4 DESCRIPTION OF REASONABLE ALTERNATIVES

4.1 INTRODUCTION

Chapter 4 of this EIAR provides a description of the reasonable alternatives as required in Directive 2011/92/EU (as amended). This requires *"A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

As noted in the Draft Guidelines on the Information to be Contained in EIARs (August 2017) "*Analysis of high-level or sectoral strategic alternatives cannot reasonably be expected within a project level EIAR"* and *"that the amended Directive refers to 'reasonable alternatives… which are relevant to the proposed project and its specific characteristics'."*

4.2 ALTERNATIVE LOCATIONS

4.2.1 Alternative Sites

In support of this EIAR a site selection exercise was carried out to identify available sites which have sufficient space for construction of the proposed facility, which will require an area of at least 65 ha.

There are no prevailing statutory guidance documents for the siting of facilities such as that currently proposed, with each proposal judged on its own merit. However, consideration has been given to the following information when preparing the methodology for the site selection and subsequent scoring systems.

The Kildare County Council Development Plan, 2011–2017, considers Waste Management infrastructure in Chapter 7 *'Water, Drainage and Environmental Services'*. There are no siting criteria outlined within the Development Plan for such facilities. It is, however, the stated policy of the Council to have regard in the assessment of planning applications for waste management facilities, to the prevailing Regional Waste Management Plan for County Kildare, which has now been superseded by the Eastern-Midlands Region Waste Management Plan 2015-2021.

There are no siting requirements set out for the disposal of hazardous waste in the EMRWMP. However policy E7 states that:

> *"The waste plan supports the development of disposal capacity for the treatment of hazardous and non-hazardous wastes at existing landfill facilities in the region subject to the appropriate statutory approvals being granted in line with the appropriate environmental protection criteria."*

It can therefore be reasonably assumed that the available documentation and guidance is favourable towards the development of hazardous landfill capacity at existing landfill facilities, such as the Drehid Waste Management Facility.

The site selection provided an examination of the available sites and a selection of the most appropriate site in respect of the following criteria:

- Availability of land;
- Location of site relative to the centroid of waste generation;
- Current planning and environmental issues at the available sites; and,
- Current site use.

The availability of a landbank of a sufficient size, of at least 65 ha, which does not have residential dwellings, located within 45 km of the 'Centroid' of the waste arising was a primary consideration in identifying a suitable landbank for the proposed development.

The 'Centroid' is defined as the geographical location that would minimise the distance that waste inputs would have to travel. The determination of the centroid is based on the calculation of the kilometres travelled by each tonne of the inputs to such a facility as that proposed. Its consideration is aimed at minimising the distance inputs travel by locating the proposed facility close to the centroid.

The wastes that are proposed to be accepted at the proposed facility include waste products (residues) that arise from the incineration process. These residues include Non-hazardous incinerator bottom ash and Hazardous fly ash and other flue gas treatment residues.. It is known that the two existing permitted incinerators in the state are in the GDA, and an assumption (for the purpose of the calculation) is made that additional waste-to-energy capacity in the state will come from the proposed facility in Ringaskiddy, County Cork.

It is also expected that the vast majority of C&D waste to be disposed of at the proposed facility will come from the GDA. The likely quantity of C&D waste from other areas of the Eastern-Midlands Waste Region are deemed to be relatively small and as such are unlikely to impact significantly on the centroid location.

It is also proposed to accept other Hazardous waste streams such as contaminated soils, industrial wastes, sludges and filter cakes, as well as metals and heavy-metal-containing wastes, which are currently exported from this country for landfilling.

Based on the above inputs, and a requirement to identify a location of least kilometres travelled, the location of the 'Centroid' for the proposed 250,000 TPA non-hazardous, and 85,000 TPA hazardous landfill facility was identified using "Excel Solver".

Having estimated the waste to be accepted at the proposed facility from each of the waste streams discussed above, the calculation of the 'Centroid' was based on:

- Distance to each of the Waste Transfer Centres in respect of waste input;
- Distance to each of the Incinerator sites in respect of waste input; and
- Distance to the centroid of the GDA in respect of waste input.

The excel solver provides the optimal location for the proposed facility that will require the minimal waste tonnage travelled. This optimal location can then be compared with available sites of an adequate size to select the most optimal site for development of the proposed facility. The optimal location for the siting of a facility with regards to tonnage travelled with respect to the assumptions outlined above is shown in Figure 4.1 below.

Figure 4.1: Centroid Location

As can be seen in Figure 4.2, the centroid is located just south of Croke Park. Sites that have a minimum area of 65 ha and are within 45km of the centroid were identified. The 45km is equivalent to approximately sixty minutes haulage time and is chosen to provide a high level filter to allow consideration of sites within a reasonable distance of the centroid of waste, thereby minimising the potential environmental impact resulting from the haulage of the waste. All sites within the 45km buffer are shown on Figure 4.2, below.

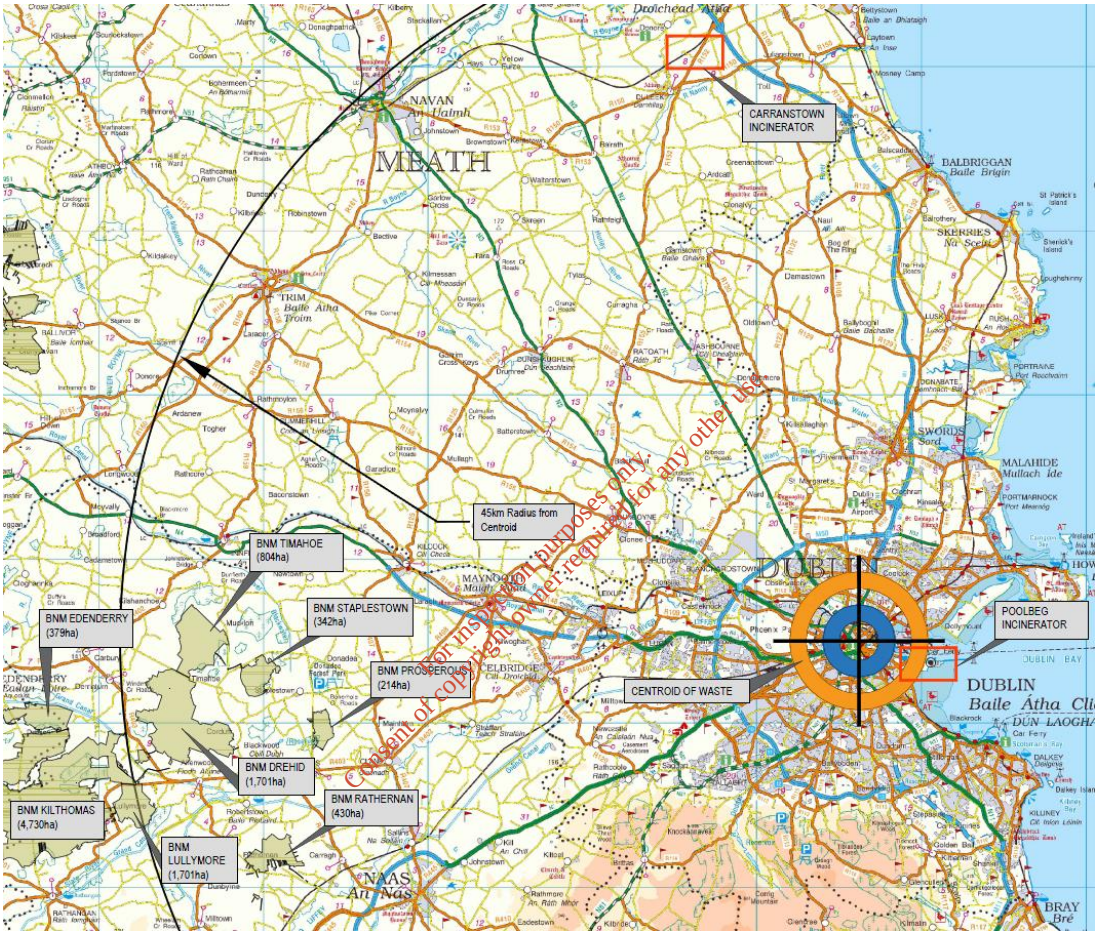


Figure 4.2: Bord na Móna sites within 45km of Centroid

Seven Bord na Móna sites emerged as viable locations for the proposed facility within 45 km of the centroid of waste arising including; Prosperous Bog, Gilltown Bog, Timahoe Bog - Drehid Waste Management Facility, Lullymore Bog, Ballydermot Bog - South, Ballydermot Bog - West and Allen Bog. These sites were assessed including an appraisal of their existing land use and thus their appropriateness for the siting of the proposed development. Additionally, the site should not be located within a designated habitat thereby avoiding impacts on designated habitats and ensuring the avoidance of disproportionate direct impacts on sensitive ecological areas. When comparing sites consideration was also given to whether or not a site is located in a highly sensitive landscape. The avoidance of a disproportionate visual impact on highly sensitive landscapes is desirable i.e. landscape areas classified as a having a “High” sensitivity should be avoided.

The sites above were examined for their ability to accommodate the proposed development. A listing of the current land uses was generated and sites which are currently in use for peat production, and therefore unsuitable for the proposed facility, were ruled out.

As a result of the site selection process undertaken, the Bord na Móna landholding at Drehid was recommended as the preferred location for development of the proposed Facility.

4.3 ALTERNATIVE LAYOUTS

4.3.1 Avoidance of Environmental Sensitivities

Within the Bord na Móna landholding at Drehid, Carbury, County Kildare, TOBIN Consulting Engineers, on behalf of Bord na Móna, identified the preferred location in the townlands of Timahoe West and Coolcarrigan as a suitable and appropriate site for the proposed development. As the proposed development will share elements of infrastructure with the existing Drehid WMF, the application area also includes the townlands of Killinagh Upper, Killinagh Lower, Drummond, Kilkeaskin, Loughnacush, and Parsonstown, wherein existing infrastructure to be shared is located.

Potential locations within the landholding were assessed in an objective manner, with a view to selecting a location which would minimise the impact of the proposed development on the surrounding environment, and would be the most sustainable solution. The factors considered included the following:

- Proximity to sensitive receptors (noise/dust/air quality);
- 200 m buffer zone;
- Visual impact;
- Biodiversity;
- Archaeology;
- Hydrogeology;
- Ground conditions and geology; and
- Compatibility with existing infrastructure at the Drehid Waste Management Facility.

The preferred location identified as outlined below, is south of the existing landfill and east of the dedicated access road, as shown in Chapter 1 of the EIAR, on Figure 1.1.

The nearest sensitive receptor will be a distance of approximately 850 m from the nearest element of the infrastructure to be used within the proposed development, i.e. the site access road, approximately 1,130 m from the proposed Non-hazardous Landfill, approximately 1,170 m from the proposed Ash Solidification Facility and approximately 1,200 m from the proposed Hazardous Landfill.

The preferred location is located further than the minimum distance specified by the EPA in their publication, "*Final Draft BAT Guidance Note on the Best Available Techniques for the Waste Sector: Landfill Activities"* (December 2011) of 200 m, "*distance between the maximum extent of waste disposal activities (actual landfilling) and sensitive receptors*".

Visual impact for this location is predominantly favourable with the site screened on all sides. This location also benefits from the location of the existing landfill which provides screening of the site. It can therefore be said that the site is the most favourable site in terms of visual impact when compared to other sites considered.

There are no significant ecological factors related to the preferred location that would rule it out, and that location within the landholding is close to the existing development, and would provide an advantage over other sites considered as it would minimise the ecological impacts.

Desktop studies identified that there are archaeological sites within the vicinity of the preferred location. However, as determined during the EIA process, following further investigation no features of archaeological interest were identified in a survey of the preferred location (as noted in the EIAR, Refer to Chapter 13, Archaeology and Cultural Heritage and Appendix 13.1 Archaeological Bog Survey Report).

There are no hydrogeological features in the vicinity of the preferred location.

There are existing ground condition reports for the area of the site in which the preferred location is situated. Peat depth ranges from approximately 0.2 m to 2.5 m at the preferred location. This peat depth is not considered to be an obstacle as it is underlain with firm to stiff gravelly clays with sufficient bearing capacities to allow construction of a landfill facility.

4.3.2 Level of Environmental Capacity

From a 'compatibility with the existing infrastructure' perspective, the site is located adjacent to the existing facility. Therefore, the preferred location provides the most suitable location for development as it provides for the use of all existing ancillary infrastructure.

Considering the above information, the proposed location was considered as the preferred site for the proposed development 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 development of 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, as noted above.

Also, it should be emphasised that the location of the proposed development within the landholding of 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.

In conclusion after consideration of all the alternative locations, the proposed location within the Drehid landholding is an appropriate and suitable location and the preferred site for the development of the landfill extension within the Bord na Móna landholding in the Timahoe Bog in County Kildare.

4.4 SIZE AND SCALE OF DEVELOPMENT

The following sections outline the main aspects which were taken into consideration for the alternative size and scale of the main elements of the proposed development.

4.4.1 Non Hazardous Landfill

It is proposed to provide capacity for the sustainable landfill of 250,000 TPA of non-hazardous wastes including incinerator bottom ash (IBA), stabilised waste arising from the biological treatment of the biodegradable fraction of municipal waste, construction and demolition (C&D) waste including the fine fraction, soil and stone. In addition, it is proposed that up to 15,000 TPA of metals will be recovered from IBA onsite prior to landfill.

4.4.1.1 Incinerator Bottom Ash

The commencement of full commercial operations at the 600,000 TPA Poolbeg incinerator in 2017 will see the production of approximately 133,000 TPA of non-hazardous bottom ash. The Poolbeg development will not have the capacity for the recovery of some 10% by weight of metals from this waste stream. In addition to the future availability of bottom ash from Poolbeg, approximately 50,000 TPA of the same material is currently produced at the Carranstown incinerator in Duleek, County Meath, where metals are subsequently removed. Since commencement of operations, the remaining ca.40,000[46]TPA of bottom ash has been disposed of, or used as engineering material, at a number of landfills in the region[47], some of which are now closed. Finally, the new Regional Waste Management Plans jointly support the development of an additional 300,000 TPA waste-to-energy capacity within the State. The net total of non-hazardous waste-to-energy bottom ash requiring management from these facilities alone is therefore of the order of 220,000 TPA (after removal of metals).

In the medium term, this material is likely to be landfilled. This is principally due to the relatively plentiful supply of aggregates in the Irish market. The proposed development has consequently been sized to meet this quantum of waste arisings.

4.4.1.2 C & D Waste including Fine Fraction, Soil and Stone

Soil, stone and fines material predominantly originating from C&D activity is traditionally recovered for use in landfill engineering. According to a recent report by SLR Consulting, approximately 250,000 TPA of C&D fines were being produced in the Greater Dublin Area (GDA) and used as landfill engineering material in 2013. The report also notes that this waste generated figure is likely to increase significantly as the construction industry recovers. The GDA is the traditional source of approximately two thirds of the wastes accepted at Drehid. However, with reducing levels of landfill activity, there is a corresponding reduction in the requirement for the deployment and recovery of this material in landfill engineering applications. This has led to concerns[48] regarding current and future outlets for this material by non-licensed, poorly regulated, waste collectors. With increasing activity rates in the construction industry there is a risk that these instances could continue and, indeed, increase.

Disposal of the material at landfill would previously have attracted a €75 levy per tonne. The risk was that, with reducing levels of landfill activity, the levy would drive the material out of regulated waste management towards illegal dumping, undermining the competitive position of compliant operators. Much of the fines material (particularly that with a particle size of less than 10mm) looks similar to soil and is generally inert but, due to the gypsum content in C&D waste, the fines contain high levels of sulphate ions. C&D fines should be contained at a location where leachate is collected and treated

[46] From Annual Environmental Reports for Carranstown, EPA website
[47] Whiteriver Landfill, County Louth; Knockharley Landfill, County Meath; Scotch Corner Landfill, County Monaghan; Ballynagran Landfill, County Wicklow; Drehid Landfill County Kildare.
[48] Expressed in DECLG's Waste Policy Circular WP 06.15, 15th May 2015.

because rainwater passing through the fines can bring the sulphate into solution and cause the water to become slightly acidic. The acidic water dissolves metal ions in soil, giving rise to contamination in groundwater.

Therefore, a new exemption from payment of the levy has been introduced by DECLG since 1st June 2015 to remove the incentive for illegal dumping and encourage the safe disposal of this material in lined (engineered) landfills such as Drehid.

To accommodate this additional volume of waste (250,000 TPA of non-hazardous waste including IBA, stabilised organic fine fraction of municipal solid waste, and C&D Waste including Fine Fraction, Soil and Stone) for a period of 25 years, it will be necessary to develop additional landfill capacity, the footprint of which was determined by the design carried out in respect of this proposal.

4.4.2 Hazardous Landfill Capacity and Pre-Processing

Ireland currently has no dedicated hazardous waste landfill disposal facility. The National Hazardous Waste Management Plan (NHWMP) for 2014–2020, published by the Environmental Protection Agency (EPA), recommends that Ireland should strive for greater self-sufficiency in hazardous waste management where it is strategically advisable and where it is technically and economically feasible. In particular, the plan identifies three overarching strategic needs for action if additional hazardous waste is to be treated in Ireland and export is to be reduced, including "securing of long-term disposal arrangements for hazardous waste streams not suitable for thermal treatment or recovery"[49]. The plan also notes that "Consideration should be given to co-location of hazardous waste treatment at existing waste facilities or brownfield sites for the purposes of sustainability and land-use planning". It is therefore proposed that capacity be provided, for a period of 25 years, for the pre-treatment (where required[50]) and sustainable landfill of approximately 85,000 TPA of hazardous wastes including incinerator fly ash and other residues as well as other hazardous waste streams which are currently exported abroad.

4.4.2.1 Incinerator Fly Ash and Other Residues

As well as non-hazardous ash, incineration produces a number of hazardous residues, such as fly ash and solid wastes from flue gas treatment. The Carranstown incinerator produces approximately 10,000[51]TPA of this material, while the Poolbeg incinerator will produce another 27,000 TPA. If the supported additional 300,000 TPA of waste-to-energy capacity is developed in the state, it will add

[49] Page 79 of the National Hazardous Waste Management Plan, 2014 – 2020, published by the EPA.
[50] Other than asbestos, a relatively small amount of hazardous waste (other than contaminated soil) requires access to off-site commercial landfill. It is likely that licence conditions for the landfill disposal of this material, and fly ash and solid wastes from flue gas treatment, would require an element of pre-treatment (such as stabilisation or solidification) which would increase the volume of landfilled waste.
[51] As confirmed by recent Annual Environmental Reports for this facility on the EPA website

approximately 13,500 TPA to these figures, resulting in a total potential of some 51,000 TPA from these facilities alone.

4.4.2.2 Other Hazardous Wastes

Table 24 of the National Hazardous Waste Management Plan (NHWMP) 2014-2020 outlines the use of landfill for Irish hazardous waste abroad for the years 2010 and 2011. Based on both these figures, the plan indicates a current capacity need for approximately 10,000 to 15,000 TPA. According to a summary of baseline scenario projections for waste generation (including for hazardous waste generation), referred to in Table 21 of the plan, this need is expected to at least double over the period to 2030. This is in addition to the hazardous residues from waste-to-energy mentioned above. While asbestos is the single largest hazardous waste stream that requires landfill disposal, other streams include some C&D wastes, contaminated soils, industrial wastes, sludges and filter cakes, as well as metals and heavy-metal-containing wastes. It is expected that the level of contaminated soils arising will increase in the coming years as the construction sector grows and developments take place on brownfield sites. A conservative figure of 34,500 TPA has been assumed from this waste stream giving a total hazardous landfill capacity of some 85,000 TPA.

To accommodate this additional volume of waste (85,000 TPA) for a period of 25 years, it will be necessary to develop additional landfill capacity, the footprint of which was determined by the design carried out in respect of this proposal.

4.5 ALTERNATIVE TECHNOLOGIES

This section provides an overview of the alternative technologies considered for the following elements of the proposed development:

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

4.5.1 Treatment Options for Fly Ash and Flue Gas Treatment Residues (FGTR)

A number of different treatment options were considered for the fly ash and Flue Gas Treatment Residues (FGTR) arising from the various waste to energy facilities currently in operation and planned in Ireland. If possible, it is preferential to recycle the residues into products e.g. salts, gypsum and filler material for salt mines. However, internationally only a small fraction of fly ash and FGTR are recovered and for the majority of this hazardous waste type, no sustainable and economical feasible methods of reutilisation are available. Sustainable disposal in an engineered landfill for hazardous wastes in Ireland is therefore considered the best alternative option but this necessitates the pre-treatment of the fly ash

and FGTR prior to landfilling. With respect to fly ash and FGTR, the main objective of landfilling is to remove the residues from general circulation and to ensure that the release of contaminants from the residues occurs at acceptable levels and preferably at levels similar to natural geological materials. To fulfil this requirement, most cases involve some level of residue treatment before placing the residues at the landfill. In many European countries, the aim is to ensure that leachate from landfilled waste is acceptable in the surrounding environment without the need of treatment after an active phase of about 30-50 years.

The alternative treatment options considered for the fly ash and FGTR are outlined in the following sections.

4.5.1.1 Solidification and chemical stabilisation of Fly Ash and FGTR

As leaching of heavy metals and salts is the main concern, solidification processes for fly ash and flue gas treatment residues (FGTR) are generally utilised which results in a material with the physical and mechanical properties that reduce the potential contaminant release from the residue matrix. This entails the addition of cement, for example, which decreases the hydraulic conductivity and porosity of the fly ash and FGTR, and increases the durability, strength and volume. The process also increases the alkalinity of the mixture, therefore improving the leaching behaviour of the product. However without additional pH adjustment, the solubility of some metals, such as lead and zinc, may be increased.

There are generally two options for the solidified product namely the production of blocks (e.g. 1 m³) or consigning the solidified product directly to landfill. Solidification methods utilise several, mostly inorganic, binder reagents such as cement, lime and other pozzolanic materials such as coal fly ash, blast furnace bottom ash or cement kiln dust etc. However, the most prevalent solidification technique is cement stabilisation. Combinations of binders and various types of proprietary or non-proprietary additives are used as well.

The main concept of chemical stabilisation is to bind the heavy metals in more insoluble forms than they are present in the original untreated residues. These stabilisation methods make use of both the precipitation of metals in new minerals as well as the binding of metals to minerals by sorption. This process includes the solubilisation of the heavy metals in the residues and a subsequent precipitation in, or sorption to, new minerals.

Some of the stabilisation methods may incorporate an initial washing step where a major part of soluble salts and to some extent metals are extracted before chemical binding of the remaining metals. These methods can be completed by dewatering the stabilised product and removal of organic compounds.
The main advantage of cement solidification is the reduced contact between water and residue and to some extent possible formation of less soluble metal hydroxides or carbonates. The solidified product is

relatively easy to handle, and the risk of nuisance from dust is very low. The release of heavy metals from the products in a short-term perspective is typically relatively low, however in the medium to long term, there is a possibility of significant leaching of amphoteric metals (Pb and Zn). The risk of leaching of amphoteric metals may be reduced by adjusting the pH during the stabilisation / solidification process.

The drawbacks of this method are that leaching of soluble salts is not eliminated and that this will eventually result in some physical disintegration of the solidified product, thus allowing further leaching. The addition of cement and additives increases the amount of waste to be handled; typically about 50 % of the residue dry weight is added as cement and additives and 30 to 100 % of the total dry weight is added as water (IAWG, 1997). Thus, the residue output from fly ash is typically increased from 20-30 kg/ton waste input to about 40-60 kg/ton waste, including addition of water corresponding to 50 % of the total dry weight.

The operation and control of equipment used by this technique is considered relatively simple and comparable with standard practices in the concrete industry. The leaching characteristics of the solidified product are improved considerably compared to the untreated residues.

4.5.1.2 Thermal treatment of Fly Ash FGTR

Another main option for the treatment of fly ash and FGTR is thermal treatment. Thermal treatment can be grouped into three categories: vitrification, melting and sintering. The differences between these processes are chiefly related to the characteristics and properties of the final product.

- Vitrification is a process where residues are treated at high temperature (currently 1300 °C to 1500 °C and then quickly quenched (with air or water) to obtain an amorphous glassy matrix. After cooling down, the melt forms a single phase product called a vitrificate. The vitrificate can be a glass like or stone-like product depending on the melt composition. Additives are sometimes added to the residues to favour the formation of the glassy matrix.
- Melting is similar to vitrifying, but the quenching step is controlled to allow crystallisation of the melt as much as possible. It results in a multi-phase product. Temperatures and the possible separations of specific metal phases are similar to those used in vitrifying. It is also possible to add specific additives to favour the crystallisation of the matrix.
- Sintering involves the heating of residues to a level where bonding of particles occurs and the chemical phases in the residues reconfigure. This leads to a denser product with less porosity and a higher strength than the original product. Typical temperatures are around 900 °C. When MSW is incinerated, some level of sintering will typically take place in the incineration furnace. This is especially the case if a rotary kiln is used as part of the incineration process.

Regardless of the actual process, the thermal treatment of residues in most cases results in a more homogeneous, denser product with improved leaching properties. Vitrifying also adds the benefits of physical containment of contaminants in the glass matrix.

The energy requirements of stand-alone treatments of this type are generally very high. In some cases residue melting is achieved within the installation (i.e. not in a separate melting process) using a higher temperature combustion stage. In such cases, the energy demand is partially met by the use of the flue-gas thermal energy and external energy input requirements may be reduced.

4.5.1.3 Extraction and separation processes for Fly Ash and FGTR

Treatment options using extraction and separation processes can, in principle, cover all types of processes extracting specific components from the residues. However, most prominent are processes entailing an extraction of heavy metals and salts with acid.

Several techniques have been proposed both in Europe and in Japan. Most of these techniques make use of the acidic solution from the first scrubber in wet flue gas treatment systems. The process is removing a significant part of the total amount of heavy metals from the residues (Cd: ≥ 85%; Zn: ≥ 85% ; Pb, Cu: ≥ 33% ; Hg: ≥ 95%) ; the leachability of the residue is reduced by a factor 10^2 – 10^3. Zinc, Cadmium and Mercury are recycled. These techniques are not available in Ireland.

4.5.1.4 Other methods or practices for Fly Ash residues

A commonly used option at incinerators with wet cleaning systems is to combine the fly ash with the sludge produced by treating the scrubber solutions; the resulting product is called a Bamberg cake. Sulphides in the sludge used in the waste water treatment facility to precipitate heavy metals can further help decrease leachability of heavy metals from the Bamberg cake in a landfill.

This method has been used for more than a decade to improve residue properties before landfilling. It is also possible to contact the fly ash with the acidic waters of a scrubber. It is reported that this can achieve very significant extraction of the heavy metal and organic components.

4.5.1.5 Recovery and Utilisation

Specific components such as salts, gypsum and metals in the fly ash and FGTR may be recovered and used again, for example in other industrial processes. Only a limited number of recovery and utilisation solutions exist today. One of the reasons for the lack of commercially available recovery and utilisation technologies is likely difficulties related to achieving satisfactorily technical qualities of products based on FGTR and readily available virgin materials.

Fly ash and FGTR have properties to some extent comparable with cement (e.g. pozzolanic behaviour and contents of Ca, S, Al, Si), and may be utilised as filler material or aggregate. However due to the high contents of easily dissolvable salts and a potential for hydrogen generation, residues cannot directly substitute cement. Considering the technical limitations related to producing concrete products with fly ash and FGTR and the ready availability of cement, residue utilisation as general construction materials is not particularly widespread. Utilisation of residues as filler material (aggregate) for construction works are generally not accepted today due to the environmental aspects (high content of easily soluble salts and heavy metals).

Salt mines

Underground storage or landfilling is usually done by placing the residues only in salt mines; these may be old or in operation. The main purpose for this is typically either to avoid collapse of abandoned mine shafts and cavities, or to reinforce mine shafts in operating mines.

In Germany it is possible to dispose of waste underground for simple disposal as well as for reuse; however, this is only allowed in salt mines (Kavernen). The reason for this is justified in the fact that no free water exists in salt mines and that these are not in contact with ground water reservoirs.

4.5.1.6 Summary

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

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

The main goal of the treatment process is to minimise the long-term release of leaching of primary heavy metals. The main parameter when comparing methods are how well they reduce leaching from the final treated product and how much energy and resources they use in the treatment process. Treated or untreated residues can potentially continue leaching/releasing heavy metals but in any case less than the content of the input for centuries and likely millennia. Treatment technologies including extraction of heavy metals can substantially reduce the amount of heavy metals available for leaching.
Given the processes available in the Waste to Energy Facilities in Ireland from where the fly ash and FGTR will arise from, some of the process options outlined above are not feasible here in Ireland. The reutilisation of treated fly ash and FGTR for construction purposes in Ireland is not approved and therefore was not considered a viable option. The most robust and sustainable option available is considered to be the solidification of the fly ash and FGTR utilising cement as an additive. This

technique is probably the most common method for the treatment of fly ash and FGTR and is widely used in Europe and Japan, considered BAT and well proven. This option is therefore proposed for the Drehid site. The fly ash and FGTR treatment process prior to consignment to landfill is as outlined in Section 3.3.2 of this EIAR.

4.5.2 Treatment Options for Incinerator Bottom Ash (IBA)

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

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

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

4.5.3 Alternative Leachate Treatment Options

Phoenix Engineers were appointed as Technical Consultants by Bord na Móna, in January 2016, to provide professional services for the evaluation of landfill leachate treatment technologies at the Drehid Landfill Site, in Carbury, County Kildare, Ireland.

The Consultant was required to recommend the most feasible leachate treatment configuration to be installed at Drehid, taking into account the outcome of a detailed appraisal of alternative options.

Work involved the detailed appraisal of a wide range of leachate treatment technologies, and the combination of several technologies to achieve the required standards for treated leachate quality, and also examined potential disposal routes for treated leachate, and the possibility that each of these might be achieved reliably and consistently.

4.5.3.1 Approach to the Study

The evaluation included for the collation of real and reliable operational data from full-scale leachate treatment systems, treating leachates similar to those being generated at Drehid, to ensure that any decision making was underpinned by reliable and robust results for the quality of treated leachate which different treatment options can achieve in practice.

4.5.3.2 Leachate Treatment Processes Considered

Combinations of technologies that have been carried forward for consideration include the following:

- Aerobic biological treatment with extended aeration, with denitrification as the primary treatment step, followed by the following as secondary treatment;
- Ultrafiltration installed as part of the above (UF);
- Biological Aerated Filter (BAF);
- Reed Bed polishing processes;
- Advanced Oxidation; and
- Membrane Bioreactor (MBR).

It was recognised that at this time there were no commercially available single leachate treatment systems that were capable of achieving standards required for optimum discharge to the local environmentally sensitive receiving water bodies (streams).

4.5.3.3 Summary, Conclusions and Recommendations

The study undertaken by Phoenix Engineering has provided clear indications of options available for leachate management at Drehid.

The following observations and conclusions can be drawn from the report prepared by Phoenix Engineering:

1. The options involving evaporation processes are so expensive compared to the base model that they are unlikely ever to be viable. High costs essentially come from energy usage and high charges for disposal of concentrates.

2. The present leachate management and disposal arrangements (tankering of untreated leachate to approved waste water treatment plants) are the most cost effective but not sustainable long term. This base option may, however, be compromised by a change in acceptance criteria for raw leachate from Irish Water, or the licensing authority desire for operators of waste management facilities, to provide for the on-site pre-treatment of leachates.
3. The best option to service the existing Drehid Waste Management Facility along with the Proposed Development is an aerobic biological treatment system with extended aeration (modified Sequencing Batch Reactor) and denitrification followed by UF and a BAF system. This would achieve complete nitrification, and partial denitrification, sufficient to readily meet standards for tanker disposal to approved waste water treatment plants such as those operated by Irish Water.
4. Adoption of the above option provides a long-term solution for leachate management and there is potential for adoption of increased rates of denitrification, if this becomes necessary at a future date.

4.5.4 Biological Treatment Processes- Considered

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

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

The following sections outline the consideration of the alternative biological treatment process for the proposed development.

4.5.4.1 Anaerobic Digestion (AD) 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.

In considering 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 current REFIT for AD in the Republic of Ireland is significantly inferior to its equivalents in Northern Ireland and Italy (for example). Therefore, coupled with the fact that the current facility is a composting facility, Bord na Móna consider that composting is the most viable option for the proposed development.

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; and
- Continuous Flow Systems.

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

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 front end and an insulated unloading door on the back. 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 above mentioned 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 7mgO_2/gDM.

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 cannot 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 composting facility where the biological treatment process will be required to process 90,000 tonnes of organic fines per annum, inclusive of 45,000 in the new composting facility footprint.

Owing to the high aeration rates and process control provided by tunnel composting systems and the resultant high rates of biological stabilisation, it was decided to propose a tunnel composting system (similar to the existing composting facility) for the composting process for the proposed development. In addition, the first stage (two phases) 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 first stage will occur within the concrete composting tunnels in the main processing area of the facility. Material will initially be loaded into a tunnel for approximately two weeks (Phase 1), after which it is moved to another tunnel for a further two week period (Phase 2).

Following stage 1, in the case of source separated Bio-waste feedstock, the composted material is moved to another tunnel far an approximate maturation period of one week. This maturation / pasteurisation stage is to facilitate the potential application on land as a soil amender or fertiliser in accordance with Animal By-Products legislation (Dept. of Agriculture). This maturation stage is not relevant to the treatment of Organic Fines.

The use of fully enclosed composting tunnels, within a fully enclosed building, for the above biological treatment process, provides double containment features in respect of odour abatement. The whole composting plant operates under negative pressure in order to minimise the escape of any potential fugitive odour emissions.

5 BIODIVERSITY

5.1 INTRODUCTION

This chapter presents the Biodiversity Impact Assessment of the proposed development and should be read in conjunction with the site layout plans and project description section (Chapter 3) of this Environmental Impact Assessment Report (EIAR). Details of the existing baseline conditions on site are presented, along with an assessment of any likely effects as a result of the proposed development. Mitigation measures are also recommended, where required. The aims of this assessment are to:

- obtain baseline biodiversity data for the proposed development site;
- determine the biodiversity value of the identified features;
- assess the effects of the proposed development on biodiversity features of value;
- recommend mitigation measures to avoid, reduce and remedy effects; and
- identify any residual effects post mitigation.

The proposed development is to be located within a larger Bord na Móna landholding, which comprises 2,544 hectares (ha) of mainly cutover bog. A description of the proposed development is as detailed in Chapter 3.

This chapter has considered detailed information available from previous Environmental Impact Statements and other data sources for this landholding.

This chapter has been prepared in the by Mrs Allison Murphy, who is employed as a Senior Scientist with TOBIN Consulting Engineers. Mrs Murphy has a Masters in Environmental Resource Management from University College Dublin. Mrs Murphy also holds a Certificate in Biological Recording and Species ID from the University of Birmingham. Mrs Murphy was supported in the compilation of this chapter by the wider team of ecologists employed by TOBIN Consulting Engineers including Ms. Jessica Clarke, Mr. Padraig Cregg, Ms. Laura Kennedy and Mr. Alan Booth.

5.2 METHODOLOGY

5.2.1 Legislations & Guidance

The following legislation has been considered in this assessment:

- Environmental Impact Assessment Directive 2014/52/EU;
- EC Birds Directive 2009/147/EC;
- EC Habitats Directive 92/43/EEC;
- EC Water Framework Directive 2000/60/EC;
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011; hereafter referred to as the Birds and Habitats Regulations);
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009);
- Convention on the conservation of European wildlife and natural habitats (Bern Convention) (Adopted in Ireland 01/08/1982);
- European Communities (EIA) Regulations, 1989 (as amended);
- Wildlife Act, 1976 and Wildlife (Amendment) Act (2000). In this document, the legislation is referred to collectively as the Wildlife Acts;
- Fisheries (Consolidation) Act, 1959;
- Flora (Protection) Order, 2015;
- Planning and Development Act, 2000 and Planning and Development (Amendment) Act, 2010; and
- National Biodiversity Plan, 2011 – 2016.

The potential for effects on nature conservation interests has been assessed taking into consideration 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 documents:

- 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);
- Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2015);
- 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 2011);
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (NRA, 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 Surveillance and Monitoring of European Bats (EUROBATS, 2010);
- 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);
- National Biodiversity Data Centre (www.biodiversityireland.ie); and
- Bord na Móna's Biodiversity Action Plan 2016-2021.

5.2.2 Consultation

Consultation letters were sent to relevant statutory bodies and other relevant organisations on the 10th June 2016. All project consultation is detailed in Chapter 1 of the EIAR and all responses received are presented in Appendix 1.1. Consultation regarding the site and proposed development was also undertaken with Bord na Móna's Ecology Team. A phone call on the 5th August 2016 with David Fallon (Senior Ecologist the Bord na Móna Ecology Team) confirmed that there is no current biodiversity management plan for the Drehid site and that no areas have been set aside for bog regeneration/links with Annex 1 habitats in this landholding. All relevant consultation responses have been fully taken into account in preparing this Biodiversity chapter of the EIAR.

5.2.3 Desk Study

The desk study for this project included the following steps:

- Identification of all sites designated for nature conservation within 15 kilometres (km) of the proposed development;
- A review of all National Parks and Wildlife Service (NPWS) site synopses for designated sites within 15 km of the proposed development, regarding potential effects;

- A species list for the Drehid study area was generated using the National Biodiversity Data Centre (www.biodiversityireland.ie) in order to determine if any rare or protected species have been recorded in this area and the likelihood of any such species being present at the proposed development site. A species list for National Grid 10 km square N73 was also generated to determine if any rare or protected species occur in the wider Kildare area;
- Review of Ordnance Survey maps and aerial photography in order to determine the broad habitats that occur within the study area; and
- Review of relevant biodiversity and ecological reports and EISs previously completed for the study area.

5.2.4 Field Survey

TOBIN Ecologists undertook site visits on the 1st, 2nd, 17th, 24th and 27th of June 2016 and on the 9th August 2016 to collect survey data as part of the biodiversity impact assessment for the proposed development.

5.2.4.1 Habitats and Flora

A habitat survey was undertaken in accordance with "*The Heritage Council's Best Practice Guidance for Habitat Survey and Mapping*"[52]. Habitats were classified according to The Heritage Council's A Guide to Habitats in Ireland[53] and following the EU Habitats Interpretation Manual for Annex I Habitats. A review of aerial photography of the study area assisted with habitat delineation and interpretation. Plant identification and nomenclature principally followed *Webb et al. (1996)*[54] and *Rose (1989)*[55]. Predominant plant species were recorded in order to determine accurately the types of habitat present in the study area.

5.2.4.2 Fauna

Birds

A breeding bird survey was conducted at the proposed development site on the 24th June 2016. Birds present were recorded by sight and/or by song/call. While all birds present were recorded, the focus was to record species of conservation concern, including species listed on Annex I of the EU Birds Directive and Red and Amber listed species of High and Moderate conservation concern, respectively[56].

[52] Smith, G.F., O'Donoghue, P., O'Hora, K & Delaney, E. (2011). *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council.
[53] Fossitt, J. (2000). Guide to Habitats in Ireland. The Heritage Council
[54] Webb, Parnell & Doogue (1996). *An Irish Flora*.
[55] Rose (1989) *Colour Identification Guide to the Grasses, Sedges, Rushes and Ferns of the British Isles and north-western Europe*.
[56] Colhoun K. & Cummins S. (2013). *Birds of Conservation Concern in Ireland 2014-2019. Irish Birds 9:523-544 (2013)*

Every effort was made to minimise disturbance risks that will potentially be caused by the human intrusion of undertaking the survey. Careful and regular stops and scans minimised potential disturbance risks and allowed rapid detection of species present, such as displaying birds.

Mammals

The mammal survey primarily involved searching the study area for evidence/signs of mammals (e.g. tracks, scats, dwellings and occasionally direct sightings) during all biodiversity site visits. An assessment of the habitats, in terms of their importance for mammals, was also undertaken.

Bat species are protected under Annex II and Annex IV of the Habitats Directive and the Irish Wildlife Acts. The study area was assessed for bats by TOBIN Ecologists using both walked transect routes and static detection methods. An SM4 Static Bat Detection Unit was placed within the site boundary of the proposed development (Figure 5.1: Map showing the placement of the SM4 Static Bat Detection Unit within Drehid study area) and was left active for seven consecutive nights from the 17th to the 24th of June 2016.

Figure 5.1: Map showing the placement of the SM4 Static Bat Detection Unit within Drehid study area

In addition to the bat detection units, the site was assessed during daytime hours for bat roost potential on the 17th of June 2016, and revisited at night for a walked transect on the 27th/28th of June 2016. All surveys were undertaken by bat specialists working in pairs using a BatBox Duet Heterodyne Detector. All surveys were carried out during optimum weather conditions for bat detection, in accordance with the recommendations of Bat Conservation Ireland and EuroBats[57].

Other fauna

Checks for the presence of other protected fauna including; marsh fritillary (*Euphydryas aurinia)*, common frog (*Rana temporaria*), smooth newt (*Lissotriton vulgaris*) and viviparous lizard (*Lacerta vivipara*), were also conducted during site visits.

5.3 RECEIVING ENVIRONMENT/BASELINE DESCRIPTION

5.3.1 Evaluation Criteria

Biodiversity resources/receptors are evaluated following NRA (2009) guidelines (refer to Table 5-1: Criteria for establishing Receptor Importance (NRA, 2009)) which set out the importance of the resource/receptor in a geographic context. These guidelines are consistent with the approach recommended in the Guidelines for Ecological Impact Assessment in the United Kingdom (IEEM, 2006).

The IEEM (2006) guidelines define an ecologically significant impact as an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographic area. The integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified.

The following parameters are described when characterising likely effects (following IEEM [2006] EPA [2002] and NRA [2009]):

- **Direct and Indirect Impacts:** An impact can be caused either as a direct or as an indirect consequence of a proposed development;
- **Magnitude:** Magnitude measures the size of an impact, which is described as high, medium, low or very low;
- **Extent:** The area over which the impact occurs – this should be predicted in a quantified manner;
- **Duration:** The time for which the impact is expected to last prior to recovery or replacement of the resource or feature;

[57] Battersby, J. (comp.) (2010): Guidelines for Surveillance and Monitoring of European Bats. EUROBATS Publication Series No. 5. UNEP / EUROBATS Secretariat, Bonn, Germany, 95 pp.

- Temporary: Up to 1 Year;
- Short Term: The effects would take 1-7 years to be mitigated;
- Medium Term: The effects would take 7-15 years to be mitigated;
- Long Term: The effects would take 15-60 years to be mitigated;
- Permanent: The effects would take 60+ years to be mitigated;

- **Likelihood:**
  - Certain/Near Certain: >95% chance of occurring as predicted;
  - Probable: 50-95% chance as occurring as predicted;
  - Unlikely: 5-50% chance as occurring as predicted; and
  - Extremely Unlikely: <5% chance as occurring as predicted.

Table 5-1: Criteria for establishing Receptor Importance (NRA, 2009)

Importance	Ecological Valuation

International Importance	• European Site including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
	• Proposed Special Protection Area (pSPA) – site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
	• Features essential to maintaining the coherence of the European Network.
	• Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
	• Resident or regularly occurring populations (assessed to be important at the national level) of the following:
	  ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
	  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
	• Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
	• World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
	• Biosphere Reserve (UNESCO Man & The Biosphere Programme).
	• Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
	• Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
	• Biogenetic Reserve under the Council of Europe.
	• European Diploma Site under the Council of Europe.
	• Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).

Importance	Ecological Valuation

National Importance	• Site designated or proposed as a Natural Heritage Area (NHA).
	• Statutory Nature Reserve.
	• Refuge for Fauna and Flora protected under the Wildlife Acts.
	• National Park.
	• Undesignated site fulfilling the criteria for designation as a NHA.
	• Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Acts; and/or a National Park.
	• Resident or regularly occurring populations (assessed to be important at the national level) of the following:
	  ○ Species protected under the Wildlife Acts; and/or
	  ○ Species listed on the relevant Red Data list.
	• Site containing 'viable areas 'of the habitat types listed in Annex I of the Habitats Directive.

County Importance	• Area of Special Amenity.
	• Area subject to a Tree Preservation Order.
	• Area of High Amenity, or equivalent, designated under the County Development Plan.
	• Resident or regularly occurring populations (assessed to be important at the County level) of the following:
	  ○ Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
	  ○ Species of animal and plants 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.
	• Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
	• County important populations of species or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP), if these have been prepared.
	• 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.
	• Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (Higher Value)	• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared. • Resident or regularly occurring populations (assessed to be important at the Local level) of the following: ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;

Importance	Ecological Valuation
	○ Species of animal and plants 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. • 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; • 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.
Local Importance (Lower Value)	• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife. • Sites or features containing non-native species that is of some importance in maintaining habitat links.

5.3.2 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 development. The nearest designated site is Hodgestown Bog (NHA) located at a distance of 3.5 km. The Grand Canal (pNHA) is not currently designated but for planning purposes it is treated as a designated site.

A Screening Statement for Appropriate Assessment (as per EU Habitat Directive requirements) was completed and the Screening Statement has been submitted alongside the planning application.

Figure 5.2: Designated Conservation Areas illustrates the location of designated conservation sites within 15 km of the proposed development site. Distances from each designated conservation site to the proposed development are provided in Table 5-2: Designated conservation areas located within 15 km of the site.

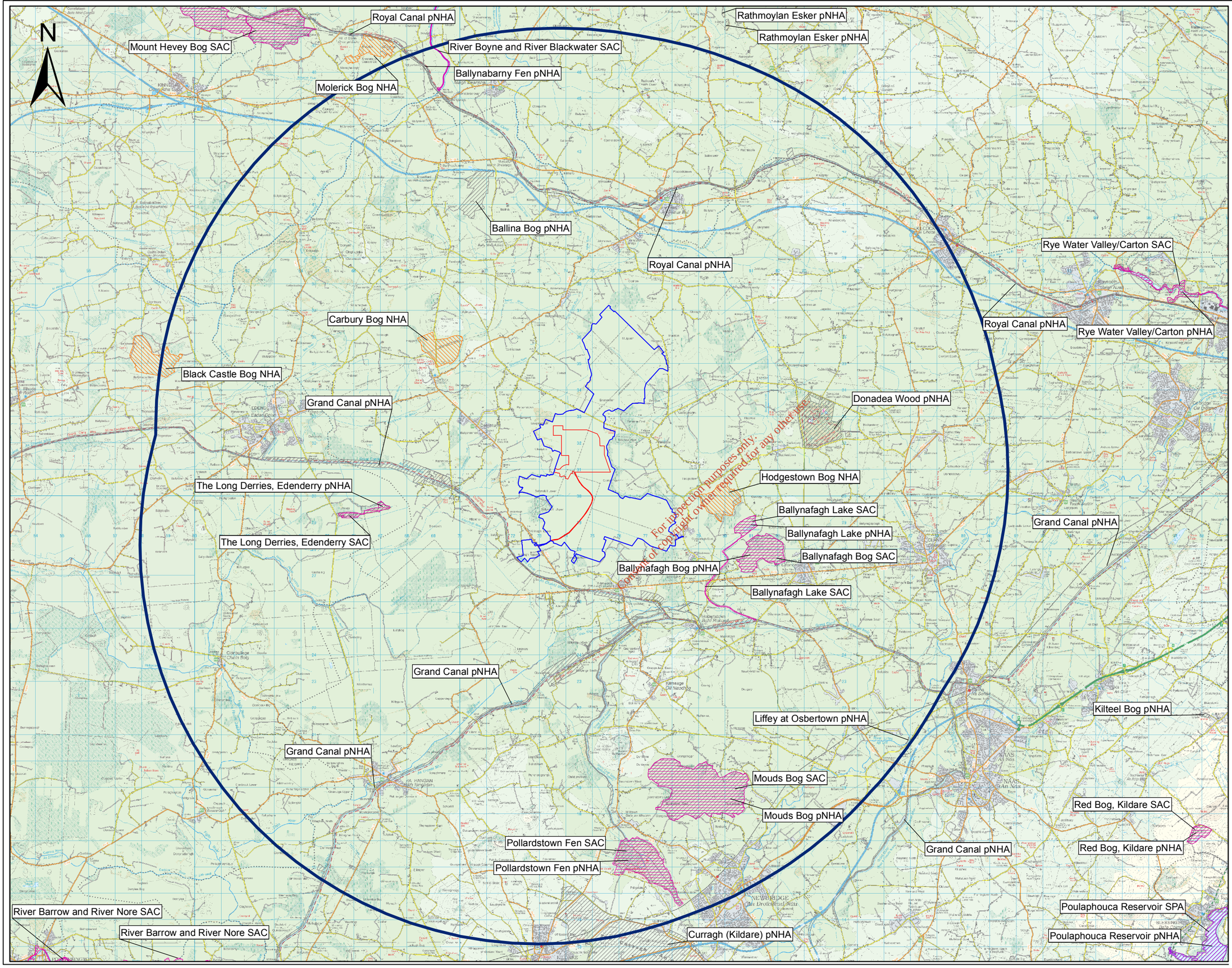
Table 5-2: Designated conservation areas located within 15 km of the site

Name	Site Code	Designation	Approximate distance from site/activity boundary (km)
River Boyne and Blackwater	004232	SPA	14.4
River Boyne and Blackwater	002299	SAC	14.4
Ballina Bog	000390	pNHA	9.5
Ballynafagh Bog	000391	pNHA/SAC	5.9
Ballynafagh Lake	001387	pNHA/SAC	5.3
Carbury Bog	001388	NHA	5.7
Donadea Woods	001391	pNHA	7.5
Grand Canal	002104	pNHA	3.2
Hodgestown Bog	001393	NHA	3.5
Long Derries, Edenderry	000925	pNHA/SAC	7.0
Royal Canal	0002103	pNHA	9.1
Mouds Bog	000395	pNHA/SAC	11.1
Pollardstown Fen	000396	pNHA/SAC	13.9
Liffey at Osberstown	001395	pNHA	15.2

Note: 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)



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Legend

- Site Boundary
- Bord na Móna Ownership Boundary
- 15 Km Buffer from Site Boundary

Protected Sites

- Special Area of Conservation
- Proposed Natural Heritage Areas
- Natural Heritage Areas
- Special Protection Areas

0 2.5 5
Kilometres

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

Rev A	NOV '17	EIAR Issue	F.H.	A.A
Issue	Date	Description	By	Chkd.

Client: BORD NA MÓNA Naturally Driven

Project: PROPOSED DEVELOPMENT AT DREHID WASTE MANAGEMENT FACILITY

Title: Designated Conservation Areas Within 15 Kilometre Buffer

Scale @ A3: 1:130,000

Prepared by:	Checked:	Date:
F.Healy	A. Austin	November 2017

Project Director: D.Grehan

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Rev: A

Figure 5.2

5.3.3 Rare and Protected Flora

The proposed development site is located in the Ordnance Survey National Grid 10 km square N73. A species list for the Drehid area was generated using the National Biodiversity Data Centre (www.biodiversityireland.ie) in order to determine if any rare or protected species have been recorded in this area and the likelihood of their being present at the proposed development site. There are no historical records of rare or protected flora occurring within the proposed development area and no rare and protected flora were observed in the study area during surveys.

A species list for National Grid 10 km square N73 was also generated to determine if any rare or protected species occur in the wider Kildare area. Table 5-3: Protected or Rare Plants, presents the relevant data for these species as recorded in this grid square.

Table 5-3: Protected or Rare Plants

Species	Status	Category
Bog Rosemary, (*Andromeda polifolia*)	Not Protected	Species not Considered Threatened in the Republic of Ireland but protected in NI
Cowslip (*Primula veris*)	Not Protected	Species not Considered Threatened in the Republic of Ireland but protected in NI

Neither bog rosemary nor cowslip were recorded during the site visits conducted in June and August 2016.

5.3.4 Habitats within the Proposed Development Site

The proposed development will be situated within a Bord na Móna landholding which includes the existing Drehid Waste Management Facility and permitted Mechanical Biological Treatment (MBT) Facility. This landholding was previously used by Bord na Móna for commercial peat extraction. In general, habitats on site are typical of re-vegetating cutover bog with heath/scrub/woodland habitats on a relatively well drained portion of the overall Bord na Móna landholding.

Habitats on the proposed development site were classified in accordance with Fossitt (2000). Twelve habitat classes and habitat mosaics (habitat consisting of a mix of habitat classes) were determined including:

- Drainage ditches (FW4);
- Wet heath (HH3);
- Bog woodland (WN7);

- Scrub (WS1);
- Bog woodland (WN7), Wet heath (HH3) / Scrub (WS1) mosaic;
- Wet heath (HH3) / Scrub (WS1) mosaic;
- Dry siliceous heath (HH1);
- Dry meadows and grassy verges (GS2);
- Buildings and artificial surfaces (BL3);
- Spoil and bare ground (ED2);
- Other artificial lakes and ponds (FL8); and
- Re-colonising bare ground (ED3).

Habitat classes and their extent within the proposed development site are presented in Figure 5.3: Habitat Map and are described below.

Drainage ditches (FW4)

There are several drainage ditches (approximately 15) within the proposed development site boundary (Figure 5.3). Four main drainage ditches cross the centre of the site running northwest to southeast. They have relatively steep banks and are up to 5 m wide. During the survey, they generally contained <40 cm of stagnant water, with stagnant water levels increasing in places to approximately 1 m and sometimes greater, where drains connected.

These drainage ditches contain very little aquatic fringing vegetation, although reeds (*Phragmites australis)* do occur at the foot of the bank at scattered locations along the ditches. The drainage ditches on site are not regularly maintained and, as a result, are being encroached upon to varying extents by the adjacent vegetation.

The banks alongside the drainage ditches on site contain bog woodland and scrub development, with the dominant species being downy birch (*Betula pubescens),* willow (*Salix sp*), bramble (*Rubus fruticosus* agg*.)* and bracken (*Pteridium aquilinum*).

There are also drainage ditches running along the west of the site in a southwest to northeast direction. These are approximately 3-6 m wide and also contain stagnant water (0.25-0.75 m deep at time of survey).

A large drainage ditch, which was dry at the time of survey, runs southwest to northeast through the northern portion of the site. This drain is approximately 2-3 m wide with steep banks approximately 2 m high. The drain has been encroached by soft rush *(Juncus effuses)* and willow.

In the southwest area a much smaller drainage ditch (approximately 1 m wide), with water depth of approximately 0.5 m, is present. Duckweed (*Lemna sp*.) was found here, although the drain is being heavily encroached upon by surrounding tree saplings and heath vegetation. To the west of the existing entrance road, two drains are also present; the southernmost of these drains is the larger of the two, being approximately 7 m wide with banks up to 4 m deep. Deep, stagnant water is present with willow scrub and willowherb *(Epilobium sp.)* overhanging from the banks. The northern drain is also wet but heavily encroached upon by scrub.

Wet heath (HH3)

This habitat occurs throughout the southern portion of the site (Figure 5.3) and is dominated by Ling (*Calluna vulgaris*). Purple Moor-grass (*Molina caerulea*) is also abundant in places, with birch (*Betula sp*.), willow (*Salix sp.)* and lodgepole pine (*Pinus contorta*) tree saplings also present throughout. Other species present include cross leaved heath (*Erica tetralix*), bog cotton (*Eriophorum angustifolium)* and hares-tail cotton grass (*Eriophorum vaginatum*), with soft rush rarely present in wetter areas. In areas of bare peat, the lichen devil's matchstick (*Cladonia floerkeana)* is occasionally present.

Bog woodland (WN7)

This habitat occurs along the edges of the existing drainage ditches running through the centre of the site (Figure 5.3). It is dominated by downy birch and willow with tree heights reaching a maximum of approximately 14 m. This habitat has an understory dominated by bracken and bramble with immature hawthorn *(Crataegus monogyna)* rarely occurring. The ground flora species vary between locations on site but include dandelion *(Taraxacum agg)*, Herb-Robert *(Geranium robertianum)*, cleavers *(Galium aparine)*, common nettle *(Urtica dioica)*, ivy (*Hedera helix)*, moss (*Bryophyta sp.*), spear thistle *(Cirsium vulgare)*, soft rush and wild strawberry *(Fragaria vesca)*.

Scrub (WS1)

This habitat is scattered throughout the site, but occurs predominantly in the northern portion of the site and in areas bordering bog woodland habitat and drainage ditches. Species present predominantly include downy birch and willow (<5 m high), bramble, bracken and gorse *(Ulex europaeus).* In most areas heather and/or purple moor-grass is found growing underneath or at the edges of these species within the scrub habitat.

Bog woodland (WN7) / Wet heath (HH3) / Scrub (WS1) mosaic

Areas of the bog are being encroached upon by this habitat mosaic (Figure 5.3). This is more notable to the south of the proposed development site.

Wet heath (HH3) / Scrub (WS1) mosaic

This habitat mosaic occurs in areas of heath habitat that is heavily encroached upon by scrub but includes influences from both habitat types. This is visible to the east of the site (Figure 5.3) where the bog is encroached upon between drainage ditches.

Dry siliceous heath (HH1)

This habitat occurs in the northern portion of the site where the land is crossed by several drains, making the soil relatively dry. The habitat has had been disturbed through the years and is degraded, with scrub encroaching upon it. Species present include ling, purple moor-grass (occasional) and hares-tail cotton grass, with birch, willow and lodgepole pine tree saplings occurring throughout.

Dry meadows and grassy verges (GS2)

This habitat occurs to the west of the proposed development site between the existing entrance road and the bog. Species present include cocksfoot *(Dactylis glomerata)*, common nettle, black medic *(Medicago lupulina)*, greater plantain (*Plantago major)*, bramble, tree saplings (willow, birch and hawthorn), willowherb *(Epilobium sp.)*, ribwort plantain (*Plantago lanceolata)*, dock *(Rumex sp.)*, creeping buttercup (*Ranunculus repens)*, silverweed (*Potentilla anserina)*, colt's foot *(Tussilago farfara)*, spear thistle *(Cirsium vulgare)* and Yorkshire fog *(Holcus lanatus)*. There are existing access tracks running through this habitat.

Buildings and artificial surfaces (BL3)

This habitat incorporates existing infrastructure including the waste facility entrance road, car park and buildings.

Spoil and bare ground (ED2)

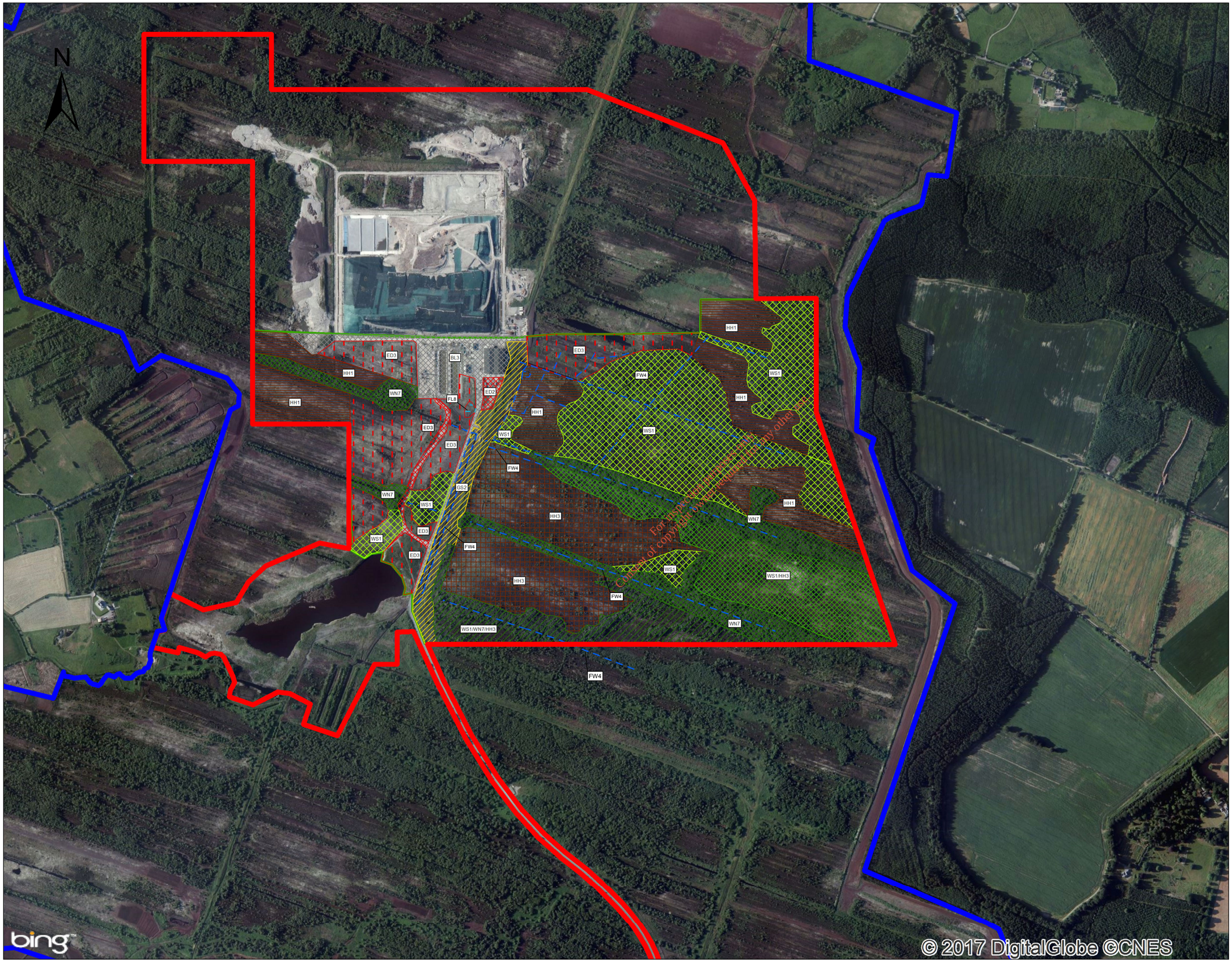
This habitat is present to the south of the existing composting facility and comprises bare ground with some re-vegetated soil heaps. It is currently used as a storage area. Species present include colt's foot, daisy (*Bellis perennis)*, dandelion, Yorkshire fog, cocksfoot and silverweed.

Other artificial lakes and ponds (FL8)

This category is used to describe a small pond area / storm water lagoons to the west of the site, south of the existing administration building. It has been formed through land disturbance and is dominated by bulrush *(Typha latifolia)* with areas of bare peat visible.

Re-colonising bare ground (ED3)

This habitat category is used for areas of bare or disturbed ground which is re-colonising with vegetation. Vegetation cover is greater than 50% with ruderals or weed plants dominating. This habitat is present in disturbed areas on site. Species present include colt's-foot, silverweed, creeping thistle, creeping buttercup, horsetail *(Equisetum sp.)*, willowherb, ribwort plantain, common nettle, cock's-foot, spear thistle, red clover (*Trifolium pratense)*, bracken, soft rush, bramble, gorse, hares-tail cotton grass and Yorkshire fog.



Legend

- Site Boundary
- Bord na Móna Ownership Boundary

Habitats

- FW4 – Drainage Ditches
- BL3- Buildings and artificial surfaces
- ED2- Spoil and bare ground
- ED3- Re-colonising bare ground
- FL8- Other artificial lakes and ponds
- GS2- Dry meadows and grassy verges
- HH1 – Dry siliceous heath
- HH3 – Wet heath
- WN7- Bog woodland
- WS1- Scrub
- WS1/HH3
- WS1/WN7/HH3

0 250 500
Metres

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.
Rev A	NOV '17	EIAR Issue	F.H.	A.A

Client: Bord na Móna – Naturally Driven

Project: PROPOSED DEVELOPMENT AT DREHID WASTE MANAGEMENT FACILITY

Title: HABITAT MAP

Scale @ A3: 1:10,000

Prepared by:	Checked:	Date:
F. Healy	A. Austin	November 2017

Project Director: D.Grehan

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Figure 5.3

5.3.5 Fauna

Breeding Birds

No confirmed breeding bird species listed on Annex I of the Birds Directive were recorded within the proposed development site boundary or in the wider environs of the site during site visits.

No species of high (red listed) conservation concern were recorded within the proposed development site boundary during site visits. Meadow pipit (*Anthus pratensis*; red listed) calling and display flights were noted further south of the proposed development site, within the overall Bord na Móna land holding. A Stonechat (*Saxicola torquata*; amber listed) family was also observed there.

Several bird species of moderate conservation concern (amber listed) were observed flying in the vicinity of the proposed development site. This included Skylark (*Alauda arvensis*), Mistle thrush (*Turdus viscivorus*), Swallow (*Hirundo rustica*), House martin (*Delichon urbicum*) and Robin (*Erithacus rubecula*). No confirmed nesting areas were noted on site for these birds although suitable breeding habitat does exist for Skylark, Mistle thrush and Robin. Swallow and House martin nests were noted around the main site office and existing buildings further north (off site). A Kestrel (Falco tinnunculus) was noted flying to the south and east (off site) within the overall Bord na Móna land holding.

Common bird species (green listed) recorded within the proposed development site area included Willow warbler (Phylloscopus trochilis), Wren (*Troglodytes troglodytes*), Song thrush (*Turdus philomelos*), Blackcap (*Sylvia atricapilla*), Blackbird (*Turdus merula*), Reed bunting (*Emberiza schoeniclus*), Chaffinch (*Fringilla coelebs*) and Pheasant (*Phasianus colchicus*). Suitable breeding habitat for these species was recorded within the proposed development site; it is therefore likely that these birds nest in this area. Some Raven (*Corvus corax*) flight activity and a begging call was noted outside of the site boundary to the east. This could mean that a Raven nest is present deep within the conifer woods (off site).

A large corvid population (mainly Rook [*Corvus frugilegus*] and Hooded crow [*Corvus cornix*]) was recorded roosting in the Drehid area, along with Lesser black-back gulls (*Larus fuscus*) and Greater black-back gulls (*Larus marinus*).

As part of the biodiversity assessment, a review of previous breeding bird surveys (completed in 2012, 2013 and 2014) conducted within the overall Bord na Móna landfill, was also undertaken. One red listed species, Whinchat (*Saxicola rubetra*), was recorded in 2013. Amber listed species previously recorded in the wider area included Mute swan (*Cygnus olor*), Teal (*Anas crecca*), Little Grebe (*Tachybaptus ruficollis*), Snipe (*Gallinago gallinago*), Woodcock (*Scolopax rusticola*), Sparrowhawk (*Accipiter nisus*), Goldcrest (*Regulus regulus*), Grasshopper warbler (Locustella naevia), Wheatear (*Oenanthe oenanthe*) and Linnet (*Carduelis cannabina*).

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.

Wintering Birds

A desktop study of previous winter bird studies (2012/2013 and 2013/2014) conducted within the overall Bord na Móna landholding by Biosphere Environmental Services, was also undertaken for this assessment. These studies involved a combination of transect and vantage point surveys.

Birds of conservation concern recorded in the area during winter 2012/2013 included Mute swan, Teal, Little Grebe, Tufted duck (*Aythya fuligula*), Lapwing (*Vanellus vanellus*) and Snipe. Birds of conservation concern recorded in the area during winter 2013/2014 included Whooper swan (*Cygnus cygnus*), Golden plover (*Pluvialis apricaria*), Mute swan, Teal, Little Grebe and Lapwing.

The existing pond area within the Bord na Móna landholding (southwest of the proposed development site) is likely to be a key attraction for these winter bird species.

Bats

Field surveys identified four bat species present on site (Table 5-4: Summary of Species Found on Site during Static and Transect Survey Work). No potential bat roost sites were identified. All records were identified outside of the emergence/re-entry periods (post-dusk and pre-dawn).

Table 5-4: Summary of Species Found on Site during Static and Transect Survey Work

Species	Scientific Name	Abundance
Common Pipistrelle	*Pipistrellus pipistrellus*	31
Soprano Pipistrelle	*Pipistrellus pygmaeus*	74
Leisler	*Nyctalus leisleri*	100
Daubenton	*Myotis daubentonii*	5

The site is comprised primarily of cutover bog which has been largely re-colonised with scrub in places. The area has been heavily drained and therefore there is limited surface water on site. The habitats identified on site during the walk over surveys confirmed the area has low habitat suitability due to the lack of linear tree-line features or true woodland. The species detected in large numbers on site are common generalist species; (Common Pipistrelle (*Pipistrellus pipistrellus*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*)) and open habitat species (Leisler's (*Nyctalus leisleri*)). Leisler bats are the largest of the Irish bat species and use 'fast flight' as their predator avoidance strategy which means they are not dependant on tree-lines.

Daubenton's bats (*Myotis daubentonii*) were recorded on three separate nights by the static monitor. Each record was a short pass indicative of commuting activity; this could be an indication of a juvenile individual seeking a new home range. This commuting activity within this land type is atypical for this species, which has a high association with extensive waterways due to their unique hunting strategy. The results of our field surveys supported the findings of the desk based study, both indicating low habitat suitability and low roost potential on site.

Other Mammals

Badger (*Meles meles*) tracks and foraging signs were recorded during the survey visits at several locations around and within the proposed development site. In the EIS submitted by the applicant in 2012 for the development of an MBT facility within the Drehid landholding, an outlier sett was noted to be present in the proposed development site area; however no setts were recorded during the 2016 site visits.

No evidence of otter (*Lutra lutra*) spraints (droppings) or a holt (breeding site) was noted within the proposed development site. It is possible that otters venture into the area, but they are unlikely to remain as the drainage ditches within the site do not appear to support strong populations of suitable prey items for otters.

Signs of fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*) and Irish hare (*Lepus timidus hibernicus*) were noted throughout the proposed development site and surrounding bog area. Irish hare is a protected species under the Irish Wildlife Acts although it can be hunted under licence issued by NPWS.

Other Fauna

Numerous sightings of common frog were made. Conditions on site are suitable for both smooth newt and viviparous lizard, although none were recorded during the site visits. These species are protected under the Wildlife Amendment Acts.

During the site visits several species of common butterfly and Odonata were recorded. These include the butterfly, speckled wood (*Pararge aegeria*), and the dragonflies, brown hawker (*Aeshna grandis*) and common darter (*Sympetrum striolatum*), along with the blue-tailed damselfly (*Ischnura elegans*).

No Devils Bit Scabious (*Succisa pratensis*), the food plant of the marsh fritillary butterfly, was recorded during site surveys. No sign of marsh fritillary was noted in the proposed development area. This species of butterfly is listed on Annex II of the Habitat Directive.

5.3.6 Likely future receiving environment/ do nothing scenario

If the proposed development does not take place (do nothing scenario) the existing baseline conditions detailed within Section 5.3 will remain. The site will continue to contain habitats that are typical of re-vegetating cutover bog. However, as the site is relatively dry and unmanaged, scrub encroachment will increase into the adjacent habitats. Fauna species will continue to use the site and adjacent suitable habitats.

5.3.7 Biodiversity Evaluation

There are no sites designated under the EU Habitats Directive and EU Birds Directive, i.e. SACs and SPAs located within the footprint of the proposed development. The nearest site to the proposed development site designated for nature conservation is Hodgestown Bog (NHA) at a distance of 3.5 km.

An Appropriate Assessment Screening Statement has been submitted alongside the planning application and concluded that it is unlikely that the proposed development will result in significant effects to any European site whether direct, indirect, or in-combination, in view of the conservation objectives of the habitats or species for which it was designated, either alone or in combination with other plans or projects. Consequently this proposed development does not need to advance in the Appropriate Assessment process or require a Natura Impact Statement.

No International, National or County significant habitats occur within the proposed development site. No rare or protected plants were recorded. Badgers forage on site but no setts were recorded during the ecological site visits. Low numbers of bats use the proposed development site for foraging and commuting purposes. No bat roosts were identified on site. No Annex I or red listed birds were recorded on site. Habitats present on site and in the surrounding area are suitable for some recorded amber listed species namely Skylark, Mistle thrush and Robin, along with various common bird species. No nest sites were confirmed within the proposed development area during site visits.

The proposed development site largely consists of cutover bog habitat which can be categorised into twelve habitat classes and habitat mosaics (habitat consisting of a mix of habitat classes). Habitats and their evaluation rating are detailed in Table 5-5: Habitat Evaluation.

Table 5-5: Habitat Evaluation

Habitat Classification	Evaluation
Wet Heath (HH3)	Local Importance (Higher Value)
Bog Woodland (WN7)	
Bog woodland (WN7), Wet heath (HH3) / Scrub (WS1) mosaic	
Wet heath (HH3) / Scrub (WS1) mosaic	
Scrub (WS1)	
Dry siliceous heath (HH1)	
Drainage Ditch (FW 4)	Local Importance (Lower Value)
Other artificial lakes and ponds (FL8)	
Dry meadows and grassy verges (GS2)	
Re-colonising bare ground (ED3).	
Spoil and bare ground (ED2)	Not evaluated
Buildings and artificial surfaces (BL3)	

Key biodiversity receptors requiring consideration in terms of likely effects and necessary mitigation are summarised as follows:

- Designated sites;
- Listed habitats – Local Importance (Higher Value);
- Badgers;
- Bats;
- Breeding bird species; and
- Common frog, smooth newt and viviparous lizard.

5.4 POTENTIAL EFFECTS ON BIODIVERSITY

5.4.1 Overview of Effects

The potential effects of the project relate mainly to the construction phase of the project. These include habitat loss, habitat damage/disturbance, disturbance to fauna species and pollution of surface waters.

Elements of the proposed works that are likely to give rise to effects are as follows:

- clearance of vegetation and loss of habitat during the construction phase;
- movements of machinery and personnel within work areas;
- works involving the transport of personnel, tools, materials to the site, deliveries, and removal of cleared vegetation, excavated material and construction materials within and from the works areas;
- redirecting, infilling or culverting of existing drainage channels; and

- construction activities within the works areas include excavation, infilling works, landscaping works, construction of buildings and stockpiling of materials.

Operational stage works are also likely to include minor disturbance to fauna species. Potential effects are likely to result from activities related to the maintenance and operation of the facility (i.e. increased noise, traffic and daily human presence in proposed development area).

The assessment of effects and the magnitude of their significance should be considered in the context of the wider Bord na Móna landholding of 2,544 ha. If this proposed development is approved and receives planning permission, 2,272 ha of the landholding will remain undeveloped. The undeveloped portion of the landholding consists of similar discrete semi natural habitats.

5.4.2 Potential Effects during Construction Phase

Designated Conservation Areas

As mentioned earlier, the proposed development area does not lie within or adjacent to any site designated for nature conservation. The nearest site to the proposed development site designated for nature conservation is Hodgestown Bog (NHA) at a distance of 3.5 km.

No direct or indirect effects on any site designated for conservation will arise through the construction of the proposed development. (Refer also to the Appropriate Assessment Screening Statement submitted with the planning application in relation to European sites). Mitigation measures for minimising risks to water sources and associated aquatic ecology are also detailed in Chapter 7 of the EIAR (Water Chapter).

No adverse effects to designated sites as a result of the proposed development will occur.

Rare and Protected Flora

No species of rare or protected flora were found within the proposed development site; therefore, it is unlikely that there will be any direct or indirect effect to rare or protected flora as a result of the proposed development.

Key habitat receptors

As noted in Chapter 1, the redline application area of 272 ha, includes an area of approximately 120 ha where development will take place for the first time. Within the area of new development, an area of approx 97 hectares will require clearance of existing habitats. Key habitats of Local Importance (Higher Value) that require consideration are detailed in Table 5-6Table 5-6: Key Habitats Directly Impacted by the Proposed development. Permanent removal of most of these habitats will be required for construction of the proposed development within the development site boundary (Figure 5.3). Arising

from the proposed development, site clearance works will involve the permanent removal of approximately 97 ha of these habitats. There is scope for retaining some existing habitat particularly to the southeast. In addition, natural re-vegetation will continue on undeveloped sections within the site, post construction.

There is potential for effects to occur during the construction phase to adjacent 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 surface water features. Mitigation measures for avoiding/minimising risks to water sources and associated aquatic ecology are detailed in Chapter 7 of the EIAR (Water Chapter).

Effects should be considered in the context of the wider Bord na Móna landholding (2,544 ha) as the area requiring clearance of habitats for the proposed development site (approximately 97 ha) consists of a relatively small portion of a much larger area of discrete semi natural habitats. Effects from the proposed development on habitats are considered to be permanent, minor adverse effects.

Table 5-6: Key Habitats Directly Impacted by the Proposed development

Habitat Classification	Evaluation	Potential Effect description	Key biodiversity habitat
Wet Heath (HH3)	Local Importance (Higher Value)	Direct, permanent loss of habitat (approximately 19 hectares). Potential indirect damage / disturbance to surrounding area of same habitat. Loss of foraging habitat for fauna. Loss of potential nesting habitat for birds.	Yes
Bog Woodland (WN7)	Local Importance (Higher Value)	Direct, permanent loss of habitat (approximately 7.5 hectares). Potential indirect damage / disturbance to surrounding area of same habitat. Habitat fragmentation. Loss of foraging habitat for fauna. Loss of potential nesting habitat for birds.	Yes
Bog woodland (WN7), Wet heath (HH3) / Scrub (WS1) mosaic	Local Importance (Higher Value)	Direct, permanent loss of habitat (approximately 5.0 hectares). Potential indirect damage / disturbance to surrounding area of same habitat. Habitat fragmentation. Loss of foraging habitat for fauna. Loss of potential nesting habitat for birds.	Yes
Wet heath (HH3) / Scrub (WS1) mosaic	Local Importance (Higher Value)	Direct, permanent loss of habitat (approximately 6.9 hectares). Potential indirect damage / disturbance to surrounding area of same habitat. Loss of foraging habitat for fauna. Loss of potential nesting habitat for birds.	Yes
Scrub (WS1)	Local Importance (Higher Value)	Direct, permanent loss of habitat (approximately 27 hectares). Potential indirect damage / disturbance to surrounding area of same habitat. Loss of foraging habitat for fauna. Loss of potential nesting habitat for birds.	Yes
Dry siliceous heath (HH1)	Local Importance (Higher Value)	Direct, permanent loss of habitat (approximately 11.9 hectares). Potential indirect damage / disturbance to surrounding area of same habitat. Loss of foraging habitat for fauna. Loss of potential nesting habitat for birds.	Yes

Birds

The removal of key biodiversity habitats, namely heath, bog woodland and scrub, will reduce the potential areas of nesting and foraging habitat for birds locally. Removal of these habitats during the construction will lead to a direct effect on bird populations at a localised scale within the proposed development site boundary.

Effects to birds are considered to be permanent, moderate to minor adverse, 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 effects on birds will be minimised.

Bats

The construction phase effects will primarily comprise of daytime activities. As there were no bat roosts identified on site, the construction phase effects are not expected to have significant effects on bat populations in the area. The construction phase will result in the loss of localised habitat. The receiving environment is a mosaic habitat with no defined linear links between the proposed development site and the surrounding available habitat. Bats are a highly mobile[58] and utilise wide ranging scattered resources within their home ranges[59,60]. The high availability of this mosaic habitat and the small scale of habitat loss resulting from the proposed development, within the wider context of similar habitats present in the overall landholding, indicate that, due to their high mobility, significant effects on bat species are not anticipated.

Other mammals

Badger tracks and foraging signs were recorded during the survey visits at several locations around and within the proposed development site. No badger setts were recorded on site. The removal of habitats and disturbance to habitats within the proposed development site will reduce the foraging area of badger locally.

Effects to badger are considered to be permanent, moderate to minor adverse, as available foraging areas will be permanently reduced. However, suitable foraging habitat is present and is currently used by badgers within the wider landholding area. Therefore it is unlikely that there will be a significant reduction in populations of this species locally.

[58] Altringham, J.D., 2011. *Bats: from evolution to conservation*. Oxford University Press.
[59] Bellamy, C., Scott, C. and Altringham, J., 2013. Multiscale, presence-only habitat suitability models: fine-resolution maps for eight bat species. *Journal of Applied Ecology*, *50*(4), pp.892-901.
[60] Bellamy, C., Torsney, A., Brown, E., Glover, A. and Altringham, J., 2012. Bat foraging habitat suitability maps for the Yorkshire Dales National Park.

There is potential that the removal of vegetation on site will reveal previously unknown/ unrecorded badger setts. Mitigation measures have been recommended to minimise effects to badger if this occurs.

No evidence of otter spraints (droppings) or a holt (breeding site) was noted within the proposed development site. It is possible that otters venture into the area, but they are unlikely to remain as the drainage ditches within the site do not appear to support strong populations of suitable prey items for otters. It is not anticipated that there will be any effects to otter as a result of the proposed development.

Other mammals including fox, rabbit and Irish hare were noted throughout the proposed development site and surrounding bog area. Abundant alternative sites for these species exist and are currently used by them across the remainder of the landholding. Therefore effects are considered to be minor adverse.

Other fauna

Removal of key habitats (e.g. drainage ditches) on site will reduce the available habitat for breeding common frog (and potentially smooth 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 breeding sites, precautionary monitoring is recommended to determine status and appropriate actions immediately prior to site clearance works, as detailed in the mitigation section.

5.4.3 Potential Effects during Operational Phase

Depending on the final lighting requirements for the proposed development, there is a potential to effect 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 proposed development is likely to attract wildlife including pest species (e.g. rodents) which will require pest control activities. Indirect effects from possible control procedures to predator species (e.g. birds of prey and protected mammals) will require consideration to minimise indirect effects to species in the wider local area.

The operation of the proposed development is unlikely to increase disturbance to bird species, which would already have acclimatised to localised disturbance from the existing waste facility, local housing, traffic and businesses.

No collision or other effects with any structures at the proposed development site are expected for bird species of conservation significance in the wider local area, including designated sites.

5.5 MITIGATION MEASURES

5.5.1 Site Clearance/ Construction Phase

The following mitigation measures will be implemented to limit the direct and indirect effects of works associated with the proposed development on the biodiversity of the local environment:

- All construction works on site will be guided by best ecological practice guidance such as those listed in Section 5.2.1 above.
- The works area will be clearly marked and fenced off to minimise effects to any surrounding habitats of ecological significance.
- 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. Materials, especially soil and stones, can prevent air and water circulating to the roots of trees and shrubs. No materials will be stored within 5m of retained trees and scrub.
- The site clearance phase of the proposed development will only take place during daylight hours to minimise potential disturbance risks to nocturnal mammal species.
- There will be no soil storage outside the site area, thereby avoiding effects to adjacent habitats.
- 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 runoff to silt traps.
- Soil storage will be arranged in a manner which avoids effects to surface waters or which generates stability issues.
- During the excavation and removal of soil for construction works, fuel / oil interceptors and silt traps or surface water attenuation lagoons 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, diesel 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 Act 1996, 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 accidently 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.
- As the construction stage is likely to be phased over 25 years and an extended period of time will arise prior to some site clearance works, pre-site clearance biodiversity survey checks will

be conducted to update the baseline impact assessment. These will determine any further site specific recommendations for minimising effects to potential key biodiversity receptors.

- It is recommended that an Ecologist is on site for confirmatory surveys during all site clearance works within areas of dense heath and scrub habitat, as there is potential that removal of dense vegetation on site will further reveal previously unknown/ unrecorded badger setts. If a badger sett is found, works will need to cease and a licence for its interference/ removal will have to be applied for from the NPWS.
- As frogs were identified on site during surveying for this assessment (and potential habitat for smooth newt), surveys should be further implemented prior to construction stage (particularly of drainage ditches) to inform best practice. Amphibians breed and are present in water bodies from February through to June before they disperse onto the land in the summer. Any removal/ interference works to drainage ditches, that are known breeding sites, should be outside this period where possible. Any disturbance/loss to a breeding waterbody will require a licence from the NPWS.
- If viviparous lizard is recorded on site during ecological pre-construction surveys (as detailed above) suitable mitigation should be employed under direction of a qualified Ecologist. Viviparous lizard exhibit significant seasonal variations in behaviour and it is therefore often possible to schedule works to avoid periods when reptiles will be at most risk.
- Where possible, scrub, tree or heath removal should 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). If works have to take place within this time period an Ecologist should be present. If any nest sites are identified, then a licence for their interference/ removal will have to be applied for from the NPWS.
- Where possible existing vegetation within the site boundary will be retained to reduce biodiversity effects. Vegetation species already present on site (e.g. birch, willow, lodgepole pine) should be used for landscaping purposes where possible. This, along with natural re-vegetation in available areas post construction works, will further reduce biodiversity effects.

5.5.2 Operational Phase

- External lighting should be minimised in its extent and usage as much as possible, so as to minimise disturbance to foraging bats. Where feasible, external lights should be cowled and limited only to areas where lighting is strictly required (as per Health and Safety minimum requirements).
- Vermin control measures should be implemented and an ecological expert should be consulted to determine suitability and control (e.g. spread of poisons) in the context of protected species in the wider landholding.

5.6 MONITORING

With regards to monitoring biodiversity, as detailed in the mitigation measures in Section 5.5, it is recommended that an ecologist is on site during the construction phase to monitor all site clearance works within areas of dense heath and scrub habitat, as there is potential that removal of dense vegetation on site will further reveal previously unknown/ unrecorded badger setts. If a badger sett is found, works will need to cease and a licence for its interference/ removal will have to be applied for from the NPWS. There are no specific monitoring requirements for biodiversity during the operational phase.

5.7 CUMULATIVE EFFECTS

In the context of the entire Bord na Mona landholding (2,544 ha), predominantly of similar habitats, and the existing development on site, the cumulative effect of the proposed development (252ha, of which 97ha of habitats are to be removed) is considered to be minor adverse. With the exception of the permanent loss of habitat for the construction of the proposed development, only minor short-term effects to fauna species on site are expected. As the existing waste facility and entrance road are operational daily, local fauna species will already be acclimatised to an extent with regards to noise, traffic and human activity in the area. The construction of the proposed development will be phased over approximately 25 years meaning the changing environment will be a gradual process allowing fauna species time to adapt.

5.8 RESIDUAL EFFECTS

The key issue in determining the significance of residual effects is the expected timeframe of recovery for key biodiversity receptors. The construction of the proposed development will be phased over approximately 25 years meaning the changing environment will be a gradual process allowing fauna species time to adapt.

Following the implementation of the mitigation measures presented above, predicted residual effects for the key biodiversity receptors are not expected to be significant. With the exception of the permanent loss of habitat for the construction of the proposed development, only minor short-term effects to fauna species on site are expected.

5.9 CONCLUSIONS

The application area for the proposed development site will occupy 272 ha, included within which is an area of approximately 120 ha where development will take place for the first time, with approximately 97 ha of habitats clearance required, within the overall 2,544 ha Bord na Móna landholding. The existing private access road, which leads to the permitted waste management facility immediately north, runs through the proposed development site. This access road will also serve the proposed development.

The proposed development will not have any effects on any sites designated for conservation or protected flora. The proposed development site 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 habitats onsite will be permanently removed for the development though the final design will retain at least some of the existing site habitats. In addition, areas will be replanted around the eastern boundary (proposed berm) of the site which will further reduce overall habitat loss.

No confirmed bird nesting sites were recorded on site although it is likely that some amber and green listed bird species do nest in the habitats present. The removal of ecological habitats on site, namely heath, bog woodland and scrub, will reduce the potential areas of nesting and foraging habitat for birds locally. During site visits these bird species were recorded also using the wider landholding area and suitable nesting habitats in these areas will remain available for local birds. Mitigation measures have been recommended to reduce further the potential effects to any nesting birds on site.

Badger currently uses the proposed development site and wider area for foraging. As suitable foraging habitat is present and is currently used by badgers within the wider landholding area, it is unlikely that there will be a significant reduction in populations of this species locally. Mitigation measures have been recommended to minimise as far as possible the potential effects to badger.

Low numbers of bats use the proposed development site and wider area for foraging and commuting purposes. The high availability of similar mosaic habitats and the small scale of the proposed habitat loss by the development, within the wider context of similar habitats present in the overall landholding, are not foreseen to have significant effects on bat species, due to their high mobility. Mitigation measures have been recommended to minimise external lighting at night as far as possible so as to minimise disturbance to foraging bats during the operational phase.

As the existing waste facility and entrance road are in daily operation, other local fauna species will already be acclimatised to an extent with regards to noise, traffic and human activity in the area. The construction of the proposed development will be phased over approximately 25 years meaning the changing environment will be a gradual process allowing fauna species time to adapt.

In general local populations of fauna will not be significantly effected as larger areas of similar alternative habitat are present surrounding the proposed development site within the local area. Proposed mitigation measures outlined in this chapter will seek to reduce any effects of the proposed development during the construction and operational phases on the biodiversity within the wider landholding.