



ENVIRONMENTAL BALANCE IN DESIGN AND CONSTRUCTION



KNOCKHARLEY LANDFILL LTD.

**ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)
FOR PROPOSED DEVELOPMENT AT KNOCKHARLEY
LANDFILL**

VOLUME 1 - NON-TECHNICAL SUMMARY

NOVEMBER 2018



Knockharley Landfill Ltd.
Kentstown, Navan, Co. Meath

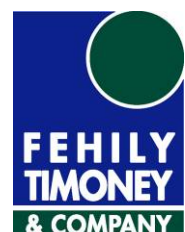


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1 INTRODUCTION

Knockharley Landfill Ltd. is the owner and operator of Knockharley Landfill facility located at Knockharley, Kentstown, Navan, Co. Meath. The facility is located on a 135.2 hectare (333-acre site). The existing landfill footprint is positioned near the centre of the landholding and the current planning permission permits the development of approximately 25 hectares of landfill cells. The landfill opened for waste acceptance in December 2004. The landfill accepts residual household, commercial and industrial wastes together with construction/demolition wastes and incinerator bottom ash (IBA). The site is licensed by the EPA with an industrial emissions (IE) licence W0146-02. The site is licensed to operate from 07:30 to 18:30 Monday to Saturday inclusive and is licensed to accept waste between 08:00 and 18:00 (excluding public holidays). It is proposed to further develop the existing Knockharley landfill and further details are presented in the next section.

1.1 Proposed Development

Knockharley Landfill Ltd proposes to further develop the existing Knockharley landfill to include the following:

- The acceptance of up to 435,000 tonnes per annum of non-hazardous wastes, which will comprise incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables. In addition, the acceptance of up to 5,000 tonnes per annum of stable non-reactive hazardous waste is proposed. Permission is sought for the acceptance of waste until the landfill cells are full.
- The increase in height of the landfill body from the current permitted post settlement final contour height of 74 mOD to a post settlement contour height of 85 mOD.
- The construction and operation of a dedicated IBA facility to store IBA until recovery outlets are identified. Permission is sought for trials to prepare IBA for recovery and removal off site. A final post settlement contour height of 85 mOD is proposed. Permission is sought for operation of the IBA facility until the cells are full and subsequent aftercare activities as may be required are complete. The development includes additional perimeter (haul) roads and screening berms. The IBA facility will comprise 1 no. portal frame building 76 m x 76 m x 15.5 m to facilitate weathering and recovery trials.
- The construction and operation of a building for the biological treatment of the organic fraction of MSW (otherwise known as MSW 'fines' material) and for contingency storage of baled recyclables and baled MSW. This facility will be 108 m in length, 50 m in width and up to 17 m in height, of portal frame construction. It will have 12 no. concrete composting tunnels located within the processing building of c. 6 m in width, 25m in length and 5 m in height and a covered bio-filtration unit within the overall processing building footprint, with a stack of height of 20 m.
- The construction and operation of a leachate management facility comprising 3 no. lagoons, 5 no tanks, a modular plant unit and articulated tank loading areas.
- Construction of screening berms along the western boundary to a maximum of 10 m in height, on the eastern boundary to a maximum height of 10 m and on the northern boundary, to a maximum height of 6 m, with a total berm footprint of c. 11.3 ha.
- Construction of surface management infrastructure, with discharge to the adjacent Knockharley Stream to the northern end of the landfilling footprint and the proposed IBA cell development. Key elements will comprise a holding pond, storm water attenuation lagoon, a wetland, a flood compensation culvert to provide equivalent 1:1000-year flood plain storage and permitted stream diversion around permitted development
- Felling of c. 12.5 ha of the existing commercial broadleaf/conifer mix plantations to facilitate construction of the screening berms along the western boundary and to the north of the proposed IBA area, and development of Phase 7 Cells 27 and 26 and the new northern surface water attenuation pond.

Replanting and new planting totalling (c.16.8 ha) will off-set loss of commercial forestry in the proposed development footprint.

- Relocation of an existing 20 KV overhead ESB powerline that provides power to the existing landfill facility administration buildings, that will be impacted by the development of the screening berm to the east of the proposed IBA cell area.
- Construction of 2 no. additional ESB sub-stations.
- Extension of existing permitted below ground infrastructure and provision of additional below ground infrastructure. (Power, water, telemetry, leachate rising mains, drainage). Extension of the existing car park for the administration area (760 m²) to provide additional no. 40 parking spaces.

Further details are provided in this chapter.

There is a glossary of terms in Appendix 2.1 of Volume 2 of this EIAR.

1.2 Application and EIAR

The proposed development is deemed to be strategic in accordance with the Planning and Development Acts 2000 to 2018. Consequently, this EIAR accompanies an application made to An Bord Pleanála under Strategic Application Reference Number 17.PC0223.

The purpose of this EIAR is to provide a detailed description of the proposed development and outline potential impacts associated with the construction and operation of the development. Where adverse impacts have been identified, mitigation measures are proposed to reduce or eliminate the potential effects. This document provides a non-technical summary of the EIAR including a description on the receiving environment, details on the proposed development and potential impacts, mitigation measures and residual impacts.

In addition to the EIAR, an Appropriate Assessment Screening Report and Natura Impact Statement has been prepared in respect of the proposed facility, as required by Article 6 of the Habitats Directive. The Appropriate Assessment Screening Report and Natura Impact Statement are included as Appendices 10.5 and 10.5 in Volume 2 of this EIAR.

1.3 Environmental Impact Assessment Report

1.3.1 [EIAR Methodology](#)

The Environmental Impact Assessment Report (EIAR) is a report of the effects, if any, which a proposed development, if carried out, would have on the environment. The EIAR provides the competent authorities and the public with a comprehensive understanding of the project, the existing environment, the impacts and the mitigation measures proposed.

The Competent Authority is obliged to carry out an Environmental Impact Assessment (EIA). The obligations imposed on the Competent Authority by the EIA Directive are set out in Part X of the Planning Acts.

Article 3 of the 2014 EIA Directive states that an "*environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*

- population and human health;*
- biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
- land, soil, water, air and climate;*
- material assets, cultural heritage and the landscape;*
- the interaction between the factors referred to in points (a) to (d)"*

An EIAR presents relevant information such that an environmental impact assessment (EIA) can be undertaken to assess the potential effects of certain development projects on the environment. The EIA process is undertaken by the relevant regulatory authorities.

The primary objective of an EIA is to ensure that projects which are likely to have significant effects on the environment are assessed and impacts avoided, where possible. This assessment process aims to achieve the most sustainable and environmentally friendly integration of a development with the local environment.

Firstly, the planning context, the background to the project including the need for the development, the alternatives assessed, and the existing and proposed development is described. This sets the reader in context as to the practical and dynamic process undertaken, to arrive at the layout and design of the proposed development that will cause least impact on the environment.

Subsequent sections deal with specific environmental topics, for example, human health and population, air and climate, hydrology and surface water, noise, etc. These sections may involve specialist studies and evaluations. The methodology applied during these specific environmental assessments is a systematic analysis of the proposed development in relation to the existing environment. The broad methodology framework for these assessments is outlined below and is designed to be clear and concise and allow the reader to logically follow the assessment process through each environmental topic. In some instances, more specific topic related methodologies are outlined in the relevant sections of the EIAR.

The broad methodology framework used in all sections includes:

- Introduction
- Assessment Methodology
- Existing Environment
- Summary of Key Possible Impacts
- Mitigation Measures
- Predicted Impacts after Mitigation
- Monitoring
- Conclusion and Summary

This EIAR has been prepared in accordance with best practice guidelines shown below. Topic specific guidelines and references are included in each chapter where relevant.

- Draft Guidelines to be contained in Environmental Impact Assessment Reports, EPA 2017
- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, European Commission 2017

1.3.2 [EIAR Structure](#)

The EIAR has been structured according to the grouped format structure referenced Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports, EPA 2017. The detailed information in respect of each environmental aspect is provided in Volume 2 Main EIAR and each of those sections is dealt with in summary form in this Non-Technical Summary.

The EIAR is broken down into the following sections:

- A description of the existing and proposed development.
- Subsequent sections deal with specific environmental topics for example, noise, air, water etc. The grouped format examines each topic as a separate section referring to the existing environment, impacts of the proposed development and mitigation measures.
- A concluding section which provides a summary of the key impacts and mitigation measures and provides an overall conclusion to the EIAR.

The advantages of using this type of format are that it is easy to examine each environmental topic and it facilitates easy cross-reference to specialist studies undertaken as part of the assessment.

The EIAR comprises of four volumes:

- Volume 1:** Non-Technical Summary
- Volume 2:** Main Report
- Volume 3:** Appendices
- Volume 4:** Drawings

1.4 Difficulties Encountered

There were no technical difficulties encountered during the preparation of this EIAR.

1.5 Viewing and Purchasing the EIAR

This EIAR is available for complimentary download at www.knockharleylandfill.ie.

Any member of the public can view the planning application and accompanying EIAR documentation, including the Non-Technical Summary, Appropriate Assessment and Natura Impact Statement, free of charge or can purchase on payment of a specified fee during normal office hours at the following locations:

- An Bord Pleanála, 64 Marlborough Street, Dublin 1, D01V902
- Meath County Council, County Hall, Co. Meath

2 DESCRIPTION OF EXISTING AND PROPOSED DEVELOPMENT

This section of the EIAR describes the existing facility and the proposed development including details on the design, construction and operation of the proposed development.

2.1 Existing Development

Knockharley Landfill Ltd. is the owner and operator of Knockharley Landfill facility located at Knockharley, Kentstown, Navan, Co. Meath. The facility is located on a 135.2 hectare (333-acre site). The existing landfill footprint is positioned near the centre of the landholding and the current planning permission permits the development of approximately 25 hectares of landfill cells. The landfill opened for waste acceptance in December 2004. The landfill accepts residual household, commercial and industrial wastes together with construction/demolition wastes and incinerator bottom ash (IBA). The site is licensed by the EPA with an industrial emissions (IE) licence W0146-02. The site is licensed to operate from 07:30 to 18:30 Monday to Saturday inclusive and is licensed to accept waste between 08:00 and 18:00 (excluding public holidays).

The existing landfill infrastructure comprises: an administration building, machinery/maintenance garage, four portable cabins for storage, weighbridge building, two weighbridges, inspection slab, quarantine slab, car parking, landfill gas treatment compound, leachate lagoon, surface water attenuation lagoon and wetland.

Knockharley Landfill Facility comprises the following elements: access road and internal road network, buildings, fencing and security, environmental monitoring infrastructure, existing utilities, an engineered lined landfill, groundwater management infrastructure, leachate management system (comprising collection and storage), surface water management system (comprising collection, attenuation and wetland), landfill gas management system (comprising collection pipework, wells and a landfill gas compound), landfill capping system, landfill void, existing waste types and existing waste activities.

2.1.1 Existing Road Networks

The landfill is accessed via the N2 national primary route which provides direct vehicular access to the national roads network, with access facilitated at a ghost island priority junction on the N2 at the facility entrance. The ghost island provides sheltered access for right turning vehicles travelling from the north. This is complimented with an auxiliary left turn deceleration lane to facilitate access for vehicles coming from the south. The junction has been designed and constructed in accordance with the NRA: Design Manual for Roads and Bridges (DMRB) and has been the subject of Roads Safety Auditing.

The access road to the site runs due west through arable lands, thereafter running under the CR384 County Road. The entrance proper to the site is located approximately 80 to 100 metres west of the underpass of the CR384. The distance from the N2 to the onsite weighbridges is approximately 900 m. The dedicated access road is single carriage way and is the only road access to and from the site.

2.1.2 Existing Buildings, Utilities, Fencing and Security

The existing facility comprises an administration building, car parking, weighbridges and weighbridge building, waste inspection and quarantine areas which includes the machinery/maintenance garage, portable storage cabins and banded fuel storage.

The existing facility is connected to the water mains and has phone and broadband. All foul effluent generated from administration welfare facilities is treated on site and discharged to leachate lagoon.

The perimeter of the site is fenced and a security gate with closed circuit television is located on the access road.

There are a number of utilities servicing and traversing the existing landfill including a 20 kV line, 220 kV line, two ESB substations importing and exporting electricity and a below ground high pressure natural gas main (no connection from the facility to this gas main).

2.1.3 Existing Environmental Monitoring

The conditions and schedules of the current IE Licence (W0146-02) outline the requirements for environmental compliance. This includes monitoring requirements, trigger levels and emission limit values. Environmental infrastructure is in place to enable the monitoring of the emissions of from the facility. Additional monitoring not requiring permanent monitoring infrastructure is also undertaken in accordance with the IE Licence.

2.1.4 Existing Landfill and Environmental Management Infrastructure

The facility was designed, constructed and is being operated in accordance with the EU Landfill Directive 1999/31/EC, the original licence, licence review, the IE amendment and technical amendments A, B, C and D, relevant EPA manuals on landfill selection, design, operation and monitoring and the relevant planning permissions that pertain to the site. Of the 7 approved landfill phases, the first 4 phases (Cells 1-16) have been constructed. Waste is being placed in Cells 15 and 16 during 2018.

The landfill is lined complying with both EU regulation and the licence conditions. The construction of the landfill liner system is subject to independent quality assurance testing and controls approved by the EPA.

Groundwater Management

Groundwater drains are constructed below the engineered clay lining system, to maintain groundwater below cell formation. Gravity flows collected in a pipe terminate in sumps and electricity powered pumps discharge groundwater via a rising main to the surface water attenuation pond on site.

Leachate Management

Leachate that gathers in the base of a cell is collected in a leachate collection system. Leachate pumped to the perimeter ring main via side-riser pipes and discharges to the leachate storage lagoon.

Surface Water Management

Surface water runoff from roads and hard standing areas discharge to a surface water trunk main collection pipe below ground. The pipe discharges to an existing attenuation pond and wetland serving the overall site, via a Class 1 bypass proprietary oil/water separator. This petrol interceptor prevents petroleum products from entering the downstream attenuation and wetland system.

Surface water from the landfill footprint is drained via the main landfill perimeter swale (Swales are vegetated channels over which flows are conveyed at low non-erosive velocities) to a purpose-built storm water attenuation pond and constructed wetland (designed for up to a 1 in 100 year design return period storm event). The outflow from the constructed wetland discharges into the local drainage network. The discharge from the surface water pond is controlled by a slam shut valve that prevents surface water discharging if continuous monitoring indicates potential contamination of the surface water.

Landfill Gas Management

Landfill gas (LFG) is extracted from all active and filled cells via vertical and horizontal gas wells. Landfill gas extraction commences from each cell once sufficient waste has been placed in a landfill cell.

Landfill gas is fed via both temporary over-ground and permanent below-ground HDPE pipes to HDPE gas ring main located outside the perimeter of the waste cells. The ring main transfers landfill gas from the cells to the utilisation compound.

The landfill gas compound comprises four engines (with two engines run continuously) on site and three enclosed flares. There is an ESB substation in the compound to facilitate the transfer of energy generated by the plant to the national grid.

2.1.5 Existing Landfill Capping System

As part of ongoing operations at the site, the active area of the landfill is covered with daily cover. Near-horizontal areas of the working face are covered with soil, the slope of the working face is covered with daily cover at the end of each working day.

12 months after a cell is filled, a fully engineered cap is put in place over the waste in accordance with the requirements of the facility licence. Future permanent capping will continue on a phased basis. A temporary cap is in place on the remainder of the active landfill where full height has been achieved.

A fully engineered cap is in place over a Cells 1-10 and half of Cells 11 and 12. This cap comprises: a gas collection layer, 1 mm fully welded LLDPE liner, sub-surface drainage layer, subsoil layer and a topsoil layer. The overall thickness of the soil layers is 1 m in accordance with the requirements of the facility licence. The final capping of Cells 11 and 12 is underway, the welded LLDPE liner is in place and the soil layers will be placed in 2019. There is an intermediate cap on Cells 13 and 14.

2.1.6 Existing Waste Types, Activities and Void Capacity

The categories of waste accepted are as per Schedule A of the facility licence W0146-02 which includes for the disposal and recovery of household, commercial and industrial waste and construction and demolition waste is 200,000 tonnes per annum. The current planning permission limits disposal to 88,000 tonnes per annum.

The total quantity of waste and recovered materials landfilled at the site up to the end of 2017 within Cells 1 through 16 is approximately at 2,170,954 tonnes. The remaining void in the currently permitted development is therefore approximately 1,627,431 m³. The current planning permission permits the acceptance of waste until 26 August 2021. Assuming a density of 1.0 t/m³ it will not be possible to fill the remaining void by the 26 August 2021.

2.2 Details of the Proposed Development

Knockharley Landfill Ltd proposes to further develop the existing Knockharley landfill to include the following:

- The acceptance of 435,000 tonnes per annum of non-hazardous wastes and up to 5,000 tonnes per annum of stable non-reactive hazardous waste.
- The increase in height of the landfill body from the current permitted post settlement final contour height of 74 mOD to a post settlement contour height of 85 mOD – the proposed height increase will apply from the active landfill phase at the time of permission grant. Permission is sought for the acceptance of waste until the cells are full.
- The construction and operation of a dedicated IBA facility. Permission is sought to store IBA until recovery outlets are identified. Permission is sought for trials to prepare IBA for recovery and removal off site. The IBA facility will comprise 1 no. portal frame building Permission is sought for operation of the IBA facility until the cells are full and subsequent aftercare activities as may be required are complete.
- The construction and operation of a building and ancillary works for the biological treatment of the organic fraction of municipal solid waste (MSW) fines and for the contingency storage of baled recyclables and baled MSW.
- Construction of leachate management facility including the continued operation of this post filling of the landfill cells to facilitate continued leachate management.
- Construction and operation of surface management infrastructure.
- Felling of trees, replanting and new planting.
- Construction of screening berms.
- Relocation of 20kV overhead ESB power line, construction of two ESB sub-stations and construction of a 20 kV overhead line within the footprint of the existing landfill.

- Development of associated buildings, plant, infrastructure (including roads and hard standings) and landscaping.

The layout of the proposed site upon completion is presented in Figure 2.1 which is taken from Drawing No. LW14-821-01-P-0000-003 Proposed Site Layout (Volume 4 of this EIAR). Further details are provided in Chapter 2 of Volume 2 of this EIAR.

An application will also be made to the EPA to facilitate the licensing of the proposed development as outlined above. The existing facility is licensed to operate by the EPA by IE W0146-02.

2.2.1 Proposed Site Infrastructure

The majority of existing site infrastructure will be utilised as part of the proposed development. The key areas are discussed below.

Roads

There are no proposed changes to the existing road network. New haul roads will be constructed within the facility to service elements of the proposed development.

Buildings, Utilities, Fencing and Security

There are no proposed changes to the perimeter fencing. Construction of new buildings, infrastructure and, provision and relocation of utilities is part of the proposed development. As part of the proposed development the construction of the following buildings and infrastructure is proposed:

- Biological treatment building
- Leachate management facility
- IBA facility and handling building
- Screening berms
- Surface management infrastructure
- Construction of two additional ESB sub-stations and new overhead ESB lines.

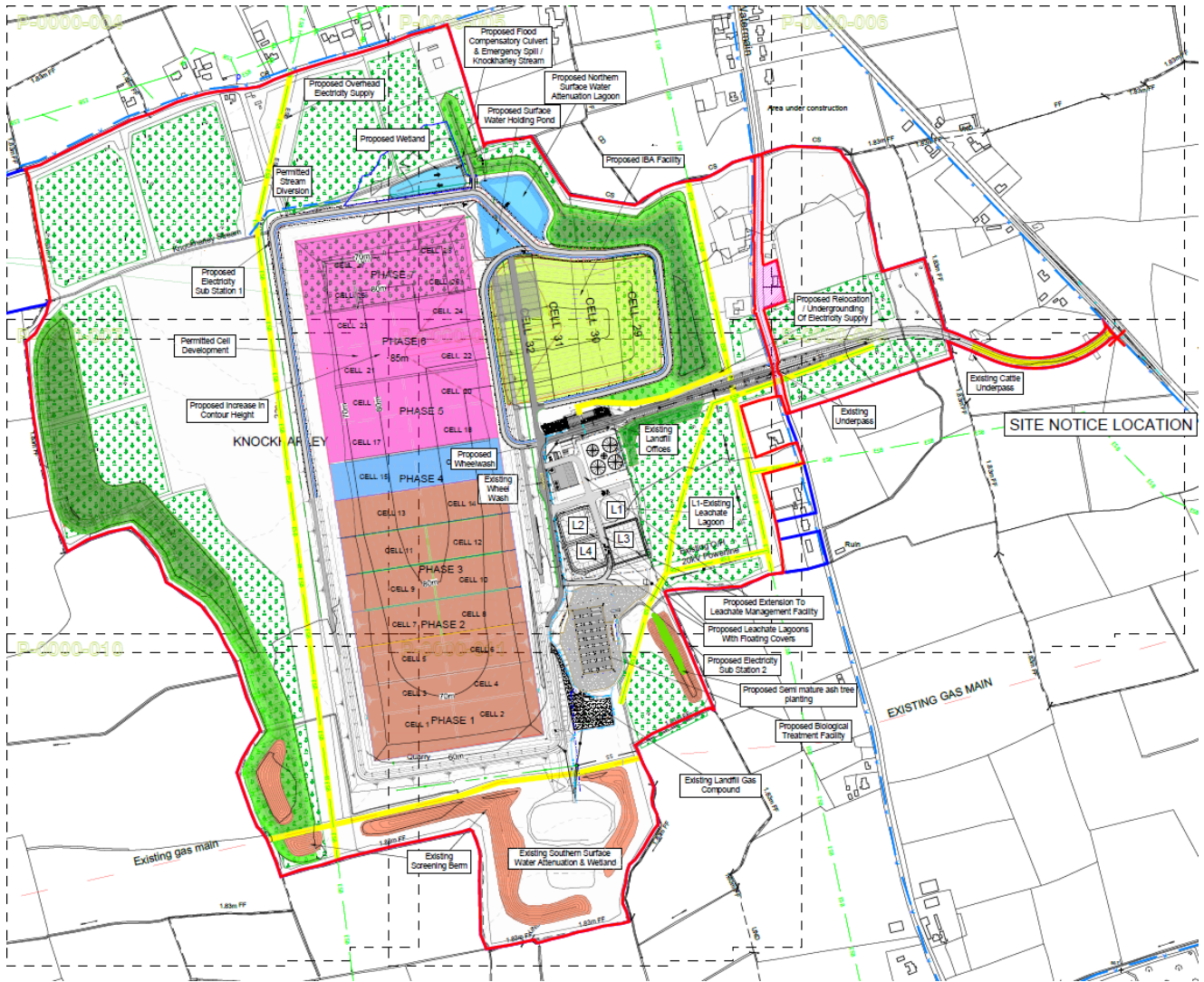


Figure 2-1: Proposed Site Layout

2.2.2 Proposed Waste Types, Activities & Quantities

It is proposed to accept up to 440,000 tonnes per annum of waste at the facility. This waste shall be managed through disposal or recovery activities, dependent on the nature of the waste material.

Waste Types and Quantities

Broadly, the waste types to be accepted as part of the proposed development are the same as those currently accepted at the facility, with the addition of two new waste types; stable non-reactive hazardous waste (maximum 5,000 tonnes per annum) and baled recyclable waste.

The waste types to be accepted are:

- Non-hazardous residual municipal solid wastes of household, commercial and industrial origin, which will have undergone various degree of pre-treatment from separate 'black bin' collection to biological treatment in the form of stabilised residual fines, as well as residual MSW from other sources such as unauthorised landfill remediation and/or repatriated wastes.
- Non-hazardous incinerator bottom ash (which is currently accepted at the facility).

- Non-recyclable bulky wastes, where bulky wastes are broadly considered as larger wastes which do not fit in household/commercial bins e.g. mattresses, furniture etc.
- Non-hazardous soils and stones and other C&D wastes.
- Street sweepings and similar cleansing wastes.
- 'Individual' volumes of non-hazardous industrial wastes from various industries such as food preparation, chemical processes, thermal processes, metal treatments, health care (non-hazardous) and water/wastewater treatment industries, all of which are currently accepted at the facility.
- Stable non-reactive hazardous waste
- Baled recyclable waste (contingency storage)
- Baled MSW (contingency storage)

Waste Activities

The proposed activities to be undertaken at the facility are classified in accordance with relevant legislation. The activities to be classified onsite will be classified as either recovery or disposal activities and can broadly be described as:

- placement of waste within lined cells
- biological treatment of residual MSW fines
- management of leachate
- storage of IBA until recovery outlets are identified
- storage of surface water for attenuation prior to discharge
- storage of unsuitable waste in quarantine area prior to removal off-site
- contingency storage of baled recyclables
- contingency storage of baled MSW
- IBA recovery trials (screening and washing, and recovery of metals)

2.2.3 Proposed Site Operation

Hours of Operation

The IE Licence currently permits the operation of the landfill from 07:30 to 18:30 hrs Monday to Saturday and waste acceptance from 08.00 to 18.00 Monday to Saturday. No changes to the hours of operation or waste acceptance are proposed.

Management & Staffing

It is anticipated that that 17 no. of personnel shall be employed on a full-time basis when the proposed development is operational.

Management of wastes generated onsite

All non-process related wastes generated onsite (from administration building, weighbridge office etc.) will be managed by a suitable waste management contracting company and will be taken off site for treatment at relevant approved waste management facilities.

2.2.4 Construction Phase Methodology

The following outlines the main elements of the construction phase of the proposed development.

These are identified, not sequentially, as:

- Surface water management infrastructure
- advance works
- general earthworks and associated concrete works
- internal roads
- deforestation
- screening berms
- IBA facility
- an additional wheel wash to clean vehicles leaving the IBA facility
- additional leachate rising mains
- additional below ground ducting for water, telemetry and power
- biological treatment facility and ancillary infrastructure
- upgrading of leachate management facility
- new underground ESB power supplies and remove existing overhead power supplies

Further details on construction methods and material for the construction elements outlined above are presented in Chapter 2 of Volume 2 of this EiAR.

Construction work will generally be carried out during daylight hours. Construction work will generally be confined to the following times:

7:30 to 18:30 Monday to Saturday

The facility's construction will lead to construction-related traffic on the roads in the proximity of the development. An outline traffic management plan to be implemented during the construction phase has been prepared and is included in the Outline CEMP in Appendix 2.0 of Volume 3 of this EiAR.

A temporary contractor's construction site compound will be put in place for the duration of the construction cycles. It will consist of a hardcored area surrounded by secure fencing, comprising a site office, canteen, toilet facilities, storeroom and staff parking areas. Fuel/oil storage areas will be bunded. The compound will move around site to accommodate the cycles of construction.

The outline CEMP sets out the key construction and environmental management issues associated with the proposed development. This plan will be finalised to take account of relevant conditions attached to any permission or IE review granted.

2.2.5 Environmental Monitoring and Reporting

Sampling and monitoring will be carried out in accordance with the IE licence. Proposed monitoring locations are shown on Drawing No. LW14-821-01-P0050-002 in Volume 4 of this EiAR. The Facility Manager will have responsibility for the implementation of the monitoring programme.

Quarterly, bi-annual and annual environmental reports are submitted to the Agency in compliance with Schedule E of the existing licence for the facility. All records of monitoring are also kept in the information room. The general public can request sight of all monitoring data associated with the landfill and this practice will continue after review of the existing facility licence.

2.2.6 Description of Natural Resources Used

Natural resources consumed during the construction phase will include:

- Diesel fuel for construction machinery
- Steel in the building construction
- Granular material for use as in-fill material for site development works and in concrete

Natural resources consumed during the operational phase will include:

- Diesel fuel for site machinery (loading shovels, diesel plant)
- Woodchip/peat/bark (if used for biofilter bed media)
- Water

2.2.7 Regulatory Control

As identified previously, the proposed development will require the granting of an IE licence by the EPA to reflect the proposed operations. An application is being prepared which will be submitted to the EPA following submission of this planning application to which this EIAR relates.

Pre-application consultation has been undertaken with the EPA and further detail on this is provided in Chapter 5 of Volume 2 of this EIAR.

Works associated with the development of the surface water attenuation lagoon to the north of the proposed IBA facility and the realignment of the stream on the north-eastern corner of the permitted landfill development will each require a Section 50 consent from the Office of Public Works (OPW).

Felling associated with the removal of existing forestry at the location of the proposed screening berms will require a Felling Licence from the Forestry Service.

The acceptance and processing of residual municipal solid fines at the proposed biological treatment facility will require a 'Type 8' facility approval by the Department of Agriculture, Food and the Marine (DAFM).

Test trenching for archaeology and will be carried out under licence from the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and the National Museum of Ireland.

2.2.8 Decommissioning

As an existing licensed landfill facility, closure, a restoration and aftercare plan has been agreed with the EPA which relates the period aftercare cessation of waste acceptance at the site. As part of the update of the facility licence, a revised closure, restoration and aftercare plan will be agreed to address the aftercare period when:

- waste acceptance within the landfill body ceases
- waste acceptance at the IBA facility ceases
- waste acceptance at the biological treatment facility ceases

The restoration and aftercare plan covering decommissioning will be subject to Agency approval.

Knockharley Landfill Ltd. has put in place the financial provision to cover any liabilities associated with the operation of the facility including closure and aftercare of the facility.

2.2.9 Health and Safety

The proposed facility will be designed, constructed and operated in accordance with the:

- Safety, Health & Welfare at Work (Construction) Regulations 2013
- Safety, Health & Welfare at Work Act 2005
- Safety, Health & Welfare at Work (General Application) Regulations 2007
- Safety, Health and Welfare at Work (Biological Agents) Regulations 2013
- Best practice guidelines
- Relevant BREF/BAT guidance
- IE licence
- DAFM Type 8 facility approval

3 POLICY AND LEGISLATION

This examines the general waste management, planning and regional policy and legislative context at European, national and regional levels with relevance to the proposed development at Knockharley Landfill.

3.1 EU Directives and Policies

3.1.1 [Council Directive 1999/31/EC on the Landfilling of Waste](#)

The overall objective of this Directive is to tightly define and unify the nature of acceptable landfill usage, by reducing and minimising the potential environmental impacts which may otherwise occur at any point in the life-cycle of a landfill. As well as technical standards, the Directive also contains binding obligations for an EU-wide reduction of the use of landfill as an option for the disposal of biodegradable municipal waste (BMW). It contains specific reduction targets for biodegradable waste which must be applied nationally. However, considering the closure of a significant number of landfill facilities in recent years, the combined capacities of landfills currently operating, and that will continue to operate, will be less than the applicable target values.

Continued acceptance of BMW material at Knockharley Landfill, as one of the few remaining operating landfill facilities in 2016 and beyond, will therefore contribute to achievement of our national obligations.

3.1.2 [Council Directive 2008/98/EC on waste \(and repealing certain Directives\)](#)

Directive 2008/98/EC has been implemented in Ireland through the European Communities (Waste Directive) Regulations 2011 (S.I. 126 of 2011), as amended. Therefore, the waste hierarchy and the concepts of self-sufficiency and proximity, are legislative requirements in Ireland.

The proposed development will contribute to the implementation of the principles of the Directive through the provision of waste disposal and recovery infrastructure which will facilitate the management of wastes generated within the region and nationally, in an EPA approved facility incorporating the best available techniques to ensure environmental protection, thus supporting the self-sufficiency and proximity tenets of the Directive.

In December 2015, the EU adopted the Circular Economy Package. This package included legislative proposals on waste, with long term targets to reduce landfilling and increase recycling and reuse.

The new Landfill Directive (EU) 2018/850 outlines several proposals including the implementation of measure by Member States to ensure that by 2035 the amount of municipal waste landfilled is reduced to 10% of the total amount of municipal waste generated (by weight).

3.2 National and Regional Planning and Waste Management Policy

It is considered that the proposed development at Knockharley is in compliance with national and regional planning and waste management policy objectives.

3.2.1 [National Planning Policy](#)

National planning policy, outlined in Project Ireland 2040: National Planning Framework (NPF) and the National Development Plan 2018-2027 (NDP), is supported by the proposed development through the provision of necessary, effective and efficient waste management infrastructure, which is identified as essential in the promotion of balanced regional development.

The development proposed at Knockharley can be considered supportive of and consistent with the aims of the NPF through the provision of the necessary waste management infrastructure to support industry and enterprise and the overall balanced development nationally and within the region it is located, as it makes references to the provision of waste management services and infrastructural:

"Adequate capacity and systems to manage waste, including municipal and construction and demolition waste in an environmentally safe and sustainable manner and remediation of waste sites to mitigate appropriately the risk to environmental and human health."

The NDP recognises the role of waste management and resource efficiency:

"Investment in waste management infrastructure is critical to our environmental and economic well-being for a growing population and to achieving circular economy and climate objectives."

and;

"Capacity will continue to be built in waste facilities, including anaerobic digestion, hazardous waste treatment, plastics processing, recycling, waste to energy, and landfill and landfill remediation, to meet future waste objectives. The infrastructure to deliver waste management policy has been, to date, largely delivered through private investment with some public-sector investment. Significant infrastructure capacity development will be required to separate and process various waste streams at municipal and national levels to achieve new EU legally-binding targets and the additional investment may include a potential role for public investment."

3.2.2 National Waste Management Policy

National waste management policy over the years has been outlined in a number of documents, details of which are included in Chapter 3 of Volume 2 of this EiAR. They are:

- Waste Management: Changing Our Ways – 1998
- Preventing and Recycling Waste – Delivering Change – A Policy Statement – 2002
- The National Strategy on Biodegradable Waste – 2006
- A Resource Opportunity – Waste Management Policy in Ireland – 2012

While acknowledging the policy objectives in relation to "landfill elimination", it is important to consider these objectives in relation to the type or nature of material to which it refers. The provision of landfill capacity for inert, stabilised or non MSW wastes, as well as for contingency landfill supply, as proposed as part of the proposed development, will continue to be required and be supported, as exemplified by the non-applicability of the landfill levy to inert wastes and stabilised MSW.

The provision of biological treatment capacity will contribute to addressing the diversion of biodegradable waste from landfill.

3.2.3 Regional Planning Policy

Meath County Council, being part of the Eastern & Midlands Regional Assembly, which was created on the 1st January 2015, contributed to the development of the Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022, which were made in June 2010.

Specific statements and strategic recommendations in relation to waste management outlined in these Guidelines are directly relevant to the proposed development include:

PIR36

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

PIR39 *The reuse of waste should be encouraged and reinforced through encouragement of business clustering across the GDA. Opportunities to facilitate source reduction, the reuse of wastes, by-products and associated energy throughout the GDA should be examined as part of economic policies. Development of these opportunities shall not compromise the integrity of ecologically sensitive areas, in particular infilling with inert materials which can result in loss and fragmentation of wetlands.*

PIR 40 *Waste management facilities should be appropriately managed and monitored according to best practice to maximise efficiencies and to protect human health and the natural environment.*

The Eastern and Midland Regional Assembly is currently preparing policies and objectives which will provide the regional planning context for the Eastern and Midland Region under the Regional Spatial and Economic Strategy for the Eastern and Midland Region. A draft Strategy was published in November 2018 which identifies the need to minimise negative impacts on the environment, identifying effective waste management as being a priority on the policy agenda.

This Draft Regional Spatial and Economic Strategy sets out the provisioning of waste management for the region and the overall vision towards rethinking the approach taken towards managing waste.

3.2.4 Regional Waste Management Policy

The policy document, A Resource Opportunity, recommended that the number of waste management planning regions be reduced from ten to three. Consequently, three Waste Management Plans were made. These are

1. Eastern Midlands Regional Waste Management (EMWR) Plan 2015 – 2021
2. Southern Region Waste Management (SRMWR) Plan 2015 – 2021
3. Connacht - Ulster Region Waste Management (SRMWR) Plan 2015 – 2021

These Plans set out the strategic vision for waste management nationally and the policy objectives outlined in each Plan are complementary. The relevant policy objectives in the Eastern Midlands Regional Waste Management (EMWR) Plan 2015-2021 are discussed in Chapter 3 of Volume 2 of this EIAR.

3.2.5 Local Policy Context – Meath County Development Plan 2013 - 2019

The Meath County Development Plan 2013 – 2019 contains a number of specific policies across a number of topic areas considered applicable to the proposed development. A list of the policies is presented in Chapter 3 of Volume 2 in this EIAR.

The proposed development is considered as strongly adhering to the policies and objectives of the Meath County Development Plan 2013 to 2019, which defers to the requirements of national legislation, policy and the regional waste management plan in most instances.

The potential re-use of IBA as part of the proposed development as described in Chapter 2 'Description of the Proposed Development' specifically relates to WM POL7, while the utilisation of landfill gas in renewable electricity generation which will continue as the development site, is supported by EC POL3.

Cognisance is also given to Kentstown Written Statement, developed under Variation No. 2 of the Meath County Development Plan 2013 – 2019 given the proximity of the proposed development.

Based on the issues identified in the Kentstown Written Statement, this EIAR gives consideration to the water quality and ecological value of the River Nanny and flood risk potential, through assessment of potential impacts resulting from the proposed development in the following sections of this EIAR.

4 NEED, ALTERNATIVES & CONSULTATION

Chapter 4 of Volume 2 of the EIAR presents the need, alternatives for the proposed development and consultation carried out prior to the application being made.

4.1 Need for the Development

The need for the proposed development is determined through consideration of a number of factors:

- examination of the current levels of generation of particular waste streams and likely future rates of generation
- assessment of the adequacy of the existing means of management of these waste streams and
- consideration for the need for contingency/emergency waste management capacity with the State in the event of an emergency arising, and
- where relevant, of the policy environment that pertains to the relevant waste stream

What has occurred in Ireland in recent years, is that this transition has occurred in a relatively uncontrolled manner, with national landfill capacity being significantly reduced over a short period of time, leading to significant pressures in the management of certain waste types, where suitable and sustainable outlets for landfillable waste have been lacking. In addition, the treatment of certain wastes in higher tiers of the hierarchy, is resulting in different waste streams requiring further management, for which landfill is an acceptable and sustainable outlet.

In addition, there is an increasingly visible requirement for the availability of landfill capacity for the management of wastes illegally deposited at unauthorised sites, both within the Republic of Ireland and in Northern Ireland, where landfill is the only appropriate means of management of this material. There will always remain a requirement for landfill capacity as part of a fully integrated waste management system, which incorporates high recovery and recycling, to provide management capacity for non-recoverable/recyclable wastes, as well as to provide back-up contingency and emergency capacity, as and when required.

It is in this context that this development is proposed.

It is acknowledged that projecting waste volumes is an inexact science, but by applying the assumptions to the data presented within the regional waste management plans, it can be seen that it is likely that there will be between 1.40 and 1.49 million tonnes of residual MSW requiring management each year over the next 15 years or so. It is expected that there will be just under 160,000 tonnes of IBA generated in Ireland in 2018 rising to c. 210,000 tonnes per annum by 2022. A national shortfall of capacity for 1.5 M tonnes per annum of C&D is identified in 2018, rising to c. 3.5 M tonnes per annum by 2022. It is estimated that at least 170,000 tonnes of waste that requires repatriation from Northern Ireland, with 300,000 tonnes of material considered as a reasonable estimate of waste deposited in illegal landfills. In terms of Class A historic legacy landfills, with 73 such sites identified nationally, 400,000 tonnes of excavated waste to be managed could be considered a legitimate estimate.

There is existing landfill capacity in 2018 for 458,000 tonnes per annum and this is expected to decrease to 120,000 tonnes per annum by 2022.

While thermal treatment facilities will provide the primary means of management of residual MSW in the country in coming years, it should be borne in mind that it is the case that these facilities typically undergo scheduled maintenance downtime on a regular basis (either annually or every 18 months) over which duration they cannot thermally treat waste.

Any integrated national waste management system needs to be supported by the presence of landfill capacity. What is clear is that there exists an impending lack of capacity across the various infrastructural elements of the national waste management system to manage waste streams that will clearly and evidentially arise. Post 2021, there is likely to be only 120,000 tonnes of landfill capacity in the country and that fact alone, when viewed against the identified capacity requirements, supports the need for further increased landfill capacity.

It cannot be argued that the presence of landfill capacity will negatively impact on the appropriate management of residual MSW through processes “higher up” the waste hierarchy – the presence of a significant landfill levy for material disposed in landfill removes any such effect that the presence of capacity might have and did have in the past.

In fact, given the significant requirement for appropriate landfill capacity, the issue of where material is managed on the waste hierarchy is moot, if the material is not actually managed.

The capacity proposed for development at the Knockharley Landfill facility can contribute to the identified need in a number of ways:

- through provision of dedicated IBA management capacity
- through contribution to biological treatment of residual fines, resulting in mass loss and stabilisation of residual fines prior to landfilling
- through direct contribution to residual MSW management through disposal, as required
- through acceptance of C&D soils for disposal and/or recovery
- through acceptance of repatriated waste for disposal
- through acceptance of waste from historic legacy site for disposal
- through acceptance of waste from other unauthorised landfills for disposal
- through the continued operation of the site being available to provide contingency waste management solutions in an emergency

The ‘proportion’ of contribution to these different requirements is likely to vary on an annual basis (with the exception of IBA management and biological treatment of fines), with there likely to be a greater requirement for, for example, residual MSW disposal one year and soils recovery or repatriated waste disposal another year.

The ‘fluid’ nature of future capacity requirements does not belie the fact that significant capacity is required – as previously identified, the Eastern Midlands Region Annual Report 2016 identifies a “national waste infrastructure deficit” in 2016 and states that “it is clear that an immediate requirement for significant additional active licensed capacity is required”. As evidenced by the scenario presented previously, the national waste infrastructure deficit identified in 2016 will be realised again in the coming years, and the proposed development Knockharley landfill has a significant ability to contribute to mitigating this deficit.

4.2 Alternatives Considered

Alternatives in relation to this proposed development are considered in terms of alternative site location, alternative layouts and processes at the preferred site and a ‘do-nothing’ alternative.

Two active landfill facilities are currently under the ownership of the AGB Landfill Holdings Ltd., which is the parent company of the applicant, Knockharley Landfill Ltd

- Knockharley Landfill, Kentstown, Co. Meath
- Ballynagran Landfill, Ballynagran, Co. Wicklow

Kilcullen Landfill in Co. Kildare is also under the ownership of AGB Landfill. Kilcullen Landfill is not an appropriate option as it is undergoing restoration and is entering aftercare. The consideration of other alternative development locations, either greenfield sites or other licenced waste management facilities not controlled by AGB Landfill Holdings Ltd., is not considered to be a realistic or viable option for AGB Landfill Holdings Ltd., given that such sites are not owned or controlled by them. Therefore, the proposed development is assessed as being potentially carried out at either Knockharley Landfill or Ballynagran Landfill.

The two facilities were assessed under the following criteria:

- Locations & accessibility
- Available development footprint
- Suitability for development
- Environmental considerations

Of the 4 no. criteria assessed as part of the alternative site development locations, the Knockharley site is considered the preferable location across three of the four criteria, with environmental considerations being considered as neutral.

With Knockharley Landfill being considered the preferable development location, there are a number of options in terms of the siting of the various elements of infrastructure proposed within the overall footprint of the site. The various elements of the proposed development could potentially be developed in a number of areas within the site. Four location options are considered with preferred site layout presented in Chapter 2 of Volume 2 of this EIAR.

Upon identification of the preferred locations for the IBA storage, leachate treatment infrastructure and biological treatment plant, consideration was given to the different technologies and processes that can be applied as part of these processes. Further details on the technologies and processes to be implemented has been given in Chapter 2 'Description of the Proposed Development'.

The primary objective of the proposed development is to provide management capacity for a range of non-hazardous waste materials, comprising non-hazardous municipal solid wastes (MSW) from varying origins, incinerator bottom ash, C&D soils & stones and other similar commercial and industrial wastes.

The 'do-nothing' alternatives, in terms of the environmental considerations of the management of the different waste streams (residual MSW, IBA and C&D soil and stones) are described.

In a 'do-nothing' scenario for residual MSW, residual MSW will continue to be managed through a combination of existing landfilling capacity, thermal treatment and export. This material will be competing for the limited landfill capacity that will exist in coming years, resulting in instances where waste material will not be removed due to lack of available landfill outlets, with resultant continuance of the negative environmental impacts resulting from the presence of this material at these sites.

In the 'do-nothing' IBA management scenario, IBA material produced will either compete with other materials for the limited landfill capacity or managed through export. The potential resource value of that material will continue to be lost as it is co-landfilled with other materials and in the case of material being exported, environmental benefits associated with re-use of this material being potentially realised in in the end destination country, rather than in Ireland.

A 'do-nothing' alternative for C&D soil and stones will see the identified lack of capacity continue, with the proposed development not making any contribution in terms of national capacity provision. Lack of appropriate management capacity could result in negative environmental impacts associated with the inappropriate management of this material as it arises.

4.3 Consultation

A number of statutory and non-governmental bodies were consulted during the preparation of this EIAR. A consultation letter, with accompanying description of the proposed development, site location map and aerial photograph, was sent to 29 statutory bodies, non-government organisations and public representatives to inform them of the proposal. A number of submissions were received in relation to the proposed development. The issues raised have been addressed, where practicable, in the relevant sections of the main volume of this EIAR.

Dedicated consultation meetings were also undertaken with the Environmental Protection Agency (EPA), An Bord Pleanála, Meath County Council (MCC) and Eastern-Midlands Waste Regional Office to ascertain their opinions in relation to the proposed development.

In addition, a public information event was held to introduce the proposed development to the public. 15 people attended this event. The main issues that were raised by attendees during the course of the event were:

- the potential for negative impacts associated with traffic
- the potential for negative impacts associated with odour
- the potential for negative impacts associated with noise
- queries in relation to the contributions relating to the existing Community Fund.

5 THE MAIN IMPACTS OF THE DEVELOPMENT & THEIR MITIGATION

5.1 Potential Significant Effects on Population and Human Health

Chapter 6 of Volume 2 of EIAR assesses the likely significant effects of the proposed development on Population and Human Health, with reference to population, human health, employment and socio-economics, land use, recreation, amenity and tourism.

5.1.1 Potential Significant Effects – Population

Construction of the proposed development will take place on a phased basis. The site will continue to operate during the construction process. During the construction phases of the proposed development, construction workers will travel daily to the site from the wider area. The impact of the construction phase is effect on the permanent population or settlement patterns will be imperceptible.

It is not envisaged that the operational phase of the proposed development will give rise to any direct or indirect effects on the population or settlement patterns in the study area through an increase or decrease in population or through the influencing of settlement patterns in the study area.

It is considered that the development of future residential dwellings will not be curtailed due to the proposed development as any new development will be within the existing site boundary. It should be noted that the lands within the vicinity of the site are unzoned white lands and have not on this basis has not been identified to accommodate specific residential or other development within the lifecycle of the Plan. The potential impact of the operational phase will be imperceptible.

5.1.2 Potential Significant Effects - Land Use

The land use at the proposed development will change from the existing undeveloped grasslands and vegetative habitats, to constructed lands and, as such, will be a direct effect. As the land is within the footprint of an existing waste facility, the potential for alternative land use is limited and therefore the potential impact will be not significant.

The impact on land use beyond the proposed development boundary during the construction phase will be imperceptible. The potential impact on land use in the forested areas of the site will be slight in the short term and imperceptible in the long term.

5.1.3 Potential Significant Effects- Socio-Economics, Employment and Economic Activity

The proposed development will positively affect employment in the area through the provision of up to 30 temporary construction jobs over the different construction phases. This will benefit the economy of the area both directly through employment provision and indirectly through the purchase of construction materials from suppliers within Meath and beyond. This is positive, short term and Not Significant.

The proposed development will positively directly affect employment in the area through the provision of an estimated 10 further long-term employment positions, primarily associated with the extra staffing requirement to operate the IBA facility, the biological treatment facility and the leachate management facility.

The continued operation of the site will also provide the commercial and industrial sectors with an available outlet for the management of waste generated by these sectors, thus indirectly and positively supporting the economic activity of the Greater Dublin Area, and beyond, and contributing to meeting the needs of the Eastern & Midlands, and other regions in terms of waste management. This is positive, medium to long term and Not Significant.

5.1.4 Potential Significant Effects - Recreation, Amenity and Tourism

Potential significant direct and indirect construction and operations phase effects on identified elements of the amenity (visual appearance/landscape, and traffic) of the study area are addressed in the relevant sections of this Non-Technical Summary. A summary of potential significant effects of these elements as they relate to this chapter is included hereunder. Recreation options and open spaces are discussed thereafter.

In conjunction with the permitted solar farm, the highest visual impact of the proposed development is deemed to be Slight-Imperceptible.

The impact of construction traffic on recreation, amenity and tourism as well as road safety is therefore considered to be not significant.

The impact of operational phase traffic on recreation, amenity and tourism as well as road safety is therefore considered to be not significant.

The construction phase of the proposed development will not affect recreation options and open spaces, given that the wider development site is a functional space for dedicated waste management activities. The impact is Imperceptible. The operational phase of the development will have a positive, direct, medium to long term effect on recreation options and open spaces through the continued support provided to local sporting facilities and teams by Knockharley Landfill Ltd., either through the Community Development Fund and/or through direct sponsorship. The potential impact on recreation options and open spaces in the local area is positive and slight.

5.1.5 Potential Significant Effects – Human Health

The process of estimating the probability of potential adverse health effects because of the proposed development is determined by undertaking human health risk assessment. The description of the proposed development is outline is Chapter 2 – Proposed Development.

According to the US EPA, conducting human health risk assessment includes four steps

1. Hazardous Identification
2. Dose-Response Assessment
3. Exposure Assessment
4. Risk Characterisation

The operation of waste management facilities e.g.an engineered non-hazardous landfill, IBA facility, leachate management facility and a biological treatment facility have the potential for a wide variety of exposures and exposure scenarios involving a variety of factors. Factors which can affect the likelihood of potential harmful exposure include: engineering and containment, hydrogeology and topography, the type and quantity of waste accepted leachate and gas generation.

In the absence of appropriate engineering controls and abatement, the primary risk to human health mainly associated with operation of waste facilities are discharges to air and water.

A detailed Air Quality Assessment is provided in Chapter 7 Air and Climate of the EIAR. The standards used in the air quality assessment include the Air Quality Standards Regulations 2011, which incorporate European Commission Directive 2008/50/EC, which has set limit values for the pollutants SO₂, NO₂, benzene and combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC).

The predicted impact of emissions from the biological treatment facility is predicted to be low.

Chapter 7 concludes that there is no appreciable risk of dust or PM₁₀ impacts from the construction phase of the proposed development. Construction traffic will be generated by the proposed development.

A DMRB screening model was used to estimate the baseline for CO, NO_x, NO₂ and PM₁₀ traffic emissions along proposed routes; the N2 and R150 between the N2 and Duleek during the construction phase/year 1 (2019). The assessment looked at present transport figures and estimated traffic figures for year 1 of the proposed development. Emissions were calculated at the nearest receptor/residential building; the closest sensitive receptor for the N2 was located 10 m from the national road while the closest sensitive receptor for the R150 was 3m from the regional road. Results from the screening assessment, indicate that traffic emissions during the year 1 (2019) the development will not breach Air Quality Standards Regulation 2011. According to the NRAs definition of impact magnitude as per Table 7.1, during 2019 (year 1, proposed development), the increase/decrease in NO₂ and PM₁₀ along the N2 and R150 will be imperceptible.

No odour generation will be associated with the construction phase of the proposed development. The overall conclusion of the odour impact assessment is that the development will have a beneficial effect on odour exposure and impact risk in comparison to the do-nothing scenario in the next four years. A residual risk of impact will remain to up to 4 no. properties during this period and up to 6 no. properties until the landfill is completed, based on application of the precautionary indicative odour impact criteria applied in the study.

The construction activities and waste management activities will occur simultaneously, and the cumulative noise impact from the construction activities and the ongoing operations at Knockharley landfill are appraised against noise limits from BS 5228-1:2009+A1:2014.

A conservative assumption was made that mobile plant will operate for a percentage on-time of 80% unless stated otherwise.

Mobile plant was located such that the distance between the respective construction activity and the nearest receptor was at a minimum. In practice, mobile plant will not operate simultaneously and the distance between the plant and the nearest receptor will often be greater than the distances used in the noise model. Hence, it is expected that the potential noise impact will be low.

The potential effect on water is assessed in Chapter 12 Hydrology and Surface Water Quality of this EIAR and on groundwater in Chapter 11 Land, Soils and Geology. During the construction period, the development has the potential to lead to impacts on surface water quality and groundwater unless appropriate mitigation is applied. The potential impacts in the absence of mitigation are Slight to Not Significant.

5.1.6 Mitigation Measures– Population

No mitigation measures are proposed in relation to population, given the lack of significant direct construction and operational phase effects resulting from the proposed development.

No traffic mitigation measures are required to facilitate the proposed development, save for a commitment to adhere to the existing HGV routing arrangements.

5.1.7 Mitigation Measures– Land Use

No mitigation measures are proposed in relation to land use, given the lack of significant direct and indirect effects on land-use beyond the proposed development boundary.

5.1.8 Mitigation Measures– Socio-Economics, Employment and Economic Activity

No mitigation measures are proposed in relation to local employment and economic activity as the proposed development is considered as having positive, direct and indirect effects during the construction and operational phases.

5.1.9 Mitigation Measures – Recreation, Amenity and Tourism

No specific mitigation measures are proposed in relation to recreation, amenity and tourism given the lack of significant direct or indirect construction and operational phase effects resulting from the proposed development on recreational activity and open spaces.

5.2 Mitigation Measures – Human Health

Appropriate mitigation measures for potential significant effects on population and human health associated with noise, air, surface water, groundwater and soil are identified in full in their respective chapters of this EIA.

5.2.1 Residual Effects after Mitigation

There are no specific mitigation measures proposed with regard to population, land use, socio-economics, employment and economic activity or Recreation, Amenity and Tourism. The residual impacts for these sections are therefore the same as those detailed in section 6.5. However, as stated previously human health also interacts with many other aspects of the environment. The residual and cumulative impact in relation to these aspects are detailed in the relevant sections of this Non-Technical Summary:

- Air and Climate
- Roads, Traffic and Transportation
- Noise and Vibration
- Hydrology and Surface Water Quality and Groundwater Quality
- Landscape and Visual Impact Assessment.

5.3 Impacts on Air Quality and Climate

Odournet UK Ltd. was retained to carry out an air quality impact assessment of the proposed development at Knockharley Landfill. Fehily Timoney and Company provided input to the chapter for the climate impact assessment, dust impact assessment and landfill gas prediction modelling. This chapter examines the potential construction and operational impacts of the proposed development on climate and air quality in the surrounding environment and proposes mitigation measures. The air and odour emissions associated with the proposed development have been assessed using computer modelling which calculates the potential impact at nearby sensitive receptors. The impact assessment was carried out with regard to current relevant standards and guidance and to responses received from consultation relating to air quality and climate.

5.3.1 Existing Environment

From the perspective of air quality pollutants, the site is located in rural Ireland (including towns with a population of less than 15,000). Existing monitoring data collected at the nearest EPA monitoring station over the last 3 years indicates that the measured background concentrations of relevant pollutants are substantially below their applicable limit values and Air Quality Standards. Under the existing IE licence conditions, there is a requirement to monitor dust deposition, PM₁₀, landfill gas, emissions from the landfill gas flares and utilisation plant, as well as volatile organic compounds (VOC) from the surface of the landfill. There have been no exceedances of the emission limit values in the licence that are attributable to site activities.

5.3.2 Potential Impacts

The main issues examined with respect to the potential impacts from the proposed development on air quality and climate are:

- vehicle emissions
- dust/particulate emissions
- landfill gas utilisation emissions
- process emissions
- odour emissions

The appraisal of the potential impact of dust has been carried out in accordance with guidance produced by the UK Institute of Air Quality Management (IAQM)¹. The appraisal of vehicle emissions has been carried out using the UK Highways Agency's DMRB² model to predict vehicle emissions. Air dispersion modelling was carried out using AERMOD.

Climate

A desktop assessment of the potential impacts on climate was carried out. During the construction phase of Knockharley Landfill there will be an imperceptible impact on the general and national climate. During the operational phase, the proposed development will positively impact the local and national climate. Benefit to the climate will be by reducing the emission of greenhouse gases by diverting biodegradable waste from landfill for treatment and by the generation of energy in the landfill gas utilisation plant and the subsequent savings of fossil fuels at a power plant.

Air

Dust Emissions

The risk posed from earthworks, construction and trackout activities during the construction phase and operational phase is deemed to be Low Risk.

With regard to ecology, the risk from earthworks, construction and trackout activities during the construction phase and operational phase are deemed to be Negligible as ecologically sensitive receptors are located outside the zone of potential impact from dust and PM₁₀.

Mitigation measures to be implemented during the construction and operational phases are outlined in detail in Volume 2 of this EIA. Examples include a dust control plan, covered loads, use of vehicle wheel wash, the spraying of access roads and internal site roads during periods of dry weather to prevent dust migration from the site, monitoring in accordance with IE licence, the implementation of a speed limits on facility roads and regular inspections to mitigate dust nuisance.

Following the implementation of mitigation measure, no adverse impacts on receptors will arise from dust generation. The residual effects of dust generation at the site are considered to be 'not significant.'

Vehicle Emissions

Predicted vehicle emissions associated with the proposed development during the construction phase will be comfortably within the relevant air quality guidelines and will have an imperceptible impact on ambient air quality. During the operation phase there will be an imperceptible impact the N2 national road and an imperceptible/negligible impact on the R150 regional road. No mitigation measures are required.

Landfill Gas Utilisation Emissions

The results of the modelling assessment indicate that predicted emissions are compliant with the statutory limits set out in the EU Ambient Air Quality Directive (EU 2008/50/EC) and other relevant standards (2004/107/EC, the Air Quality Standards and Environment Agency guidance) at any nearby sensitive receptors and will not impact significantly on the ambient air quality of the area. On this basis the significance of impact of emissions from the gas utilisation plant on human health is considered to be 'Not significant' and on local designated habitats is 'Imperceptible'.

Biological Treatment Facility Emissions

The predicted impact of emissions from the biological treatment facility is predicted to be low.

Odour Emissions

No odour generation will be associated with the construction phase of the proposed development. No mitigation measures are therefore proposed for this phase.

¹ IAQM.2014. Guidance on the assessment of dust from demolition and construction version 1.1. www.IAQM.co.uk

² Design Manual for Roads and Bridges (DMRB) (Volume 11, Section 3 Air Quality, May 2007), UK Highways Agency

The proposed changes in operation to Knockharley landfill to accept 440,000 tpa of varying types of waste has the potential to influence odour emissions generated from the site in three fundamental ways:

1. The construction of a biological waste treatment facility will introduce new sources of odour to the site which may act in combination with emissions generated from landfilling activities.
2. The quantity and quality of the waste received at the site will change and over time the location of the operational area will change as the site develops. This includes construction of an IBA facility.
3. The construction of leachate storage tanks to store the increased leachate generated from the increased acceptance of waste.

The odour impact assessment considered the odour emissions and exposure levels under the following operational scenarios:

- Scenario 0: Baseline conditions in 2018.
- Scenario 1: Year 4 'do nothing'. The situation which is likely to occur in the final active deposition stages of the landfill if it continues to operate in line with current planning and licence conditions (i.e. the development does not go ahead).
- Scenario 2: Year 4 of proposed development.
- Scenario 3: Year 6 of proposed development. The situation which will occur in the final stages of the landfill if permission is granted.

It is noted in Chapter 7 of this EIAR, that whilst examples are provided of the industries which may generate odours that fall into each offensiveness category, the guidance does not specify specific criteria for all industrial sectors. It is also important to note that the criteria are intended as indicative benchmarks for development of odour impact *risk*, but are not absolute standards and may vary due to local factors such as population density, complaint behaviour, receptor sensitivity etc. Selection of an appropriate criteria is therefore a matter of specialist judgement.

IAQM guidance states that based on the current evidence available to the authors, odour annoyance can develop at odour exposure levels of between $C_{98, 1\text{-hour}} = 1 \text{ ouE/m}^3$ to $C_{98, 1\text{-hour}} = 10 \text{ ouE/m}^3$ depending upon the offensiveness of the odour and local conditions. Matrices are provided in Chapter 12 which outline the possible effect of odour exposure on receptors with different sensitivities (i.e. odours that are classified as 'most offensive' and 'moderately offensive'). In these matrices the likely effect is considered at different exposure levels and receptor sensitivities, ranging from negligible to substantial. Where the effect is above 'slight', it is likely to be considered significant in EIA terms.

For the purposes of comparing the impact risk between the various operational scenarios studied in this case and evaluating the potential significance of impact in EIA terms, the following criteria for assessing potential have been applied:

- Landfilling operations (high offensive odours) threshold: $C_{98, 1\text{-hour}} \geq 1.5 \text{ ouE/m}^3$.
- Biological treatment facility emissions (moderately offensive odour) threshold: $C_{98, 1\text{-hour}} \geq 3 \text{ ouE/m}^3$.

Under baseline conditions (Scenario 0), emissions from landfilling activities are predicted to be higher than for the future operational scenario (year 4) under current licence conditions (Scenario 1). This is linked to the current gas generation rates and number of cells currently with intermediate capping in place. Going forward, it is assumed that all cells will have permanent capping applied within a year of filling thus reducing potential fugitive emissions released to atmosphere.

The total emissions generated from the landfilling operations are predicted to decrease as a result of the proposed development in comparison to the current operational scenario (Scenario 0) and year 4 operation if the proposed development does not go ahead (Scenario 1). This is due to the enhanced containment of landfill gas emissions which will be achieved by the proposed development.

In overall terms, the emissions from the proposed development are predicted to increase due to the inclusion of a new biological treatment facility (Scenario 2 and 3).

However, enhanced odour control techniques provisions will be provided to ensure any odours from this facility are treated prior to release through an elevated stack which will serve to disperse residual odours in the atmosphere. The offensiveness of the odours released will also be lower due to the nature of the treatment process and treatment of the air prior to release in a biofilter.

It is therefore evident that the development will lead to an overall reduction in offsite odour exposure and impact risk in comparison to the baseline and the 'do nothing' situation, up until 2022, when the existing planning approval expires. A potentially significant risk of odour impact will remain to a handful of properties to the north of the site during the remaining life of active deposition and subsequent completion of permanent capping which is estimated to be in the order of 2 no. years.

Although an odour exposure of $C_{98, 1\text{-hour}} \geq 1.5$ is considered 'significant' according to IAQM planning guidance criteria, and in Odournet's experience it is possible for a significant adverse odour impact to develop at exposure levels as low as $C_{98, 1\text{-hour}} \geq 1.5 \text{ ou}_E/\text{m}^3$, it should be noted that such instances are relatively rare and hence the thresholds should be considered as precautionary.

The overall conclusion of the odour impact assessment is that the development will have a beneficial effect on odour exposure and impact risk in comparison to the do-nothing scenario in the next four years. A residual risk of impact will remain to up to 4 no. properties during this period and up to 6 no. properties until the landfill is completed, based on application of the precautionary indicative odour impact criteria applied in the study.

5.3.3 Mitigation Measures

Dust Emissions

The developer in association with the contractor will develop and implement a dust control plan. It will include procedures for inspections of roads and vehicles, spraying during dry weather, site speed limits, vehicle wheel wash, planting of berms and monitoring of dust levels to ensure measures are effective.

The facility is currently operating and carrying out construction activities (cell construction and landfill capping) in compliance with dust and PM_{10} limits in the licence. The measures employed under current operating conditions will be continued and additional control measures will be initiated for the proposed development. These include weathering of IBA under cover, handling of IBA at an appropriate moisture content, waste loads will be covered, biofilter to remove dust emissions generated from the biological waste treatment building and therefore preventing any release of dust to the atmosphere. All waste handling at the biological waste treatment facility including handling of finished product will be carried out indoors under negative air pressure and the building will be fit with fast action roller shutter doors.

Operation Phase – Gas Plant Emissions

Predicted emissions from the landfill gas plant onsite are within the relevant air quality guidelines and therefore will not have a significant impact on ambient air quality. Servicing of the landfill gas utilisation plant will be carried out in accordance with the manufacturers recommendations.

Odour Emissions

The proposed operations at Knockharley will involve the following activities that have the potential to generate odour emissions:

- Reception of MSW fines for composting within a biological treatment building
- Landfilling of waste and fugitive emissions associated with landfill gas

However, in accordance with best practice a range of odour control measures, which are included in the mitigation measures identified below, will be incorporated into the design to mitigate such potential emissions. The odour management plan for the facility shall be updated to include odour control measures for the proposed development activities and submitted to the EPA for approval as part of the industrial emissions licence application.

To mitigate potential odour emissions from the proposed development activities the following measures will be put in place:

- A proposed filling schedule for the permitted landfill has been designed. Waste with a potential to generate landfill gas will not be landfilled north of cells 21/22, to reduce exposure to receptors to the north thus mitigation by design.
- The proposed development will use hermetically sealed geo-multicovers for intermediate capping to mitigate the potential for fugitive emissions through the intermediate capping.
- The biological treatment facility has been designed to mitigate odour emissions.
- All waste activities will be carried out within a building under negative pressure. The air in the building will be collected and treated.
- The main entrances to the building will be fitted with rapid response roller shutter doors. A closed-door management strategy will be enforced.
- Treated emissions from the odour control plant will be discharged via a 20 m stack to enhance dispersion.

5.3.4 Residual Impacts

Climate

There will be an overall positive impact on climate from Knockharley Landfill.

Air

Following the implementation of the above mitigation measures and with the implementation of good housekeeping and management procedures and techniques, it is predicted that the proposed development will not have a significant impact on ambient air quality, dust exposure or PM₁₀ exposure.

Odour

The odour exposure levels that are predicted to occur around the site as a result of landfilling operations are predicted to be lower than the current baseline and the 'do nothing' situation for the first 4 years, if the proposed development goes ahead. The development is therefore predicted to have a beneficial effect on odour exposure and impact risk during this period. The number of houses exposed to odour levels that exceed the threshold where a potentially significant risk of odour impact could develop is 4 no. residential properties in year 4 of the proposed development.

A risk of impact will remain whilst the landfill is operating beyond year 4 which is predicted to be at its highest in the final year of the landfill (year 6). Under this scenario, 6 no. properties are predicted to be exposed to odour levels that exceed the threshold where a potentially significant risk of odour impact could develop, based on application of the precautionary indicative odour impact criteria applied in the study.

The odour emissions from the biological treatment facility are not predicted to pose any risk of impact at any area within or outside the facility

5.4 Impacts on Roads, Traffic and Transportation

The site is located in the townland of Knockharley, approximately 6km south of Slane on the west side of the N2 National Primary Route. Navan is located approximately 13km to the west of the site via Balrath Cross and the R153 Regional Road. Increased traffic movements on the existing public road network will occur as a result of the proposed development during the construction, operational and decommissioning phases.

5.4.1 Construction Phase

For the purposes of this robust traffic assessment, a singular construction period of less than twelve months is envisaged for each phase as this assumes a 'worst case' construction scenario from a traffic viewpoint.

The primary generators of traffic during construction will be construction staff and the delivery of construction materials. Construction materials are expected to be predominantly structural steel, cladding and concrete for the development of the facility building and leachate plant infrastructure.

A construction traffic appraisal has indicated that 25 No. HGV trips per day would be required to cater for the delivery of these materials to the site during the most intensive construction period. This will result in a negligible, temporary direct impact on the local road network, which will be comfortably accommodated. Construction plant is expected to mainly consist of rigid body vehicles, 8-wheel tippers, ready-mix HGV and articulated vehicles.

From a sequencing and cost viewpoint, construction of new cells within the permitted footprint and construction of new cells associated with the dedicated IBA area will be undertaken as one project. Therefore, the only impact of including the construction of the new IBA cells will be a longer construction duration, which can be assumed to be a further 8 weeks – thus, the average daily traffic generation of 10No. HGV per day is assumed but over a longer construction period of approximately 18 weeks.

Following discussions with the Applicant it is our understanding that construction of new landfill cells (permitted area and IBA area) will be programmed so it is concurrent with construction activities arising from the proposed facility building and leachate plant infrastructure development

Significant roads infrastructure both within and serving the site was provided as part of the original landfill development. The existing infrastructure serving the site is provided with features (auxiliary turning lanes) designed to increase road safety and to preserve the mainline flow of traffic. An outline Construction Traffic Management Plan has been prepared as part of the outline Construction Environmental Management Plan provided in Appendix 2.0.

5.4.2 Operational Phase

The traffic associated with the operational phase of the facility will comprise of personnel working at the facility, visiting contractors, maintenance personnel and others, and HGVs delivering and removing materials from the site. LGV movements (staff, contractors, etc.) will access the facility via a ghost island priority junction on the N2.

A traffic appraisal has indicated that there will be 156 HGV movements (78 arrivals and 78 departures) and 70 LGV movements (35 arrivals and 35 departures) will arrive and depart at the landfill. This includes both the existing average and proposed assessment values provided. This includes 113 trips per day compared to the current 2016 figure of 68 trips per day.

The proposed development peak hour is not expected to correspond with the recorded network peak hours on the N2 and adjoining regional roads and this reduces the potential for conflict with commuter-based traffic and impacts upon the efficiency of the wider road network. The traffic assessment shows that the impact of the proposed development upon capacity of the local road network will not be significant. With the exception of the site access it is extremely unlikely that the impact of the development on the existing receiving road network will be perceptible to existing road users.

The proposal at the site will result in modest increases in traffic flows relative to the strategic road network serving the existing site. The impact of the proposed development on the operation of the existing receiving road network is accordingly likely not to be significant. The existing development access has not resulted in increased hazard on the adjoining national road. Given the safety record of the existing access, it is reasonable to presume that the potential intensification in vehicular use is unlikely in itself to create a significant traffic hazard.

5.4.3 Mitigation Measures

No mitigation measures are required to facilitate the proposed development, save for a commitment to adhere to the existing HGV routing arrangements.

Significant roads infrastructure both within and serving the site was provided as part of the original landfill development. The existing infrastructure serving the site is provided with features (auxiliary turning lanes) designed to increase road safety and to preserve the mainline flow of traffic and to preserve the carrying capacity of the road. This section of the EIAR demonstrates that the existing infrastructure is satisfactory for the proposed intensified use. Reserve capacity at the existing site access is likely to be in the region of 90% over the life of the development.

5.4.4 Residual Impacts

There will be no residual impacts on traffic and transportation in relation to the proposed development.

5.5 Impacts on Noise and Vibration

This chapter appraises the potential noise and vibration impacts during the construction and operation phases of the proposed development at Knockharley Landfill, Knockharley, Co. Meath. The potential noise emissions associated with the proposed development have been assessed using computer modelling which calculates the noise levels at noise sensitive locations in the vicinity of the development. The assessment includes the cumulative noise levels of the proposed development as well as the existing landfill operations and associated activities.

5.5.1 Receiving Environment

The existing environment within the Knockharley landholding includes noise from the existing landfill and rural type sounds such as bird calls, noise from livestock, occasional farm activity, traffic on local roads and occasional noise from aircraft overhead. To the east of the site, traffic noise from the N2 National Primary route is more significant.

Quarterly noise monitoring is ongoing in accordance with the EPA IE licence and it is undertaken at four boundary locations. The results of the most recent surveys (2015 to Q3 2018) have been reviewed and confirm that the site is compliant with the daytime noise limit. There is no requirement in the EPA licence to undertake surveys during the evening and night-time periods.

5.5.2 Potential Impacts

There is potential for noise and vibration impacts during the operation and construction phases of the proposed development.

Noise during the construction phase will arise from the delivery of material to site, site clearance and preparation works, construction of the northern surface water attenuation pond, holding pond, and wetland, construction of IBA cells, construction of buildings, installation of plant, construction of haul roads and service works. Construction noise levels were predicted and the predicted noise levels from each activity as well as the cumulative noise level from construction and operational phases are below the noise limit.

Noise during the operational phase will arise from activities during the construction of landfill cells and activities including waste placement. In addition, there is potential for noise to be generated from the IBA weathering area, biological treatment facility, existing landfill gas utilisation plant and site traffic including HGVs on the site access road and moving around the site. As part of the development, earth berms are proposed along some of the site boundaries. In general, the daytime noise limit will be met. However, there is potential for short term exceedances of the noise limit during the felling of trees and installation of earth berms.

During evening and night-time periods there is no waste acceptance, however, the existing landfill gas utilisation and biological treatment facility will operate and the predicted noise levels from these activities will be below the evening and night-time noise limits.

The potential for vibration at neighbouring sensitive locations during construction and operation is typically limited to excavation works and HGV movements on uneven road surfaces. Considering the distances from the majority of works to the nearest sensitive locations, it is expected that vibration arising from operational and construction activities will not be perceptible at nearby sensitive locations, and any vibration arising from such activities will be significantly below any thresholds for structural damage to property.

5.5.3 Mitigation Measures

There are no specific mitigation measures required during the construction phase. To minimise the potential noise and vibration impacts during the construction phase a number of mitigation measures will be implemented including restricting construction traffic movements along access routes to the standard working hours and exclude Sundays, unless specifically agreed otherwise. The construction works on-site will be carried out in accordance with the guidance set out in BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites -Part 1 Noise and the noise control measures set out in Appendix 2.0 Outline Construction Environmental Management Plan (CEMP) in Volume 3 of this EIAR.

During the operational phase the predicted noise impact from the proposed development will typically be below the noise limit. There is potential for short term exceedances of the noise limit during the felling of trees and installation of earth berms. These exceedances will be for a short duration and noise impacts will be mitigated where reasonably practicable by orientating plant to minimise the noise impact, use of temporary barriers where practicable, phasing of the works, minimising the use of noise machinery and planning of berm construction to minimise impacts.

In addition to the above mitigation measurements, a number of earth berms will be constructed. The construction of Berm A will be carried out first due to the long term positive impact for receptors to the east and north east of the proposed development.

With mitigation measures, the temporary noise impact from the felling of trees and construction of berm A and B are expected to be below the noise limit. The operational noise impact from the remainder of the proposed development will also be below the daytime noise limit.

5.5.4 Residual Impacts

Noise from construction activities are expected to be below the construction noise limit at noise sensitive locations.

During the operation phase, with the implementation of the identified noise mitigation measures, the predicted noise impact will be below the daytime noise limit. The predicted noise levels during evening and night-time periods are below the noise limits and there are no residual impacts from operational phase of the proposed development.

5.6 Impacts on Biodiversity

5.6.1 Existing Environment

There are three European Sites and twelve Potential Natural Heritage Areas (pNHAs) within 15 km of the proposed development. No Candidate Special Areas of Conservation (cSACs) or Natural Heritage Areas (NHA) are located within 15 km of the site. An appraisal of the potential impacts of the proposed development on the constitutive characteristics of European sites within 15km of the proposed development at the Knockharley landfill is set out in the AA Screening Statement and Natural Impact Statement which accompany this application for permission

There are 12 pNHAs within 15km of the proposed development, however, there is only linkage to Balrath Woods pNHA, as the Knockharley Stream (Flemingstown Stream) flows through part of this site. However, this site is designated for woodland which will not be affected by the proposed development.

The habitats on the site have been modified as part of the existing landfill site development. The site surrounding the active landfill site is dominated by mixed broadleaved/coniferous woodland (WD2) which has been planted as part of the development of the site in compliance with conditions of the EPA waste licence. There are woodland classified as mixed broadleaf and conifer woodland (Fossitt Code WD2). The trees are largely less than 4-5 m in height in the still immature sections and comprise a mixture of Alder, Silver Birch, Beech and Willow species (among others). The remainder of the site which has not been planted is dominated by wet grassland (GS4) and a mosaic of wet grassland and improved agricultural grassland (GS4/GA1). Areas of improved agricultural grassland (GA1) are located around the administration buildings, landfill gas compound and in the northeast of the site. The field boundaries on the site comprise hedgerows (WL1) predominantly and some treelines (WL2) also occur in the northern and eastern portion of the site.

In 2010 a total of 7 mammal species were recorded on the site during the site walkover. In 2015 four mammal species were recorded during the site visit. Fox scat and trackways, small Badger latrine and trackway, evidence of Otter and Brown Rat were all observed during the survey. No Badger setts were found on the site and no evidence of breeding Badgers or Otter was found on the site. Also, a Hare track was recorded along the fence line. Other species not recorded on the site, but which are likely to occur are Pygmy Shrew (*Sorex minutus*), Irish Stoat (*Mustela erminea hibernica*) and Hedgehog (*Erinaceus europaeus*).

Three Butterfly species were recorded as well as a Ladybird species, a species of Bumblebee and Common Frog. The Common Frog is protected by the Wildlife Act (1976 and Amendment 2000). Common Frog is also listed as a species of International Importance in the Irish Red Data Book (Whilde 1993) and as species of community interest under Annex V of the EU Habitats Directive. Common frog is still present on site in suitable habitat as frog spawn was identified in Otter prey remains during the site visit in March 2015.

A total of 24 bird species were recorded during avian surveys on the site in 2010 (FTC 2010). A further 2 species were recorded in March 2015 and a further 9 species in 2016.

5.6.2 Potential Impacts – Construction Phase

As the site is not contained within a designated conservation site, there will be no direct impacts to designated sites as a result of construction of the proposed landfill cells and berms and no connection exists between the site and designated conservation sites within 15km – a tributary of the River Nanny flows through Balrath Woods pNHA, however, this site is not designated for aquatic species.

In terms of habitats, the construction of landfill cells for the IBA and a surface water pond will result in a loss of agricultural grassland. This habitat is not of high ecological value and therefore the impact can be described as slight and permanent. In terms of habitats, the construction of the IBA facility, biological treatment, surface water infrastructure and berm creation will result in a loss of agricultural grassland (GA1/GS4), wet grassland (GS4), mixed broadleaved/coniferous woodland (WD2) and deciduous woodland (WD1) and section of hedgerow (WL1) and treeline (WL2). Agricultural grassland is not a habitat of high ecological value and therefore the impact can be described as slight and permanent. The removal of hedgerow (WL1) and treeline (WL2) will be limited. These habitats provide cover and foraging habitat to local wildlife. Prior to mitigation the loss of these habitats will have a Permanent Moderate Impact. Improved agricultural grassland/wet grassland mosaic (GA1/GS4) is of Local Importance (lower value) and its loss will have a Permanent Slight Impact.

In relation to the construction of the berms to the east of the IBA cells and to the west and south of the site, this will result in the loss of deciduous and coniferous trees which are relatively young, however these habitats do provide cover and foraging habitat for fauna. With replanting taking into account, as well as the phased manner in which felling will take place, and the young age of the forestry, the impact on broadleaved/coniferous woodland (WD2) and deciduous woodland (WD1) is deemed to be a Short-Term Moderate Impact. As woodland on site is for commercial timber production, felling and replanting will occur whether the proposed development goes ahead or not.

Construction of the facility processing building, and extension of the leachate management will result in the loss of a mosaic of improved agricultural grassland and wet grassland, resulting in a slight impact which will be permanent. No protected flora was identified within the site and therefore there will be no impact to protected flora as a result of the proposed development.

The mammal species recorded on the site are not of high conservation concern and they are likely to be common and widespread in the surrounding environment. The proposed location of the landfill cells for IBA is proximal to an area where badger evidence (latrine) was located, however no evidence of breeding was recorded (setts) and therefore no long-term impacts are predicted. There will be slight temporary disturbance impacts during construction, as badgers are likely to avoid this area. A number of mature trees were identified along the periphery of the planted woodland to the west of the site which have the potential to support bat roosts. Without the inclusion of mitigation measures, impacts to bats as a result of felling could potentially be significant.

No Annex 1 birds of the EU Birds Directive were recorded on the site. Three *red-listed* species of conservation concern (Meadow Pipit, Herring Gull and Black-headed Gull) were recorded from the subject site. The construction phase of the project will have the highest potential impacts on bird species in terms of disturbance and loss of nesting habitat. The construction phase will be temporary and will take place in a phased manner, which will allow disturbed birds to relocate to alternative suitable habitats on the site. For the proposed construction of the berm around the site, a large number of trees (immature / young) will need to be removed. This area will be replanted following construction, however, as it will take a number of years for the trees to mature, the impact on nesting birds is considered to be moderate and short-term.

5.6.3 Potential Impacts – Operational Phase

There will be no direct impacts to designated conservation sites during the operational phase, as the proposed development is not located within a designated conservation site.

The operational phase will have a lesser potential impact on the local ecology than the construction phase. Following the completion construction, the area shall be landscaped. There shall be no further habitat loss during the operational phase of the proposed project, and therefore no further impacts on habitats. During the operational phase, a positive impact will be the growth of the newly planted trees on the berms to the south, west and north east of the site which will provide cover and foraging habitat for fauna.

During the operational phase, mammals are likely to continue to use the site and the new woodland created will provide habitat for cover and foraging. Also, as the replanted trees mature, they will provide nesting habitat for birds, which is a slight positive impact.

5.6.4 Mitigation Measures

Mitigation measure during construction of the proposed development will be employed to protect against potential impacts on habitats, flora & fauna and water quality. A project ecologist will firstly be appointed to oversee all works. He/she will have the authority to stop construction activity should it have the potential to result in significant adverse ecological impacts.

To minimise disturbance to habitats and flora, the area of the proposed works will be kept to the minimum necessary. Regular ecological walkover surveys shall be undertaken by the project ecologist to examine the area for newly established invasive species.

To minimise disturbances to mammals, construction operations will take place during daylight hours to minimise disturbances to faunal species at night.

Toolbox talks shall be given to all construction staff entering the site to ensure that they are made aware of the potential impact to badgers and the local ecology of the site. The conditions of the bat derogation licence for the site will be adhered to in full. As per recognised guidelines a pre-construction mammal survey will be undertaken to reconfirm the finding of the preplanning surveys. EIA

The removal of vegetation and scrub will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive) so as to protect nesting birds. The demolition of the buildings containing breeding birds will also not occur during the breeding season. Construction operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species.

5.6.5 Residual Impacts

A certain amount of permanent habitat loss will be associated with the footprint of the proposed development; however, this will be small relative to the habitats available on the site.

With the application of the above mitigation measures there will be no significant residual impacts of this development. The residual impact is assessed as being imperceptible.

5.7 Impacts on Land, Soils and Geology

Chapter 11 of Volume 2 of this EIA presents the existing environment, the potential impacts and mitigation measures relating to the proposed development. This chapter also incorporates groundwater.

5.7.1 Existing Land, Soils and Geology

The site is underlain by overburden comprising of glacial till predominantly derived from the underlying Namurian shales and sandstones, with the southern part of the site being underlain by tills derived from Carboniferous limestone. Two narrow swathes of alluvium deposits are identified within the southern section of the site and along the northern boundary, with glacial till derived from the Limestone identified to the south of the site. Historical site investigations indicate that the glacial tills vary in thickness from 12 to 21.5 m across the site, with the thickest deposits being encountered to the west and thinnest to the east of the site.

The underlying bedrock comprises the Carboniferous aged (Namurian) Limestone Balrickard Formation. The Balrickard Formation is underlain by similar strata to the north and south belonging to the Donore Formation and passes up into similar rocks of the Walshstown Formation to the northeast.

The Balrickard Formation underlying the site is classified as a Poor Aquifer (PI). A Poor Aquifer is generally unproductive except in local zones with the average groundwater recharges rate for the underlying aquifer is 34 mm per year. The GSI classifies the site as 'Low Vulnerability' to groundwater pollution due to the relatively thick cover of low permeability Glacial Till (boulder clay) in the area.

The site is not located in an area of specific geological heritage interest. The nearest site of significant geological heritage features fields of mega-fluting, located approximately 800 m to the east of the site. This geological feature covers 115 km² area and forms part of the largest field of such features in Ireland.

Baseline groundwater monitoring was undertaken to establish baseline conditions prior to the acceptance of waste. Monitoring was undertaken in both shallow and deep boreholes across the site. The groundwater in the overburden is characterised by naturally elevated sodium, potassium and sulphate levels.

The groundwater in the bedrock displays a similar natural groundwater signature to the overburden groundwater with elevated sodium, potassium and sulphate levels. The presence of a thick, low permeability till layer overlying the bedrock aquifer is reflected in the low total organic carbons, chloride and nitrate values. The elevated manganese levels again are a characteristic of the Namurian rock type with the reducing conditions encouraging the mobilisation of this metal in the groundwater regime.

5.7.2 Potential Impacts

Soils, geology and groundwater may be impacted from a number of on-site activities. The main potential impact to soils and geology is associated with excavation and removal of topsoil and subsoil during the construction phase of the IBA Facility, northern Surface Water Management infrastructure, leachate management facility, biological treatment facility and ancillary infrastructure including roads, drainage, etc. The development of the IBA facility will involve a significant amount of excavation works comprising the removal of till material to a depth of approximately 7.0m BGL across an area of 57,829m².

The magnitude of these potential impacts to soils and geology, prior to mitigation, is considered to be of moderate significance.

The proposed development also includes the development of screening berms of the northern and western boundaries of the site and to facilitate it, felling is required. The berms will be replanted. Forestry felling, if not properly mitigated, could cause or contribute to ground condition instability due to ground vibration and ground loading from tree felling equipment. The potential impact of forestry felling on soils and geology is considered to be minimal.

As outlined above a significant proportion of the glacial till will be removed during the construction phase of the proposed development. This may result in the exposure of the weathered bedrock to sources of contamination and may temporarily increase the vulnerability of the underlying aquifer. However, given that 10m - 15m of glacial till is present below the site the impact is unlikely to be significant. The excavation into the glacial till will result in some local lowering of the shallow subsoil water table and the piezometric surface in the bedrock. The construction works may impose hydrogeological impacts in the absence of mitigation by modifying the natural seepage of the soils, which may deprive ditches and streams of their natural supply of water which may lead to a reduced baseflow and reduced recharge to the bedrock aquifer.

The construction of additional drainage channels and other infrastructure may result in localised drawdown of the water table and, where gravel is used during construction, may also result in localised preferential drainage pathways.

The magnitude of these potential impacts to the hydrogeological regime, prior to mitigation, is considered to be of slight significance.

5.7.3 Mitigation Measures

With regard to the proposed development, detailed design best practice will be implemented. Examples of such best practice include the use of a suitably qualified and experienced geotechnical engineer or engineering geologist and the completion of a design risk assessment and method statement for all works.

A number of mitigation measures will be taken to reduce impacts on soils and geology from the proposed development. These mitigation measures are outlined in detail in Volume 2 of this EIA. Examples of some of the main mitigation measures are presented below.

The development will be constructed in a phased manner to reduce the potential impacts of the development on the soils and geology. Phased construction reduces the amount of clearing and soil excavation required at any one time. One of the primary mitigation measures employed at the preliminary design stage is the minimisation of volumes of soil excavation. Excavated overburden soils will be reused as far as possible.

To mitigate against erosion of the exposed soil or rock, all excavations will be constructed and backfilled as quickly as possible. Excavations will stop during or prior to heavy rainfall events. To mitigate against possible contamination of the exposed bedrock/aquifer, refueling of machinery and plant will only occur at designated refueling areas. Refueling will be conducted from refueling trucks with drip trays and spill kits available. A designated refueling area will be located at the site compound.

5.7.4 Residual Impacts

As a result of the mitigation measures being implemented, the proposed development is expected to have a low impact on the receiving environment.

The proposed development is not expected to contribute to any significant, negative cumulative effects of other existing developments in the vicinity. When the mitigation measures are implemented in full, any effects on the receiving environment will be of minor significance.

5.8 Impacts on Hydrology and Surface Water Quality

5.8.1 Existing Hydrology and Surface Water Quality

The proposed development site, lies within Hydrometric Area HA 08 known as the Catchment of Nanny-Delvin of the Irish River Network and is under the new single River Basin Management Plan for Ireland which is the responsibility of the Water Policy Advisory Committee. The Midlands and Eastern Water and Environment Committee will have responsibility for regional delivery and implementation. The site is situated within the waterbody catchment as defined by the EU Water Framework Directive (WFD - 2000/60/EC) as the Nanny-Delvin IE_EA_08_352 The risk status and water quality of riverbodies are taken from www.catchments.ie.

The Knockharley or Flemingstown stream was diverted around the footprint of the site towards the north of the waste disposal area during previous construction and the connecting drainage channels were redirected to maintain the current drainage level. The Knockharley or Flemingstown stream entering the site from the western boundary at Knockharley is a 1st order tributary of the River Nanny. A second tributary, the Kentstown Stream flows east along the southern licensed boundary before turning south and joining the Veldonstown Stream, just upstream of its confluence with the Knockharley or Flemingstown Stream.

A water quality monitoring programme was established by the Environmental Protection Agency (EPA) under the WFD to determine the status of the waterbodies. Whilst the most recent results in 2014, represent 'Poor' water quality status under the water framework directive, because the upstream and downstream observations are similar, poor quality status arises from influences external to and upstream of the existing and proposed development.

Drainage from the existing landfill facility is directed towards a storm water attenuation pond and afterwards to a constructed wetland before it flows into the local drainage network which in turn flows into the Kentstown Stream.

The storm water attenuation pond is sized to receive all surface water run-off from the existing development and to hold it to allow suspended solids to settle and to control the rate of discharge from the site. There is continuous monitoring at the outlet of the pond with an automated shut-off valve. The constructed wetland further polishes the water.

5.8.2 Proposed Development

The proposed development is summarised in Section 1 of this non-technical summary. It is proposed to develop a second surface water attenuation pond, wetland and outfall on the northern boundary of the facility along with a flood compensation culvert and compensation storage area for a 1:1000-year flood event. Surface water from the proposed infrastructure development will be directed to either the northern or southern attenuation pond.

5.8.3 Potential Impacts – Construction Phase

In the absence of mitigation measures, the following potential impacts on hydrology and surface water quality during construction have been identified. The significance prior to mitigation is noted.

- Increased run-off – Not significant
- Flooding – Slight
- Sediment loading - Slight
- Nutrient loading - Slight
- Spills – Not significant
- Erosion and sedimentation within the stream - Slight

5.8.4 Potential Impacts – Operational Phase

During operation and maintenance there is potential for the following impacts on hydrology and surface water in the absence of mitigation measures. The significance prior to mitigation is noted.

- Uncontrolled release of leachate - Slight
- Increased run-off - Slight
- Flooding – Not significant
- Sediment and nutrient loading - Slight
- Cumulative impacts with other developments -Not significant

5.8.5 Mitigation Measures – Construction Phase

A number of mitigation measures relating to surface water and drainage will be implemented during the construction phase so as to protect the receiving waters from potential adverse impacts. These mitigation measures are outlined in detail in Volume 2 of this EIAR. Examples include the excavated subsoil material will be removed and utilised in the soil infill area and to form the screening bunds, the refueling of plant within designated refueling areas and the training of all personnel working on site in in pollution incident control response and a new attenuation pond will be put in place at the commencement of construction at the site. The existing attenuation pond to the south of the site together with the new pond will mitigate any increase in run-off. There will be measures to prevent runoff erosion from vulnerable areas and consequent sediment release into the nearby watercourses to which the proposed development site discharges.

An outline of the construction environmental management plan which will be implement during construction details proposed mitigation measures. This is included in Appendix 2.0 of Volume 3 of this EIAR.

5.8.6 Mitigation Measures – Operational Phase

The surface water management system will mitigate any potential impacts on hydrology and surface water quality during the operational phase. A four-stage treatment train (swale – holding pond- attenuation – wetland will mitigate the potential impacts of increased run-off and sediment loading on watercourses from the proposed development. Leachate and surface water will continue to be managed in accordance with the IE licence for the facility. The design of the proposed leachate and surface water management infrastructure will be subject to EPA approval prior to construction.

The drainage has been designed to operate effectively during the operation period. Surface water run-off will discharge to the drainage swales during rain events. During the operation, period the swales will have vegetated and will serve to further attenuate flows and reduce the amount of sediment discharging from the site. The attenuation pond will be a permanent feature and will continue to be effective in filtering the run-off from the site.

Surface water will be visually inspected as part of the operational site walkovers on a weekly basis. There will be continuous monitoring of surface water quality at the outfall from the surface water attenuation ponds to the wetland. Routine surface water sampling is and will continue to be carried out in accordance with the licence which includes the submission of interpretive reports to the EPA for approval. Any incidents shall be notified to the EPA in accordance with the licence.

The potential impact post mitigation on hydrology and surface water is Not significant.

5.8.7 Residual Impacts

The residual significance of the effects of the proposed development on downstream receptors post mitigation is considered to be Not Significant.

All mitigation systems as appropriate will be put in place in advance, as construction progresses across the site. It will be the responsibility of the developer to ensure that these facilities are put in place and a suitably qualified person will be appointed by the developer to ensure their efficient operation and maintenance.

5.9 Impacts on Landscape and Visual Assessment

5.9.1 Existing Landscape

The existing Knockharley Landfill site comprises 135.2 hectares (333-acre site) with the existing landfill footprint positioned near the centre of the landholding, aligned approximately north-south through the centre of the site.

The landfill site itself is generally characterised by the field network pattern of the wider landscape setting into which the landfill cells and associated infrastructure and facilities have been placed. While this has necessitated the removal of part of the hedgerow landscape infrastructure, significant sections of it remain on the site and additional structure planting has been undertaken since the commencement of landfill operations, particularly along the boundaries to provide screening and a suitable buffer between the site and residences associated with the local road network.

The site is contained in a generally flat and gently undulating terrain, between the River Boyne to the north and the River Nanny to the south. The River Boyne and the River Nanny are the principal watercourses within the study area. The general topography of the area is low-lying. The landfill site is located within the catchment area of the River Nanny which flows west to east some 1.5 km to the south. The site is sloped with elevations ranging from 70 mOD in the north west to 55 mOD in the south east of the site. The site is a mix of constructed landfill and associated facilities with some woodland and wet grassland. The vast majority of the 5 km radius study area is farmed landscape consisting of fields of crops and pastures.

The visual envelope is the extent of potential visibility of the site to or from a specific area or feature. The visual envelope for the proposed development will be defined by views from:

- the local CR384 road to the east, south west, west and north of the development site
- the R150 regional road directly south of the development site

A Landscape Character Assessment was prepared for County Meath in 2007 and this is incorporated into the County Development Plan 2013–2019 as Appendix 7. The Landscape Character Assessment identifies four generic Landscape Character Types (LCT's) for the county including; Hills and Upland Areas; Lowland Areas; River Corridors and Estuaries and; Coastal Areas. The site is fully contained within the 'Lowland Landscape'. These LCTs are sub-divided into 20 geographically specific landscape character areas (LCAs) and the existing and proposed development is in LCA 6 Central Lowlands, which is of the "Lowland Areas" LCT.

A number of recommendations are outlined in relation to LCA 6 including among them, the recommendation to "*maintain the visual quality of the landscape by avoiding development that would adversely affect short range views between drumlins*".

5.9.2 Potential Impacts

The proposed development will continue the emerging trend within Knockharley Landfill landholding. The main landscape impacts associated with the proposed development will be the removal of existing woodland boundary planting and the construction of soil berms in the west and north of the site. The soil berms will be replanted with forestry. The proposed development will not result in significant changes in the size, elevation or landscape character and will continue to alter the landscape character in a same degree as before. In distant views the proposed biological treatment facility is well integrated due its low position on the site and the adjacent existing screen vegetation. In conjunction with the permitted solar farm, the highest visual impact of the proposed development is deemed to be Slight-Imperceptible from two Viewpoints.

5.9.3 [Mitigation Measures](#)

Avoidance and reduction mitigation measures integral to design of the development are the primary means of mitigation proposed. These measures include:

- The biological treatment facility is positioned in a naturally low area of the site to improve screening by the existing vegetation;
- Maintenance of existing screening berms and planting to the south.
- Replanting of forestry felled to facilitate construction of screening berms on the western and north eastern boundary
- Enhancement of the planting on top of the existing berm on the eastern boundary;
- The filled landfill cells 27 and 28 will provide screening for landfilling activities south of those cells;
- The filled IBA cell 29 will provide screening for IBA facility activities west of that point; and
- Careful selection of colour finishes for elevations of the proposed buildings in adherence with the Development Management Standards and Guidelines of the Meath CDP 2013 – 2019 will provide additional visual impact mitigation.

5.9.4 [Residual Impacts](#)

No significant residual impacts are envisaged after mitigation as outlined.

5.10 Archaeology, Architecture and Cultural Heritage

5.10.1 [Existing Environment](#)

There are no Recorded Monuments within the proposed development area or the 1 km study area. The closest Recorded Monument (RMP ME026-030) is located approximately 1.3 km west of the landfill site boundary and takes the form of a possible ringfort.

5.10.2 [Potential Impacts](#)

Fieldwork previously carried out for the phased development of the Knockharley landfill site has revealed substantial archaeological remains within the immediate vicinity of the proposed development area. As such, it is considered there is a potential direct construction impact on previously unrecorded archaeological remains of unknown significance.

There will be no direct or indirect operational impact on the archaeological, architectural or cultural heritage resource.

5.10.3 [Mitigation Measures](#)

It is proposed that a programme of pre-development test trenching be carried out after the geophysical survey has been completed and within all areas of proposed land take.

Test trenching will take in to account the results of the geophysical survey and will be carried out under licence to the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and the National Museum of Ireland.

5.10.4 [Residual Impacts](#)

There will be no residual impacts on archaeological, architectural or cultural heritage remains after mitigation measures have taken place.

5.11 Impacts on Material Assets

5.11.1 Existing Material Assets

An overhead 220 kV ESB line runs north-south across the site along the western boundary of the landfill footprint. A 20 kV ESB line also runs north south on the eastern boundary parallel to the existing local road. This line provides electricity to the local community as well as supplying the existing landfill site.

A 20kV ESB substation is located within the existing landfill gas compound onsite. This substation allows electricity generated from the onsite landfill gas engines to be transferred to the national electricity grid. A 20kV ESB line connects the onsite substation to the nearby 20 kV ESB line.

There is an existing Bord Gais gas pipeline running west to east through the south of the site just south of the existing landfill footprint and north of the existing surface water lagoon.

Telecommunications are provided to the local community and also service the main administration buildings onsite. A source of potable water for use in the canteen, welfare facilities and for general site cleaning is sourced from the mains supply. This water source also provides water to a fire hydrant onsite.

The entire development site and a number of immediate surrounding agricultural fields are owned by the applicant; Knockharley Landfill Ltd. Access is via a dedicated entrance off the N2 national primary route. A number of dwellings adjacent to the development site boundary are also owned by the applicant, Knockharley Landfill Ltd.

Fossil fuel use at the site in 2017 was 426 m³ of light fuel oil, while 4,180 m³ of water and 170 MWh of electricity was used. The existing site itself is a renewable energy source. There is a landfill gas utilisation plant on site, which has been operational since the mid 2000's. Landfill gas engines in the utilisation plant allow the landfill gas produced onsite to be utilised in the production of renewable electricity for export to the national grid. In 2017, renewable electricity output from the gas engines was 18,872 MWh.

5.11.2 Potential Impacts

There are potential slight, direct impacts in the absence of mitigation measures during construction on site due to the location of the 220 kV ESB line running across the site along the western flank. Construction activities will take place in the vicinity of the power lines and in the absence of appropriate controls, could directly damage a power line, potentially creating a temporary power cut to the site and the local community.

There will be a direct, slight impact on power supply to the landfill administration buildings and potentially within the wider locality for a short period of time resulting from the relocation of the existing 20 kV ESB lines that run along the eastern boundary of the site, to facilitate berm construction directly to the east of the IBA cell facility and during connection of the two proposed ESB substations.

Similarly, unmitigated excavation activity in the vicinity of the Bord Gais pipeline onsite has the potential to interrupt gas transmission through the pipeline.

Electricity consumption associated with the proposed development activities will increase compared to the current consumption. There will also be an increased demand for electricity for the management of leachate from the proposed development and powering composting plant.

The total electricity consumption will be slightly greater than the average large business requirement and approximately half of an industrial facility's annual requirement. The impact on non-renewable resources will be slight.

An indirect impact is envisaged at wastewater treatment plants in the wider region, resulting from the increased volumes of leachate produced onsite and tankered offsite.

However, with onsite pre-treatment the contaminant loading will be reduced, thus increasing the range of potential facilities that may accept this leachate and reducing the 'loading' at facilities where it is currently accepted and may be accepted in the future.

5.11.3 Mitigation Measures

Given that the impacts arising from the relocation of the power lines on site during the construction phase will be temporary and slight, no specific mitigation measures are proposed, other than those typically undertaken by ESB Networks in such an event, which will include prior notification of impacts to end users, as well as all health and safety precautions.

Mitigation measures to be applied to prevent potential for impact on the Bord Gais pipeline centre on appropriate method statements by Contractors and clear delineation of the route on site.

No mitigation measures are required in relation to buildings, other structures, ownership and access.

5.11.4 Residual Impacts

There will be no residual impacts on the infrastructural material assets of the study area.

While non-renewable resources, fossil fuels and water are required onsite during the construction and operational phases and will have a negligible residual depletion impact, it is not considered that there will be any further residual impacts associated with the infrastructural material assets of the location assessed in this section.

6 INTER-RELATIONSHIPS & INTERACTIONS

The purpose of this section is to holistically assess cause overall effects and cumulative impacts of the proposed development. This process also examines whether interactions between the different effects themselves may cause impacts that are greater than those alluded to when the relevant topics were discussed individually.

Potential impacts resulting from the development, **prior to mitigation** are identified as follows:

Potential Negative Effects

- increased noise levels during construction and operational phase
- potential for dust generation during construction phase
- potential for odour generation during operational phase
- potential for climate impact during operational phase
- impact on existing biodiversity of the site during construction phase
- potential impact on surface water quality during construction and operational phase
- potential impacts on soils and hydrogeology during the construction and operational phase
- potential impacts on visual amenity

Potential Positive Effects

- provision of appropriate waste management infrastructure to support national and regional waste management policy and the concepts of self-sufficiency, proximity and the waste hierarchy
- employment provision and demand for goods and services
- continued and increased contribution to the Community Fund benefiting the local community
- continued generation of electricity from landfill gas and export to the national grid
- reduction in the volume of BMW to landfill in line with national and EU waste policy
- facilitating the future recovery of IBA for use as an aggregate
- together the diversion of BMW from landfill and the generation of energy from landfill gas will have a positive impact on climate

For a project of this nature, there is also the potential for interaction amongst these impacts that may not be perceived when examined individually. Therefore, it is necessary to consider the relationships between the impacts.

With the successful application of the mitigating measures presented and best practice techniques implemented during construction and operation, the proposed development at Knockharley Landfill site is not anticipated to have any significant, long term, negative impacts on the local environment.

When considered in parallel with other existing and potential developments in the wider locality, it is concluded that the proposed development will not result in greater cumulative impacts than those identified for the proposed development alone.