul routes with reference to the terms outlined in the NRA “Traffic and Transport Assessment Guidelines”;
- Stress tests carried out at junctions on the R403 and adjoining road network indicate that the proposed MBT Facility will generate a maximum additional 4.5% traffic on the proposed Haul Routes during the operational scenarios, even in the most unlikely event that all the traffic comes from either the south or north;
- The impact of development traffic on the haulage road network both in terms of link and junction capacity will be slight with reference to the terms outlined in the NRA “Traffic and Transport Assessment Guidelines”;
- All contractors, delivering waste to the facility and removing outputs from the facility, and all construction contractors will be issued with a map of the permitted haul routes such that all materials imported into the site and exported out of the site are transported via one of the identified haul routes. A penalty system will be operated by Bord na Móna to ensure haulage operators comply with these requirements;
- The maximum percentage increases in total traffic along each road forming part of the haul routes are below 12% for the construction phase, the majority of which is made up of LGV traffic. While this impact will be greater than that of the operational phase it is only a temporary impact;
- For the purpose of robustness, the traffic analysis for both the operational and construction phases assumes that all of the generated traffic is confined to each of the haul routes running from the M7 to the facility. In reality, the dispersion of the facility generated traffic between the route options (from M7 to the facility) will also proportionally reduce the traffic loading on any one route;

- It is considered that the existing road network is capable of accommodating the net increase in generated traffic associated with the proposed MBT Facility;
- The R402 Road Improvement Scheme will further improve the haul route for vehicles accessing the proposed MBT Facility from the north;
- The existing site entrance will operate below the desired 0.85 RFC up to and including the design year of 2035, with the inclusion of MBT Facility generated traffic;
- The regional road network comprising the haul routes will operate below capacity up to and including the design year of 2035;
- There will be a negligible net increase in HGV traffic as a result of the proposed MBT Facility which may have minimal impact on the pavement condition along the haul routes;
- Adequate visibility splays of 3.0 x 160m have been provided at the existing site entrance junction in accordance with NRA DMRB TD 41-42/11; and,
- A ghost island junction with a right turning lane has been provided at the existing site entrance which is capable of accommodating the increased traffic associated with the proposed MBT Facility.





- GENERAL LEGEND**
- BORD NA MONA OWNERSHIP BOUNDARY**
- SITE ACTIVITY BOUNDARY**
- HAUL ROUTE No.1  
HAUL ROUTE No.1.1  
HAUL ROUTE No.1.2  
HAUL ROUTE No.2  
HAUL ROUTE FROM N50 TO REGIONAL ROAD NETWORK VIA M7/N7  
HAUL ROUTE FROM N50 TO REGIONAL ROAD NETWORK VIA M4/N4
- HAUL ROUTE No.3  
HAUL ROUTE No.4  
COMPLETED NAAS ROAD IMPROVEMENTS

- L7074** LOCAL ROAD
- COUNT LOCATIONS**

- NOTES**
- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
  - ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
  - ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
  - ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
  - 6" OS SHEET NO'S: KILDARE 3, 4, 8, 9 & 13



Issue	Date	Description	By	Check
A	05.05.12	ISSUED FOR REPORT	MN	BW

Client:  
**BORD NA MÓNA**

Project:  
**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:  
**HAUL ROUTES  
AND TRAFFIC COUNT  
LOCATIONS**

Scale @ A3: **1:75,000**

Prepared by: **M. Nolan** Checked: **B. Ward** Date: **March 2012**

Project Director: **D. Grehan**

**TOBIN**  
Patrick J. Tobin & Co., Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-3, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353(0)1-8030406  
fax: +353(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

Drawing No.: **Figure 11.1** **A**



## 12 ARCHAEOLOGY AND CULTURAL HERITAGE

### 12.1 INTRODUCTION

Arch Consultancy Ltd. (Archaeological Consultants) was commissioned by TOBIN Consulting Engineers to undertake an archaeological assessment of a proposed Mechanical Biological Treatment (MBT) Facility in the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare. The site consists of an area of cutover bog located immediately east of the private access road to the existing Drehid Waste Management Facility located within the same Bord na Móna landholding. Two separate configurations for the Drehid MBT Facility are proposed –Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) - and are dealt with separately in relation to potential impacts and proposed mitigation measures herein (Sections 12.3 & 12.4).

#### 12.1.1 Methodology

The archaeological and cultural heritage significance of the area in general and in particular of the site of the proposed development was examined in three distinct phases.

##### *Phase 1: Paper Survey*

- Cartographic sources such as early antiquarian maps of the area, first edition and subsequent editions of the ordnance survey maps as well as the Record of Monuments and Places Maps were examined.
- The topographical files housed in the National Museum of Ireland were examined.
- Aerial photographs of the site were studied to identify any possible archaeological remains.

Previous published and unpublished archaeological reports, assessments and surveys of the area as well as previous consultations with The Irish Wetland Unit, The Heritage Service, Archaeological Development Services Ltd. and staff members of Bord na Móna who previously worked at this location were assessed. Reports on all archaeological monitoring associated with the construction of the waste management facility to the north of the proposed development were also consulted.

##### *Phase 2: Field Walking*

The second phase consisted of a field inspection of the entire area of the proposed development. This allowed the opportunity of first hand observation of the terrain, which can

often result in the discovery of hitherto unrecorded sites and finds. The site of the proposed development was visited in December 2011.

### *Phase 3: Reporting*

Phase three involved the collation and assessment of the material and reporting on the conclusions. This includes the potential impact on any archaeological features in the general environs of the proposed development. Archaeological monuments in the adjoining townlands were identified to understand the wider archaeological landscape.

## 12.2 EXISTING ENVIRONMENT

Boglands cover one-sixth of the total landmass of Ireland extending over an approximate area of 1.34 million hectares. They can be divided into two major types, raised bogs and blanket bogs, although both appear similar in character the mode of formation differs greatly. The vast majority of Ireland's raised bogs occur in the central lowlands of the country unlike blanket bogs that are predominately confined to mountainous areas and some occasional lowland areas along the western seaboard.

The anaerobic environment of bogs and wetlands helps create unique circumstances for the preservation of remains and have long been known for their rich abundance of archaeological deposits, which can range from the prehistoric to the medieval periods. One of the earliest known sites from a wetland context is the Mesolithic habitation from Lough Boora in County Offaly where radiocarbon dating provided a range of dates from 7000-6500 BC.

A number of archaeological artefacts and sites have been recorded to the north of the proposed development site. All the identified sites are toghers or trackways, called toghers from the Irish word *tógher* meaning causeway (Harbison 1988), they invariably transverse bogs at the narrowest crossing point. These trackways can vary significantly in size and form, from simple surface brushwood paths to larger timber planked roadways such as the Corlea trackway in Co. Longford, some gravel and flagstone examples have also been recorded. The presence of trackways could suggest human activity from as early as the Neolithic period (4000-2500 BC).

The cooler and wetter climatic conditions of the Bronze Age together with the impact of farming on vegetation and in particular tree regeneration, led to soils becoming wetter and drainage deteriorated. These conditions facilitated a more rapid increase in the growth and the spread of bogs. Consequently, the crossing of bogs became more difficult and problematic and the archaeological record shows a significant increase in the size and number of toghers constructed during this period. The Bronze Age also saw the deliberate deposition of artefacts as votive offerings in water logged areas and bogs. Boglands have in the past yielded high concentrations of artefacts, particularly Bronze Age flat axes, swords and rapiers. For instance, in north Leinster 48% of Early Bronze Age flat axes have been found



in bogs, while in Ireland as a whole, 51% of Late Bronze Age (Dowris Phase) hoards and 59% of later Iron Age (La Tène Phase) weapons have been recovered from bogs (Cooney and Grogan 1994). The topographical files of the National Museum of Ireland record a multi-period assemblage of finds for the Timahoe area and surrounding townlands (Section 12.5). Some such as the bronze rapier from Allenwood Middle indicate activity for the Middle Bronze Age or Bishopsland Phase.

Human remains or ‘bog bodies’ have been recovered from wetland sites, the most notable being the exceptionally well-preserved ‘Gallagh Man’, and more recently an example from Cul na Móna in County Laois. Over eighty burials have been recovered from wetland areas.

Discoveries of bog butter are frequent in Irish bogs, though not entirely an Irish phenomenon, as examples have also been found in Scotland. The practice of burying butter in bogs may possibly date to the sixth century A.D. The preservative properties of the bog would have been ideal for storage, though the desire to produce a special flavour in the butter is a possibility. Containers made from a variety of materials were used to store the butter during its time in the peat, though wooden vessels predominate with some highly decorated examples having been found. Bog butter has also been buried in bark, cloth, wickerwork and animal skin.

### 12.2.1 Historical Background

Drehid bog is in the barony of Carbury, Co. Kildare. Although usually known as Drehid bog, after Drehid townland, the bog is also known as Timahoe Bog. Timahoe derives its name from *Tígh Mochua* or the house of Mochua, from the monastery founded here by St. Mochua in the fifth century. The remnants of a church and a well-preserved twelfth-century round tower are all that survive of this monastic settlement. The area had previously been known as Sidh Neachtain or “The Fairy Hill”, a name derived from Nuadha Neacht of Neachtain, who was High King of Ireland for a year, before being slain in 45 AD. The proposed development is located within the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, County Kildare. The townland name *Cúil Charraigín* translates as the ‘Nook of the little rock’ (Flanagan & Flanagan, 194). Placenames and townland names are often indicators of past settlement and specific monument types, with Cill (Kill) for example, referring to a church, monastic settlement, churchyard or graveyard while Drum or Droim usually refers to a ridge. The townlands of Ballynakill (Upper and Lower) located to the southwest of the proposed development refer to the ‘town of the church or wood’. Other townland names in the vicinity of the proposed development refer to features of the landscape, such as Corduff, meaning the ‘black round hill’ (Joyce 1990).

To the south of the site is the Hill of Allen which also has associations with myths. It was here that “Almhuin (was) the palace of Fionn Mac Cumhal in Leinster”, Almhuin being the Hill Of Allen. The Annals of The Four Masters records two battles being fought here in 526 AD and 718 AD (O’Donovan 2002, 100). The last reference to Sidh Neachtain was in the

Annals of the Four Masters which records the death of Laoghaire, High King of Ireland, at Sidh Neachtain in 458. The area then became known as “Cairbre Og Ciartha” or Carbury. Cairbre was Laoghaires’ brother and his dynasty controlled the area until the Norman period when Meider Fitzhenry was granted the Carbury area. Fitzhenry subsequently lost the property in 1181.

The next major holders of the Carbury lands were the Fitzgeralds who were a powerful family in Ireland. The 7th Earl served as Chief Governor of Ireland on a number of occasions. Unfortunately for the Fitzgeralds, their power came to an end because of their involvement in the 1641 rebellion. In the aftermath of the Cromwellian War, Timahoe became the property of the Duke of York, brother of Charles II, who later became King of England, and who was defeated at the Battle of the Boyne in 1690. Subsequently, the property was confiscated and given to two brothers, John and Robert Curtis. They leased the property to Theobald Burke and Richard Aylmor, who in turn leased it to a group of Quakers from Northern Ireland. They built a meeting house adjacent to their own cemetery and also a windmill nearby.

The bog played an important part in the 1798 rebellion in North Kildare. “The Prosperous and Clane rebels formed a camp at Timahoe ....it was sited on Hodgestown Hill...” (Cullen 1998, 13). This was an area of dry land within the bog thus making access almost impossible for English cavalry and artillery. At one point there were almost 2,500 rebels camped there, growing to 4,000 when rebels from Wexford and Wicklow joined them. This latter group moved on however, after just a day, (Ibid, 25).

To the east of the proposed development is Coolcarrigan Demesne which contains a Georgian House built in the 1830’s and has a small 19<sup>th</sup> century Church of Ireland church in the grounds.

## **12.2.2 Archaeological Landscape**

There are a number of recorded archaeological monuments within the overall Bord na Móna landholding (Fig. 12.1 and 12.2 a-d). North of the proposed development, in the area immediately north of the existing Drehid Waste Management Facility site, two trackways or toghers, (KD009-018 & 019, also known as KD008-029 & 030) are recorded. The monuments were excavated by E. Rynne in the 1960’s and by Monroe in 1986, (O’Carroll 2002). One of the trackways was a substantial oak plank trackway whilst the other was a less substantial birch trackway. Monroe thought that the trackways were broadly contemporary and the oak plank trackway was dendrochronologically dated in the Middle Bronze Age (1987, 22). A walkover survey conducted in preparation for the EIS of the Drehid Waste Management Facility in 2002, found no extant trace of either trackway. Subsequent monitoring of all excavations works associated with the development (License 06E0746 and extensions to this license) revealed no features of archaeological significance. The Irish Archaeological Wetland Unit identified a further 10 sites in the vicinity of the recorded trackways in the 1990’s. Two of these trackways were destroyed before they were plotted

(information received from Irish Archaeological Wetland Unit). The trackways were recorded to the north and east of the existing Drehid Waste Management Facility and will not be impacted by the proposed MBT development. The sites originally recorded by the Irish Archaeological Wetland Unit have, since 2010, been updated to the Sites and Monuments Record available at [www.archaeology.ie](http://www.archaeology.ie) and are plotted on Figure 12.1.

Possible medieval activity in the area is indicated by the presence of the ringforts (KD009-001 & KD004-011) at Mulgeeth and the castle at Timahoe West (KD009-009). There is a church and graveyard (KD009-008 (001, 002)) at Timahoe East and also at Ardkill (KD008-009 (001, 002)).

### **12.2.3 Monument Types in the area of the proposed development**

#### ***Ringforts***

The construction of ringforts in Ireland dates from the early Christian/medieval period (c.500 AD to 1170 AD) and possibly continued up to the seventeenth century. Rath is the term applied to those ringforts of earthen construction, while cashel refers to those constructed from stone. A ringfort generally consists of a circular, subcircular, oval or D-shaped area, enclosed by one or more banks of earth or stone, or a combination of both. Earthen ringforts usually have an external fosse surrounding the bank, and a causewayed entrance giving access to the interior. The bank is generally built by piling up inside the fosse, the material obtained by digging the latter. The function of ringforts was generally as enclosed homesteads, with the defences protecting the houses and outbuildings in the interior, but they may also have been used for social gatherings. A Ringfort is recorded in the townland of Mulgeeth (KD009:001) to the north east of the proposed development.

#### ***Enclosures***

Enclosures are usually distinguished on the basis of their anomalous characteristics, such as their large or small size, or lack of entrance features, which sets them apart from ringforts or other classifiable enclosures. The term usually refers to a site which consists of an enclosing bank surrounding a circular or subcircular area, and with no apparent entrance. Due to the lack of diagnostic remains it is difficult to suggest a period of construction or use for the monuments. Occasionally, the enclosures are surrounded by a ring of trees. The function of these sites is indeterminable from visual inspection alone, that is, without excavation due to the lack of identifiable features. Sites which are now destroyed but which have been detected on aerial photographs, marked on various Ordnance Survey maps or locally described as circular or subcircular areas defined by banks and/or fosses are usually categorised as enclosures. Enclosures are recorded in the townlands of Collinstown (KD008:007), Parsonstown (KD008:023), Drehid (KD008:027), Coolmartin (KD009:007), Giltown (KD009:010) and Cooleareagh (KD013:002).

#### ***Children's burial ground***

These sites are usually found either in isolation or associated with other monuments such as

enclosures and are characterised by the presence of numerous small, uninscribed set stones, often arranged in rows. A Children's Burial Ground is recorded from Timahoe West (KD009:006.1), to the northeast of the proposed development.

### ***Churches***

Medieval churches, which often incorporate the fabric of early Christian churches, are distinguished on the basis of their ground plan and date. Nave and chancel churches are dated to the twelfth to thirteenth century, while single-celled churches are assigned a thirteenth to seventeenth century date. The single-celled churches were generally orientated east/west and were entered at the west end of either the north or south wall. Some churches had opposing doorways at the west end of the church. These churches may also have had a subdivision at the west end of the church, in the form of a cross-wall, or the presence of corbels or beam-holes which indicate the former presence of a loft. These quarters comprised the accommodation for the parish priest. A recorded Church site is located in Collinstown (KD008:020) while Church and Graveyards are recorded from Ardkill (KD008:009) and Timahoe East (KD009:008) townlands.

### ***Holy wells***

A holy well is recorded from the townland of Ticknevin (KD012:002.3.4.) to the west of the proposed development. Holy well can be defined as any location where water is used as the focal point of supernatural divination, cure or devotion on a regular basis. The remains found at the wells vary from an unadorned natural spring, or a hollow in bedrock, to mortared stone well-chambers with steps, canopies and wall niches (Alcock 1999, 337). The veneration of holy wells is among the oldest Christian practices in Ireland, probably having originated in pre-Christian ritual. Many of the holy wells are dedicated to local saints and are renowned for their curative properties, often for a particular ailment (O'Brien and Sweetman 1997, 115; Alcock 1999, 337). The ritual connected with holy wells can often be quite complex. Pilgrimages are often focused on a pattern day, usually the anniversary of the saint to whom the well is dedicated (Alcock 1999, 337). The wells are often found in association with ecclesiastical remains and children's burial grounds.

### ***Tower House***

The origins of the Irish tower house are unclear and in general the buildings are one of the least understood castle type structures. While Cairns (1987, 9) claims their origin is in the 14th century the fact that a grant of £10 was made available under the statute of Henry VII in 1429 to every man in the Pale who wished to build a castle within 10 years and with specific measurements, suggests a 15th century date for the construction of these buildings. It is thought that the simpler tower houses found in the east of the country are the earlier examples with the more elaborate buildings in the west being of later date. The tower house continued to be built in the 17th century in County Galway as evidenced by a construction date of 1643 for Derryhivenny and a date of 1683 associated with Castle Ffrench.

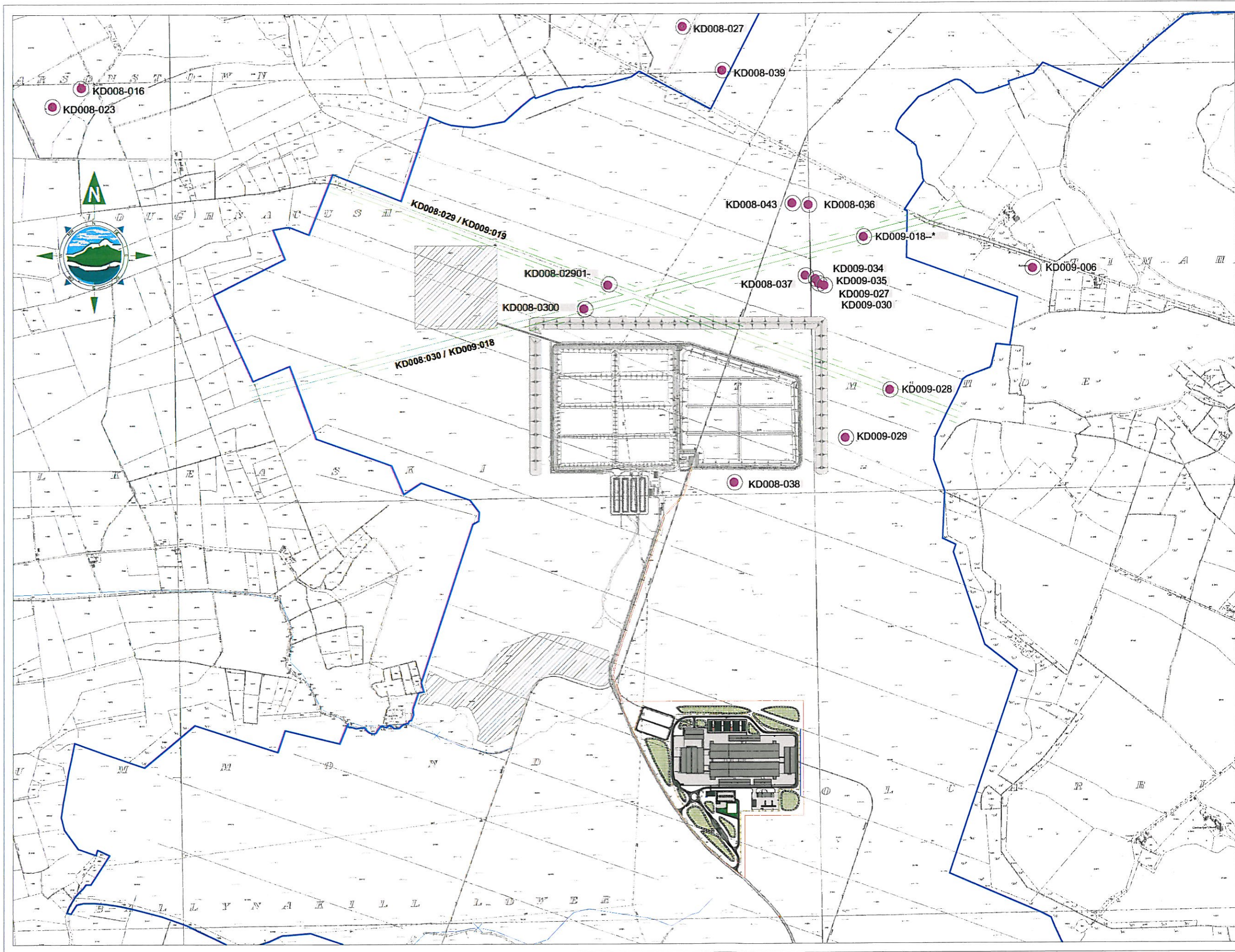
The main function of tower houses appears to have been the provision of a place of security

for ones family and stock. The siting of many tower houses, their impressive bawn walls, narrow slit windows, yetts, murder-holes, bartizans and machicolations testify to the defensive aspect of the structures. Most of the defences were geared towards assaults using bows, muskets and other light weapons and it is likely that the advent of the cannon in the 16th century eventually led to the decline in tower house construction. While the historical context of Irish tower houses stress their role as defensive buildings developed as a response to political instability it should not be forgotten that these buildings also functioned as family residences, a consideration reflected in their layout and design. A tower house is recorded from the townland of Ardkill to the northwest of the proposed development (KD008:008).

### ***Toghers***

A togher or tóchar is a brushwood trackway or more usually a roadway constructed from timber beams held in place by wooden pegs, traversing bogland or wetland. Stone-built roads or tracks were also constructed, and are known in some cases to connect with wooden trackways. Both the roads of wood and stone construction have a broad date span, with some dating to the Neolithic period, while others are assigned a late medieval date. In many cases modern roads follow the line of their more ancient antecedents (O'Brien and Sweetman 1997, 51). Togher sites are recorded to the north of the proposed development in the townlands of Parsonstown and Timahoe West (KD008:029/KD009:019, KD008:030/KD009:018). A number of toghers originally identified by the Irish Archaeological Wetland Unit have now been updated to the Sites and Monuments Record and are included in Figure 12.1. These sites are located to the north and north-east of the proposed MBT Facility development in the townlands of Coolcarrigan and Timahoe West. They are recorded as unclassified roads, peatland structures and toghers. Further north, togher sites are recorded from the townland of Drehid (KD008:025, KD008:026, KD008:027).





**GENERAL LEGEND**  
OWNERSHIP BOUNDARY  
ACTIVITY BOUNDARY

**ARCHAEOLOGY LEGEND**  
RMP SITE  
TOGHER

**NOTES**  
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING  
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE  
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES  
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	05.05.12	ISSUED FOR REPORT	MN	ST

**Client:**  
**BORD NA MÓNA**

**Project:**  
DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

**Title:**  
ARCHAEOLOGICAL FEATURES

**Scale @ A3:** 1:15,000

**Prepared by:** M. Nolan  
**Checked:** S. Tinnelly  
**Date:** February 2012

**Project Director:** D. Grohan

**TOBIN**  
Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
Tel: +353-(0)1-8030406  
Fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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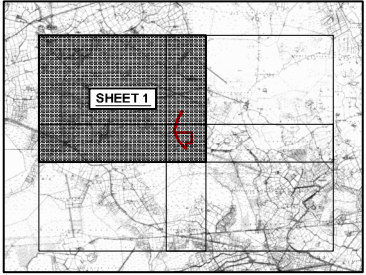
**Drawing No:** **FIGURE 12.1**  
**Issue:** **A**





GENERAL LEGEND  
ACTIVITY BOUNDARY

KEY PLAN



NOTES:

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

Issue	Date	Description	By	Chk'd
A	05.05.12	ISSUED FOR REPORT	M.N.	D.C.

Client:

**BORD NA MÓNA**

Project:

**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:

**SITES & MONUMENTS  
MAPPING  
- Sheet 1 of 4 -  
(Kildare Sheet 8)**

Scale @ A3:

1:20,000

Prepared by:

M. Nolan

Checked:

D. Conneran

Date:

February 2012

Project Director:

D. Grehan



Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353 (0)1-8030406  
fax: +353 (0)1-8030409  
email: info@tobin.ie  
www.tobin.ie

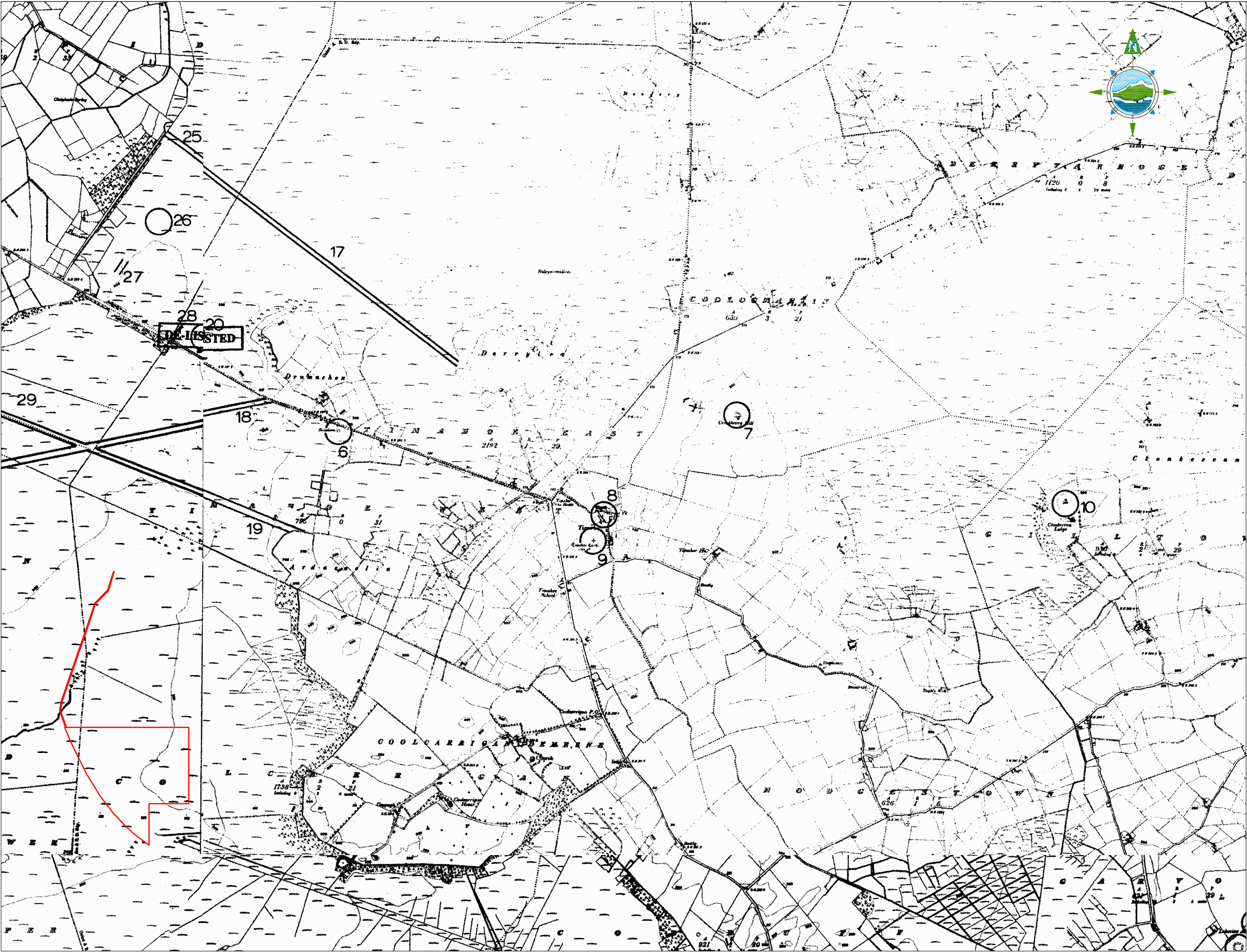
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Drawing No.: **Figure 12.2 a**

Issue:

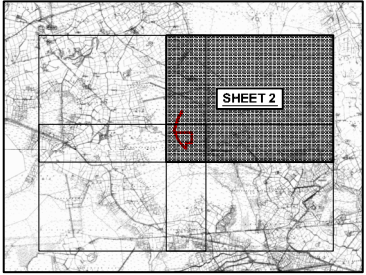
**A**





GENERAL LEGEND  
ACTIVITY BOUNDARY

KEY PLAN



NOTES:

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

Issue	Date	Description	By	Chkd.
A	05.05.12	ISSUED FOR REPORT	MUN	D.C.

Client:

**BORD NA MÓNA**

Project:

**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:

**SITES & MONUMENTS  
MAPPING  
- Sheet 2 of 4 -  
(Kildare Sheet 9)**

Scale @ A3:

**1:20,000**

Prepared by:

**M. Nolan**

Checked:

**D. Conneran**

Date:

**February 2012**

Project Director:

**D. Grehan**



Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-01-8030406  
fax: +353-01-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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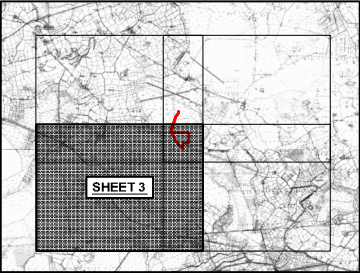
Drawing No.: **Figure 12.2 b** Issue: **A**





GENERAL LEGEND  
ACTIVITY BOUNDARY

KEY PLAN



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Issue	Date	Description	By	Chk'd
A	05.05.12	ISSUED FOR REPORT	M.N.	D.C.

Client:  
**BORD NA MÓNA**

Project:  
**DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY**

Title:  
**SITES & MONUMENTS  
MAPPING  
- Sheet 3 of 4 -  
(Kildare Sheet 12)**

Scale @ A3: 1:20,000

Prepared by: M. Nolan  
Checked: D. Conneran  
Date: February 2012

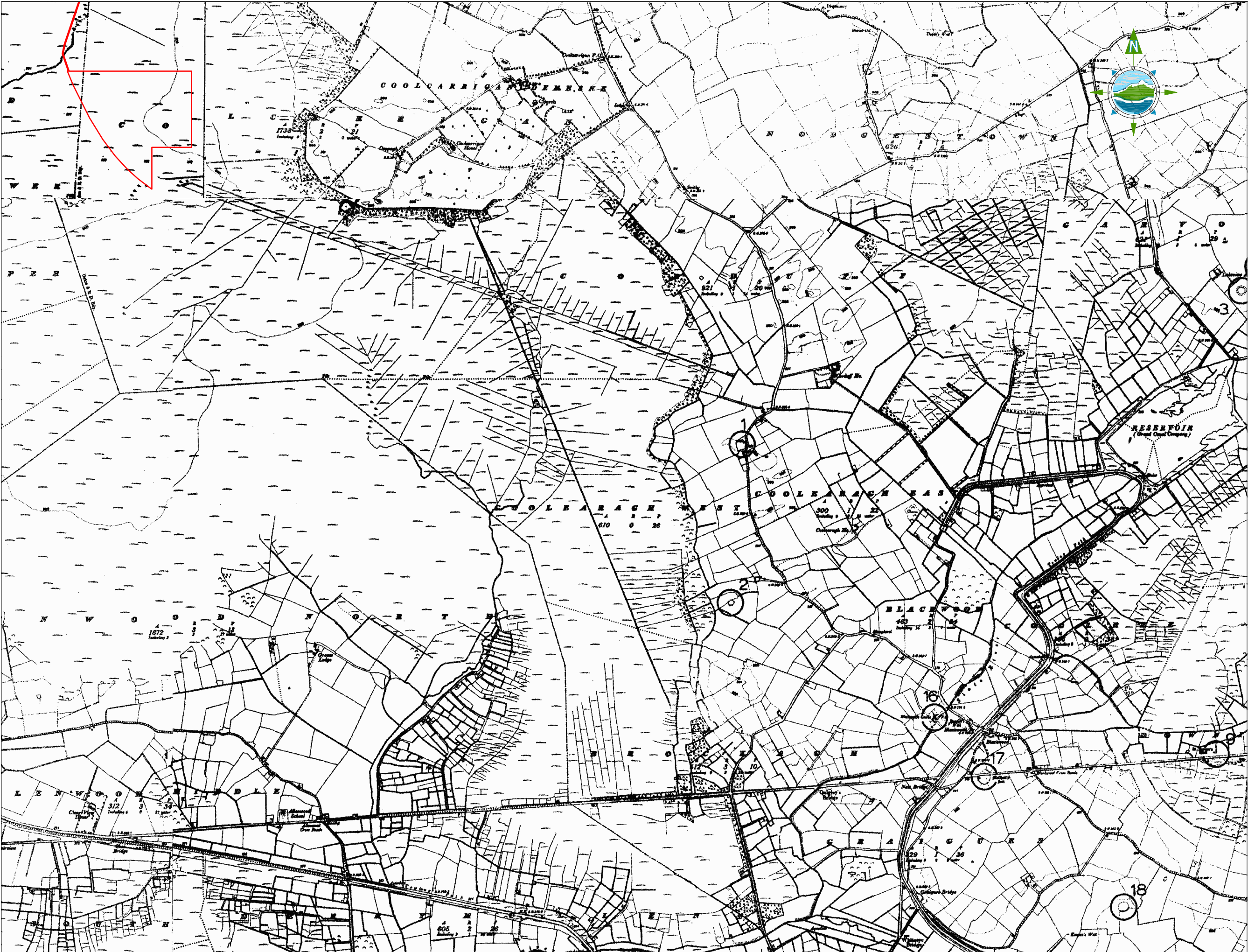
Project Director: D. Grehan

**TOBIN**  
Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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Drawing No.: **Figure 12.2 c**  
Issue: **A**

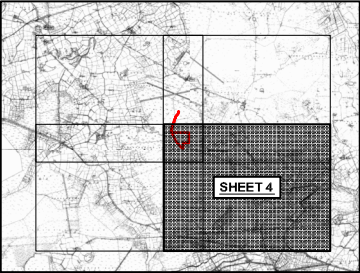




GENERAL LEGEND  
ACTIVITY BOUNDARY



KEY PLAN



NOTES:

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Issue	Date	Description	By	Chk'd
A	05.05.12	ISSUED FOR REPORT	M.N.	D.C.

Client:



Project:

DREHID  
MECHANICAL BIOLOGICAL  
TREATMENT (MBT) FACILITY

Title:

SITES & MONUMENTS  
MAPPING  
- Sheet 4 of 4 -  
(Kildare Sheet 13)

Scale @ A3:

1:20,000

Prepared by:

M. Nolan

Checked:

D. Conneran

Date:

February 2012

Project Director:

D. Grehan



Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland.  
tel: +353-(0)1-8030406  
fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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Issue:

Drawing No.: Figure 12.2 d A



#### 12.2.4 Recorded Archaeological Monuments in the area

The following archaeological monuments in the townlands surrounding the proposed development are included to highlight the type of sites that survive in the vicinity of the proposed development. It should be stressed that none of these monuments will be directly affected. The closest recorded monument to the proposed development is an unclassified road (KD008:038) that is located approximately 830m to the north of the proposed development.

**Table 12-1 Recorded Archaeological Monuments in the Area**

TOWNLAND	ARCHAEOLOGICAL SITE TYPE	SMR NUMBER
Collinstown	Enclosure	KD008:007
Ardkill	Castle	KD008:008
Ardkill	Church & Graveyard	KD008:009
Parsonstown	Ringfort Site	KD008:016
Rathmore	Enclosure	KD008:019
Collinstown	Church site	KD008:020
Parsonstown	Enclosure	KD008:023
Drehid	Enclosure	KD008:024
Drehid	Togher	KD008:025/KD009:017
Drehid	Togher	KD008:026
Drehid	Togher	KD008:027
Timahoe West	Unclassified Road	KD008:036
Coolcarrigan	Unclassified Road	KD008:038
Timahoe West	Peatland Structure	KD008:043
Mulgeeth	Ringfort	KD009:001
Timahoe West	Togher	KD009:006
Timahoe West	Children Burial Ground	KD009:006 (01)
Coologmartin	Oval Enclosure	KD009:007
Timahoe East	Church & Graveyard	KD009:008
Timahoe West	Castle	KD009:009
Giltown	Circular Enclosure	KD009:010
Timahoe West	Peatland Structure	KD009:027
Timahoe West	Peatland Structure	KD009:028
Coolcarrigan	Unclassified Road	KD009:029
Timahoe West	Peatland Structure	KD009:030
Timahoe West	Peatland Structure	KD009:034
Timahoe West	Peatland Structure	KD009:035
Kilpatrick	Burial Ground	KD012:001

Ticknevin	Togher	KD012:002/003/004
Ticknevin	Holy Well	KD012:008
Parsonstown/Timahoe West	Togher	KD008:029/KD009:019
Parsonstown/Timahoe West	Togher	KD008:030/KD009:018

**PARSONSTOWN/TIMAHOE WEST**KD008:029/KD009:019**Locational details****Classification** Togher**Nat. Grid Ref.** 274478/232403

RMP: Yes

**Site description** A wooden trackway (L2275m) crossed Timahoe Bog on an east-southeast – west northwest orientation linking dry ground near Ardnacoolia in Timahoe West to dry ground in Loughnacush and Parsonstown townlands. It intersected a second oak trackway (KD008:030/KD009:018) mid-way across the bog. Two small sections were excavated by Munroe in 1986 (Munroe 1987:22). The trackway was found to consist of small logs laid end to end in an irregular pattern. Besides the rough trimmings of the ends there was no carpentry evident. The site was radiocarbon dated to 2466-2200 BC.

**TIMAHOE WEST**KD008:030/ KD009:018**Locational details****Classification** Togher**Nat. Grid Ref.** 274458/2326425

RMP: Yes

**Site description** A narrow oak trackway on a brushwood substructure may originally have traversed approximately 2600m of Timahoe Bog (east-northeast -west-southwest) between dry ground at Drumachon Island to the east and dry ground in Kilkeaskin townland in the west. It is intersected by a second togher KD008:029/KD009:019 which crosses the same stretch of bog. This site was examined by Rynne (1966) and Munroe (1986) and the Wetland Unit in 1992. It consists of a haphazard arrangement of large oak planks laid longitudinally and transversely, with occasional narrow side planks, supported on a sub-structure of roundwood runners. Dendro dating suggests a two phase structure. The sub-structure is dated to 1484 BC and the superstructure to 1378 BC. The surviving remains were surveyed by the Wetland Unit in 1992. Extending for a length of 218.9m east-northeast and 2.5m wide the togher consisted of transversely laid roundwoods, brushwoods and planks. Oak and birch brushwood, up to eight rods deep, was used as filler. Displaced timbers in the area indicate the site was originally more extensive.

**COLLINSTOWN**KD008:007**Location Details****Classification:** Enclosure site**National Grid Ref.:** 27112/23612**RMP:** Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. It consists of a roughly circular earthwork set in a depression on a slight rise in good pasture land. The surrounding land is higher than the interior of the site. The ground drops to a fosse with an inner bank. The interior is very uneven and is planted with trees. The site measures 42m east-west and 26m north-south. No traces of this site exist today.

---

**ARDKILL**KD008:008**Location Details****Classification:** Castle (Tower House)**National Grid Ref.:** 27107/23530**RMP:** Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. According to O'Donovan's OS Letters (1838-1840) '*...in the south east part of the townland of Ardkill are the ruins of an old church and of a castle*'. The tower house is dated to the fifteenth/sixteenth century, with the fireplace and chimney turret added in the seventeenth century. It is located on a natural rise in undulating pasture (well drained) surrounded by an area of low earthworks (especially to south-east) towards Ardkill. Only the south wall with a turret on the south-west corner and a small fragment of the north-east wall remain. The turret was added in order to add chimneys and has red brick in the fabric and is dated to the seventeenth/eighteenth century. In the east wall, at the top of the barrel vault over the ground floor, a joint line occurs where the wall under the vault is filled in. In the south wall a band of rough stones mark the level of the barrel vault between the ground and first floor. There are two breaks in the south wall, the break on the east is large and possibly marks the position of a doorway while that on the west is where the east wall and turret abut the south wall. The turret abuts the south-east corner and contains two flues, one from the ground floor runs behind that from first floor. On the ground floor the lower part of the flue is ruined, while on the first floor it is intact and widens out where the fireplace was. To the south-east of the castle there are numerous low earthworks over an extensive area between the castle and the church. There are no traces of the west tower, though there are joint lines evident where the curtain wall joined the tower. To the south-east of the bawn there are a series of large terraces and possible trackways.

---

**ARDKILL**KD008:009**Location Details****Classification:** Church & Graveyard**National Grid Ref.:** 27121/23496

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. The church is enclosed by a low stone wall, polygonal in shape. The graveyard is overgrown, but is still used for burial. The entrance gate is located in the south-west corner. The church is rectangular in plan, orientated east/west with internal dimensions of 16m east/west and 6m north-south. The church is ruinous and completely overgrown. There are no datable architectural features present. The upstanding west wall is constructed of roughly coursed limestone. Though ivy covered, there are traces of a crude round-headed window visible, but no dressed stone evident. The remains of the north and south walls are mostly grass-covered. Only the south-east portion of the south wall survives to a height of 1.2m. The east wall is ruinous with ivy and grass covering it. There is evidence of a supporting buttress on the south-east corner with possible rubble remains of another, on the opposing north-east corner. Where the walls survive they have a maximum thickness of 0.9m. There are some late headstones in the interior, however no dates are discernible.

---

## PARSONSTOWN

KD008:016

### Location Details

**Classification:** Ringfort site

**National Grid Ref.:** 27228/23322

RMP: Yes

**Site Description:** This site is marked on the first and third edition of the Ordnance Survey Maps. It has been levelled and survives as a sub-circular mound with traces of a ditch encircling it, visible at the south and west. The site is clearly visible on the aerial photographs. The earthwork to the north of the site is the remains of a nineteenth-century house and farm, now abandoned.

---

## RATHMORE

KD008:019

### Location Details

**Classification:** Enclosure site

**National Grid Ref.:** 27063/23112

RMP: Yes

**Site description:** The site is marked on both the first and third edition of the Ordnance Survey Maps. It has been destroyed and the field is now under tillage.

---

## COLLINSTOWN

KD008:020

### Location Details

**Classification:** Church site

**National Grid Ref.:** 27232/23490

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance

Survey Maps. According to O'Donovan's OS Letters (1838-1840) '*Killcooney Church is shown in the Maps from Sir William Petty's Survey and some old people call the portion of Collinstown south of Killcooney River, Killcooney townland*'. There is no trace of any structure visible. At the east angle of the field there is a shallow fosse 0.4m deep, running in a straight line north-west/south-east. The farmer put many drains down in this area and quarrying was also carried out in the east of the field.

---

## PARSONSTOWN

KD008:023

### Location Details

**Classification:** Ringfort possible

**National Grid Ref.:** 27217/23315

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. It consists of an oval enclosure, largely denuded, located 30m south of Parsonstown multivallate rath. It has an entrance causeway at the north-east and there are earthworks between it and the rath.

---

## DREHID

KD008:024

### Location Details

**Classification:** Enclosure

**National Grid Ref.:** 27318/23449

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. There is no visible trace of this site. The present field remnants point towards a rectangular earthwork but this may be due to later disturbance. The present landholders note that the previous owners called it the 'rath'-treating it with suspicion as one of their kins hair turned white over some incident. During the Emergency the trees at centre were felled for timber. It was mentioned that they were in a circle. This area has been hollowed out for yellow clay for house buildings, leaving a water-filled pond. Later reclaimed, the pond was drained and the area levelled by a bulldozer. It is now left as a haggard.

---

## DREHID

KD008:025/009:017

### Location Details

**Classification:** Togher

**National Grid Ref.:** 27492/23412

RMP: Yes

**Site Description:** This site consists of a scatter of broken and displaced timbers noted along the north-facing bank in an area of peat cutting. To the west, in an area of uncut peat, timbers were noted in the face of old cutting. It is probably the same togher, apparently running



north-west/south-east across a narrow part of Timahoe Bog.

---

**DREHID**

KD008:026

**Location Details**

**Classification:** Togher

**National Grid Ref.:** 27478/23369

RMP: Yes

**Site Description:** In 1995 a timber structure was uncovered here during the course of bog drainage operations. In a drainage cutting, which was about 1m wide and on average 2m in depth, a timber structure some 5m wide, 0.17m in thickness and 1.6m below the present (shrunk) surface of the bog was apparent. This togher or timber causeway was comprised (in this first cutting excavated) of light branches laid on each other, some crosswise, and others slanting, but not interwoven in any regular fashion. Below these branches was some 0.06m of what is locally described as 'ciabh' or sedge on which the timbers had been placed. There were more peat foundations below this sedge layer. In other cuttings inspected some large hewn timbers were observed. One of these measured over 1.05m in length and 0.22m in width and 0.08m in thickness. There were no traces of any work on the large beams, such as mortice and tenons. A portion of the togher in the first cutting was excavated and the only finds were a number of broken hazel nut shells.

---

**DREHID**

KD008:027

**Location Details**

**Classification:** Togher

**National Grid Ref.:** 27458/23345

RMP: Yes

**Site Description:** Timbers of a trackway were identified at this location on several occasions lying close to the present surface and have been dated to the medieval period.

---

**TIMAHOE WEST**

KD008:036

**Location Details**

**Classification:** Togher/Unclassified Road

**National Grid Ref.:** 275061/232772

RMP: Yes

**Site Description:** The site (L115m, W 2.1m, D 0.2m) is orientated NW-SE and consists of a compact layer of longitudinal ash and oak roundwoods (Diam. 0.08-0.16m) with occasional hazel brushwood rods. Some of the roundwoods have been split in half. Pegs, worked into wedge and chisel points, secure the outer edge of the structure. In some areas the upper surface of the timbers are charred and some hazelnuts are present.

**TIMAHOE WEST**KD008:037**Location Details****Classification:** Togher/Unclassified Road**National Grid Ref.:** 275048/232504**RMP:** Yes

**Site Description:** A two layered structure (L61.8m, W 3.1m, D 0.33m) lying just 0.3m above the mineral soil. It is composed of a compact longitudinal roundwood and brushwood superstructure over a thin, dispersed layer of brushwood (hazel, birch and yew) four rods deep. A number of pieces are worked into wedges and chisel points.

---

**TIMAHOE WEST**KD008:038**Location Details****Classification:** Togher**National Grid Ref.:** 274775/231721**RMP:** No

**Site Description:** The site (L72m, W 1m) consists of several pieces of hazel brushwood (diam. 0.01-0.25m) in a haphazard arrangement, probably the destroyed remains of a more substantial structure.

---

**TIMAHOE WEST**KD008:043**Location Details****Classification:** Peatland Structure**National Grid Ref.:** 274999/232778**RMP:** Yes

**Site Description:** The site is exposed in section in the north face of a turf bank 2.5m high. It comprises a partially removed and degrading deposit of over 15 pieces of light brushwood and twigs.

---

**MULGEETH**SMR KD009:001**Location Details****Classification:** Enclosure site**National Grid Ref.:** 27776/23566**RMP:** Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. There is no other information available for this site.

---

**TIMAHOE WEST**SMR KD009:006**Location Details**

**Classification:** Trackway (s)

**National Grid Ref.:** 27592/23253

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. A trackway, 3m wide and with a fosse on either side is visible running for a short distance in a southern direction from the children's burial ground (KD009:00601). It is cut by a crop mark of a former field boundary, probably connected although not shown on the OS first edition. A second track to the west of site is also visible.

---

## TIMAHOE WEST

SMR KD009:00601

### Location Details

**Classification:** Children's burial ground

**National Grid Ref.:** 27592/23253

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. It is located on a small low rise on the edge of a bog. It is enclosed and overgrown (D. c. 30m). The uneven appearance of the surface is probably due to the collapse of old trees and grass-covered stumps. No headstones or indeed stones of any sort are visible.

---

## COLLOGMARTIN

SMR KD009:007

### Location Details

**Classification:** Enclosure site

**National Grid Ref.:** 27819/23270

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps and is located on Coologmartin Hill. The owner states that there was formerly a 'depression' on the hill-top, just to the north of the summit. The depression was filled in and the area levelled and re-seeded recently. The hill-top is now in meadow. There is no indication of an earthwork apart from a slight depression to the north of the summit.

---

## TIMAHOE EAST

SMR KD009:008

### Location Details

**Classification:** Church & Graveyard

**National Grid Ref.:** 27744/23210

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. According to O'Donovan's Ordnance Survey Letters (1838-40) '*at Timahoe village, which is between the townlands of East and West Timahoe, there is an old church in ruins*'. According to the field inspection carried out by the National Monuments Service the

overgrown foundations of a rectangular structure are visible (c. 20m by 5m). Small portions of the wall adjacent to the south-west corner still stand but are in very poor condition, consisting chiefly of the rubble core of the wall, with a lintelled gap where a former window was. The graveyard is oval-shaped (40m by 31m) and is slightly smaller than the area enclosed by the modern wall. It is higher than the surrounding field level and contains a large number of headstones, many of eighteenth-century date.

---

## TIMAHOE WEST

SMR KD009:009

### Location Details

**Classification:** Castle site

**National Grid Ref.:** 27739/23195

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. According to O'Donovan's Letters (1838-1840) '*in the east portion of west Timahoe townland there is a field called Castlefield, close to the village. In this field there stood formerly a castle, the walls of which were entirely cleared away more than thirty years ago*'. According to the National Monuments Service this site lies in open, in very slightly undulating pastureland. There are some lazy beds in the vicinity but not visible over the site.

---

## GILLTOWN

SMR KD009:010

### Location Details

**Classification:** Enclosure site

**National Grid Ref.:** 28010/23225

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. The site is also indicated on Taylor's Map of 1783. There is no other information available for this site.

---

## TIMAHOE WEST

KD009:027

### Location Details

**Classification:** Peatland Structure

**National Grid Ref.:** 275404/232014

RMP: No

**Site Description:** A single dried out piece of broken yew roundwood with one edge worked into a wedge point. It was revealed by turf cutting operations and may be associated with KD009:028.

---

**TIMAHOE WEST**KD009:028**Location Details****Classification:** Peatland Structure**National Grid Ref.:** 275338/232441**RMP:** No

**Site Description:** The site consists of transversed and longitudinal roundwoods and brushwood of birch. Many pieces had their ends worked into wedges and chisel points.

---

**COOLCARRIGAN**KD009:029**Location Details****Classification:** Unclassified Road**National Grid Ref.:** 275199/231889**RMP:** No

**Site Description:** The site consists of a number of roundwoods lying upon occasional longitudinals with scatters of brushwood nearby. Several timbers were burned.

---

**TIMAHOE WEST**KD009:030**Location Details****Classification:** Peatland Structure**National Grid Ref.:** 275120/232466**RMP:** No

**Site Description:** A single worked yew roundwood the end of which had been worked into a wedge point and may have formed part of a peatland structure KD009:028.

---

**TIMAHOE WEST**KD009:034**Location Details****Classification:** Peatland Structure**National Grid Ref.:** 275087/232491**RMP:** No

**Site Description:** A small area formed by several worked roundwoods predominantly of yew. The end of one roundwood is worked into a chisel point.

---

**TIMAHOE WEST**KD009:035**Location Details****Classification:** Peatland Structure**National Grid Ref.:** 275099/232473



RMP: No

**Site Description:** A single dried out broken yew roundwood with its end worked into a wedge.

---

## KILPATRICK

SMR KD012:001

### Location Details

**Classification:** Graveyard

**National Grid Ref.:** 27122/22966

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. According to O'Donovan's OS Letters (1838-1840) *'there is a graveyard in the north east part of Kilpatrick townland in which I am told there is no part of a church remaining'*. It is shown on 1909 OS 6" map as a sub rectangular area.

---

## TICKNEVIN/ DERRYBRENNAN/ BALLINDOOLIN/ BALLYBRACK/ LULLYMORE WEST

SMR KD012:002/003/004

### Location Details

**Classification:** Togher

**RMP: Yes**

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. The togher ran in an approximately north-north-west/south-south-east direction across the north-east part of the bog. The total length of the togher investigated ran in a straight line aligned between the peaks of Carbury Hill, to the north and Grange Hill to the south. During turf cutting operations in Lullymore Bog three stretches of bog road were uncovered in 1964, but were not continuous.

---

## TICKNEVIN

SMR KD012:008

### Location Details

**Classification:** Holy well

**National Grid Ref.:** 26956/22998

RMP: Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. It is situated in the old graveyard at Ticknevin. There is no record of a pattern at this well. There is a cure for warts in the well and in order to be cured three visits have to be made to the well. On the first visit the suppliant leaves three pins at the side of the well. On the third visit the pins are gone and the warts are cured. There is a stone beside the well which reputedly retains the imprint of the Saint's foot.

**COOLEARAGH WEST**SMR KD013:002**Location Details****Classification:** Ringfort**National Grid Ref.:** 27835/22781**RMP:** Yes

**Site Description:** This site is marked on both the first and third edition of the Ordnance Survey Maps. It consists of a circular enclosure outlined by a fosse and a bank or embankment. The fosse is much silted up and is barely traceable in some places, the bank is of earth and is low and is set on an embankment. The interior is flat and has traces of cultivation ridges. The site is on a rise in open pasture land. There are bushes and brambles growing on the bank and the interior on the eastern side of the earthwork. The diameter of the interior is 22m. There is a possible entrance at north-west. The field boundaries adjoin at the north and north-west sides.

**12.2.5 Cultural Heritage Sites in the area**

It is the policy of Kildare County Council as published in the County Development Plan 2011-2017 to promote an appreciation of the landscape and historical importance of traditional and historic gardens, demesnes and parks within Kildare in general and particularly where they constitute an important setting to a protected structure. Two buildings of architectural/ cultural heritage significance are located in the vicinity of the proposed development. Coolcarrigan House and Church (Reg. B09-10, B09-11) are located approximately 1.6km east of the proposed development and will not be directly impacted. The house was constructed in the 1830's and was originally used as a shooting lodge. It has extensive gardens and a 19<sup>th</sup> century Hiberno-Romanesque church on the grounds. A mixed coniferous and deciduous tree belt along the eastern edge of the existing bog ensures that these structures will not be visually impacted by the proposed facility.

**12.2.6 Archaeological artefacts recorded from the area**

The following archaeological artefacts are included to highlight the type of archaeological activity in the area and the importance of archaeological monitoring as stray finds are frequently found in the course of monitoring of ground works. Archaeological finds recorded in the topographical files of the National Museum of Ireland indicate human activity in the general area from the Neolithic period with many of the artefacts recovered from a peat environment. While the bogs have since been harvested it is possible that further artefacts and/or features survive in the lower levels of peat. A study of the topographical files housed in the National Museum of Ireland yielded the following archaeological artefacts:

**Townland** Allenwood South**Registration No.** 1987:72**Find Type** leather shoe

<b>Found</b>	in bog 1.25m deep
<b>Townland</b>	Allenwood South
<b>Registration No.</b>	1987:71
<b>Find Type</b>	Bronze Cauldron (15th /16th century)
<b>Found</b>	in bog 1.25m deep
<b>Townland</b>	Allenwood Middle
<b>Registration No.</b>	1942:1870
<b>Find Type</b>	Bronze Rapier
<b>Found</b>	in bog
<b>Townland</b>	Ardkill
<b>Registration No.</b>	1937:2433
<b>Find Type</b>	Stone Axehead
<b>Found</b>	
<b>Townland</b>	Ballybrack
<b>Registration No.</b>	1937:2438-44
<b>Find Type</b>	Stone Implement
<b>Found</b>	
<b>Townland</b>	Ballybrack
<b>Registration No.</b>	1937:2421
<b>Find Type</b>	Stone Axehead
<b>Found</b>	
<b>Townland</b>	Ballynakill Lower/Upper
<b>Registration No.</b>	1962:75
<b>Find Type</b>	Iron Axehead “bearded” type
<b>Found</b>	in boggy land
<b>Townland</b>	Ballyteague
<b>Registration No.</b>	-
<b>Find Type</b>	Designed Stone
<b>Found</b>	near Castle
<b>Townland</b>	Coolcarrig
<b>Registration No.</b>	1979:7
<b>Find Type</b>	wooden shovel blade
<b>Found</b>	5.5m below bog surface
<b>Townland</b>	Coolcarrig

<b>Registration No.</b>	1979:9
<b>Find Type</b>	wooden keg with bog butter
<b>Found</b>	in bog
<b>Townland</b>	Demense
<b>Registration No.</b>	1950:31
<b>Find Type</b>	Stone object (point)
<b>Found</b>	open field during ploughing
<b>Townland</b>	Downings
<b>Registration No.</b>	1945:268
<b>Find Type</b>	Stone Axehead
<b>Found</b>	
<b>Townland</b>	Drehid
<b>Registration No.</b>	1972:355 A&B
<b>Find Type</b>	Bent wooden stake (in two parts)
<b>Found</b>	4ft deep in bog cutting
<b>Townland</b>	Kilkeaskin
<b>Registration No.</b>	1937:2420
<b>Find Type</b>	Stone axehead
<b>Found</b>	
<b>Townland</b>	Kilkeaskin ('The River Field')
<b>Registration No.</b>	1968:438-439
<b>Find Type</b>	2 polished stone axeheads
<b>Found</b>	
<b>Townland</b>	Killinagh
<b>Registration No.</b>	1994:72
<b>Find Type</b>	wood in bog
<b>Found</b>	
<b>Townland</b>	Killinagh
<b>Registration No.</b>	1929:1298
<b>Find Type</b>	bog butter
<b>Found</b>	at depth of 6ft in bog
<b>Townland</b>	Mulgeeth
<b>Registration No.</b>	1980:46
<b>Find Type</b>	wooden object
<b>Found</b>	in bog of unknown depth

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<b>Townland</b>	Mylerstown
<b>Registration No.</b>	1991:44
<b>Find Type</b>	Stone axehead
<b>Found</b>	Field close to bog

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<b>Townland</b>	Ticknevin
<b>Registration No.</b>	1987:140
<b>Find Type</b>	Leather Shoe
<b>Found</b>	Bog

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<b>Townland</b>	Timahoe East
<b>Registration No.</b>	1943:132
<b>Find Type</b>	Portion of solid wooden wheel
<b>Found</b>	Bog

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<b>Townland</b>	Timahoe East
<b>Registration No.</b>	1938:8560
<b>Find Type</b>	Fragment of large stone axehead
<b>Found</b>	

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<b>Townland</b>	Timahoe East
<b>Registration No.</b>	1943:286
<b>Find Type</b>	Silver bracelet
<b>Found</b>	Bog

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<b>Townland</b>	Timahoe East
<b>Registration No.</b>	1943:130-131
<b>Find Type</b>	Wooden yoke and long perforated timber
<b>Found</b>	Bog

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<b>Townland</b>	Timahoe East
<b>Registration No.</b>	1950:7
<b>Find Type</b>	Iron axe
<b>Found</b>	at depth of 6ft during cutting operations

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<b>Townland</b>	Timahoe Bog
<b>Registration No.</b>	
<b>Find Type</b>	Bog body –human forearm
<b>Found</b>	in 1959 during hand-work operations

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<b>Townland</b>	Timahoe
<b>Registration No.</b>	1950:4a, 4b, 4c

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<b>Find Type</b>	3 portions of wooden vessel
<b>Found</b>	in bog at depth of 7ft.
<b>Townland</b>	Timahoe (Derrymahon Bog)
<b>Registration No.</b>	1942:409
<b>Find Type</b>	Wooden object
<b>Found</b>	3 ft. below bog
<b>Townland</b>	Timahoe East or West
<b>Registration No.</b>	1978:3
<b>Find Type</b>	Leather shoe
<b>Found</b>	
<b>Townland</b>	Timahoe
<b>Registration No.</b>	1941:1120
<b>Find Type</b>	Bronze spearhead
<b>Found</b>	
<b>Townland</b>	Timahoe Bog, Timahoe West
<b>Registration No.</b>	1966:2
<b>Find Type</b>	Flint arrowhead (barbed)
<b>Found</b>	
<b>Townland</b>	Timahoe West
<b>Registration No.</b>	1970:139
<b>Find Type</b>	Rough out for two handled wooden vessels
<b>Found</b>	
<b>Townland</b>	Timahoe Bog
<b>Registration No.</b>	-
<b>Find Type</b>	Human skeletal remains
<b>Found</b>	in area of Drummond or Ballynakill Lower Townland
<b>Townland</b>	Roberstown
<b>Registration No.</b>	1994:62
<b>Find Type</b>	bronze socketed axehead
<b>Found</b>	in bog

### 12.2.7 References

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### 12.2.8. Cartographic Evidence & Aerial Photography

An examination of old maps and aerial photographs of the subject site revealed nothing of archaeological significance. The 1752 map by Noble and Keenan records the Bog of Allen with Timahoe and Drehid marked. The area of the proposed development is indicated as part of the vast bog in this mid 18<sup>th</sup> century map. Alexander Taylor's map of 1783 similarly depicts the area as a vast bog with the Cashanure River to the west. The first edition ordnance survey map produced in the mid 19<sup>th</sup> century highlights Coolcarrigan Demesne to

the east of the site but no feature is indicated in the area proposed for development. More recent maps and aerial photographs highlight the drainage channels throughout the site. Nothing of archaeological significance is marked in the area of the proposed development on any of the maps or aerial photographs.

#### 12.2.9. Archaeological Assessment

The site of the proposed development is in an area located immediately east of the existing access road to the Drehid Waste Management Facility (Plate 1). The archaeological assessment was conducted in order to determine if any previously unrecorded sites exist in the area proposed for development. The assessment involved an analysis of previous work on the site and a walkover survey of the proposed development concentrating on the areas of cutover bog and drain faces - where it might be possible to identify archaeological features more readily. The evidence from archaeological monitoring of all ground disturbance associated with the Drehid Waste Management Facility to the north was also examined. In 2006 archaeological monitoring of the initial phases of the Drehid Waste Management Facility groundworks was carried out by Archaeological Development Services Ltd (Turrell & Flood 2007). This included the monitoring of the access road located to the east of the proposed MBT facility. In 2008/9 further monitoring was carried out in advance of the construction of additional landfill cells (Phases 3, 4 & 5) (Turrell 2009). Further monitoring associated with a biowaste composting facility was undertaken in 2010-2011. Nothing of archaeological interest was noted during the course of these groundworks.



**Plate 1:** General view of the proposed development site from the west.

Timahoe Bog is part of Bord na Móna's Allen group of bogs which were first brought into industrial peat production in the 1950's. Peak production at Timahoe Bog was achieved during the 1960's when the bog was in sod peat production. The peat was removed from the bog via a railway system, with many of the tracks, or sections of them still in place. One such section of track runs from east to west through the proposed development site (Plate 3). The track is overgrown with grass but the iron rail is still visible in places. Industrial production at the site was gradually phased out over the last twenty two years as most of the bog was cut away and the poor quality of the remaining peat made further peat harvesting

uneconomical. Small scale production for domestic purposes continues at the margins of the commercially cut away bog.

To reduce the moisture content of the peat material during the years of peak industrial activity it was necessary to drain the entire bog. This was achieved by the excavation of a network of east to west running drains that discharged into a central underground culvert that ran from north to south. The drainage network facilitated heavy plant and machinery to safely traverse the bog. As a result of the drainage channels the entire site is divided into plots referred to as 'peat fields'. These turf plots span the length of the bog. In some areas they have been exploited to a depth of 0.5m-1m above the natural mineral soil.

The surface areas of the proposed development site consist of tracts of flat low-lying bog with varying densities of vegetation cover. The walk over survey was restricted to areas where over-growth was sparse or non-existent. Investigation of drain section faces and a walkover of the area yielded nothing of archaeological interest.



**Plates 2 & 3:** View from east and detail of railway track running from east to west

## 12.3 POTENTIAL IMPACTS

### 12.2.1 *Potential Impacts of Configuration A (MBT with Composting)*

Given the partly overgrown nature of the site of the proposed development a full survey of the area proved problematic. However the walk-over survey of the proposed development site revealed no features of archaeological or cultural heritage significance. Furthermore the archaeological assessment of the area indicates that the proposed development will not impact on any known features or artefacts.

### *12.2.2 Potential Impacts of Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

The walk-over survey of the proposed development site revealed no features of archaeological significance. Furthermore the archaeological assessment of the area indicates that the proposed development will not impact on any known features or artefacts.

## 12.4. MITIGATION MEASURES

### *12.2.3 Mitigation measures for Configuration A (MBT with Composting)*

Archaeological finds recorded in the topographical files of the National Museum of Ireland indicate human activity in the general area from the Neolithic period with many of the artefacts recovered from a peat environment. While the bogs have since been harvested it is possible that further artefacts and/or features survive in the lower levels of peat. It is therefore proposed that prior to development the vegetation is cleared, as this will assist in determining if any features of archaeological significance are present in these areas. The removal of vegetation will be undertaken in advance of construction works and will be monitored by a suitably qualified archaeologist. The route of the existing railway will be recorded to ensure its documentation as part of the industrial heritage of the site.

All ground disturbance associated with the development will be monitored by a suitably qualified archaeologist working under the appropriate license.

### *12.2.4 Mitigation measures for Configuration B (MBT with Dry Anaerobic Digestion and Composting)*

Similarly to above, it is proposed that prior to development the vegetation is cleared, as this will assist in determining if any features of archaeological significance are present. The removal of vegetation will be undertaken in advance of construction works and will be monitored by a suitably qualified archaeologist. The route of the existing railway will be recorded.

All ground disturbance associated with the development will be monitored by a suitably qualified archaeologist working under the appropriate license.

## 12.5 CONCLUSIONS

Timahoe and its environs have evidence of the presence of humans possibly dating from the Bronze Age as indicated by the dendrochronological dating of the toghers from Timahoe Bog. However, the recovery of eight axeheads and a flint arrowhead suggests earlier activity



dating to the Neolithic period (4000-2000 BC). Artefacts recovered from the area, which are generally found in a bog environment includes leather shoes and portion of a wooden wheel. The area continued to be occupied throughout the medieval period as indicated by the presence of church and castle sites in the vicinity of the proposed development.

Given the partly overgrown nature of the site of the proposed development a full survey of the area proved problematic. The archaeological and cartographic records indicate no features of archaeological significance in the area of the proposed development.

The evidence from archaeological monitoring of all ground disturbance associated with the existing Drehid Waste Management Facility is equally devoid of archaeology (See Section 12.2.9). Previous works also included the archaeological monitoring of the access road to the Drehid Waste Management Facility. This roadway is located immediately west of the proposed development site. Nothing of archaeological significance was encountered during archaeological monitoring of this roadway.

Archaeological finds recorded in the topographical files of the National Museum of Ireland indicate human activity in the general area from the Neolithic period with many of the artefacts recovered from a peat environment. While the bogs have since been harvested it is possible that further artefacts and/or features survive in the lower levels of peat. It is therefore recommended that in advance of construction all vegetation on the site will be cleared to enable a full appraisal and that during construction all ground disturbance be archaeologically monitored.

The mitigation measures proposed here are subject to ratification by National Monuments, Department of Arts, Heritage and Gaeltacht Affairs.



## 13 INTERACTION OF THE FOREGOING

The significant impacts of the proposed development and the measures proposed to mitigate these impacts have been outlined in this EIS. However, in any development with the potential for environmental impact there is also the potential for interaction between impacts of the different environmental aspects.

The result of these interactions may either exacerbate the magnitude of the impact or may in fact ameliorate it. As part of the requirements of an Environmental Impact Statement (EIS), the interaction of the impacts on the surrounding environment needs to be addressed.

There is the potential for interaction between the impacts of the proposed MBT Facility development and also the potential for interaction with the previously permitted Drehid Waste Management Facility (as both are located within the same Bord na Móna landholding).

Potential interactions between the impacts of various environmental aspects are as follows:

- Potential odour and air emissions will be controlled as all processing activities will take place within enclosed buildings. A building ventilation and odour abatement system will be employed at the MBT Facility. The maintenance of a negative pressure environment within each building will prevent the emission of untreated air thereby minimising potentially nuisance causing odour emissions. These measures will reduce the impact on human beings in the community.
- Dust suppression and vehicle wheel washes will be used at the MBT Facility to mitigate the impact of any wind blown dust around the site and to nearby dwellings. These measures will reduce the potential impact on human beings, material assets and ecological receptors.
- Travel patterns will not be disrupted by the proposed MBT Facility development, however vehicle numbers will increase. Mitigation measures, which have been employed at the site entrance, will reduce the impact of the development and additional mitigation measures for the MBT Facility have also been proposed within the EIS. These measures will improve road safety for all road users.
- Professional vermin control experts will be employed to ensure the potential for vermin activity is minimised. These measures will reduce impacts on human beings and material assets.
- Compliance monitoring of groundwater, surface water, noise, air and dust will be undertaken as per regulatory conditions and annual environmental reports will be compiled to detail the performance of the MBT Facility. These reports will be made available to all interested parties, which will allay public concerns as to the operation of the site and will result in a positive interaction with respect to human beings and flora and fauna.
- There is the potential for interaction between groundwater, surface water and ecology and this interaction has been considered in the relevant sections of the EIS.

- The MBT Facility will be operated to Best Available Techniques (BAT) as per EPA recommendations. A complaints register will be maintained and the EPA will undertake regular environmental audits, which will demonstrate how the MBT Facility is performing. These measures will result in interaction in all environmental criteria.
- Finally, it should be noted that throughout the EIS potential interaction between various environmental criteria are discussed. The proposed MBT Facility will be sited at a significant distance from the local road network and residential properties, with the nearest residence being approximately 1km from the facility footprint. Avoidance of impacts was used throughout the design of the MBT Facility. The mitigation measures proposed are designed to further ameliorate the impact of the proposed MBT Facility on the wider environment and the potential cumulative impact of the development within the same Bord na Móna landholding as the permitted Drehid Waste Management Facility.

While there is potential for the above impacts to interact and result in a cumulative impact, it is unlikely that any of these cumulative impacts will result in significant environmental degradation.

It should also be noted that the proposed MBT Facility will divert biodegradable municipal solid waste from the existing landfill at the adjacent Drehid Waste Management Facility. Biodegradable municipal solid waste will be diverted, by the MBT Facility, by the biostabilisation of the organic fraction and the production of SRF. The biostabilisation of biodegradable municipal waste significantly reduces its potential to generate landfill gas when landfilled. As a result, the MBT Facility is likely to have a positive effect on odour emissions from the existing landfill. In this regard, the proposed MBT Facility will have a positive effect on human beings in the community.

Given that outputs from the proposed MBT Facility will be accepted at the existing landfill at the Drehid Waste Management Facility for the remainder of its operational life, there will be a corresponding reduction in the amount of waste accepted directly at the existing landfill from external sources.



**TOBIN**  
Patrick J. Tobin & Co. Ltd.

## INTERNATIONAL NETWORK

Galway  
Fairgreen House,  
Fairgreen Road,  
Galway.  
Ph +353 (0)91 565211  
Fax +353 (0)91 565398  
E-mail [galway@tobin.ie](mailto:galway@tobin.ie)

Dublin  
Block 10-4,  
Blanchardstown Corporate  
Park,  
Dublin 15.  
Ph +353 (0)1 803 0406  
Fax +353 (0)1 803 0409  
E-mail [dublin@tobin.ie](mailto:dublin@tobin.ie)

Castlebar  
Market Square,  
Castlebar,  
Co. Mayo.  
Ph +353 (0)94 902 1401  
Fax +353 (0)94 902 1534  
E-mail [castlebar@tobin.ie](mailto:castlebar@tobin.ie)

Poland  
Ul. Cystersów 9  
31-553 Kraków  
**Ph** +48 12 353 8646  
**Fax** +48 12 353 7329  
**E-mail** [biuro@tobin.pl](mailto:biuro@tobin.pl)

United Kingdom  
CAB International,  
Nosworthy Way,  
Wallingford,  
Oxfordshire OX10 8DE  
**Ph** +44 1491 829327  
**Fax** +44 1491 833508  
**E-mail** [brian.allum@tobin-uk.com](mailto:brian.allum@tobin-uk.com)

visit us @ [www.tobin.ie](http://www.tobin.ie)