

EPA Application Form

1.2 – Non-Technical Summary

Attachment

Organisation Name: *

Application I.D.: *

1. Introduction

Knockharley Landfill Ltd. (KLL) is the owner and operator of Knockharley Landfill. The landfill opened in December 2004 and it operates under an Industrial Emissions (IE) Licence (W0146-02) that authorises the acceptance for disposal of 175,000 tonnes of non-hazardous waste, including residual household, commercial and industrial wastes, construction/demolition wastes and incinerator bottom ash (IBA).

KLL proposes to increase the annual waste disposal rate to 440,000 tonnes, which will require raising the final profile from 74m Ordnance Datum (OD) to 85m OD; accept stable non-reactive hazardous waste (SNRHW); provide an IBA storage facility where recovery trial will be carried out, install a leachate treatment plant and facilitate future contingency storage for residual municipal solid waste (MSW) and baled recyclables.

2. Planning & Licensing History

Planning

In 2002, permission was granted to Celtic Waste Ltd. for the development and operation of an engineered landfill and ancillary facilities. The permission restricted the acceptance of waste for disposal at the facility to waste arising from the North-East Waste Management (Meath, Louth, Cavan and Monaghan). The quantities of waste accepted at the facility were restricted to 132,000 tonnes per annum until December 2007 and thereafter to a maximum of 88,000 tonnes per annum.

In 2007, Greenstar Ltd was granted permission to remove the regional restriction on the origin of the waste that could be accepted, continue to accept 132,000 tonnes/year up to 2010, extend the operational area and install a gas utilisation plant that had the capacity to generate up to 4.2 MW of electricity for export to the national grid.

In 2017, KLL was granted permission for an extension of the duration of planning permission 01/5006. In 2018, Starrus LFG Ltd. was granted permission for a solar farm on part of the capped and reinstalled landfill, with a generating capacity of approximately 3MW

In December 2018, KLL applied to An Bord Pleanála for permission (PL17 .303211) to increase the annual waste disposal rate to 440,000 tonnes, accept SNRHW; develop a biological treatment plant; provide an IBA storage facility; install a leachate treatment plant and facilitate the contingency storage for residual MSW and baled recyclables.

Licensing

The original Waste Licence (W0146-01) was granted to Celtic Waste Limited in 2003, and was amended in October 2005 to include conditions relating to resource use and energy efficiency, accident prevention and emergency response and restoration and aftercare. In 2009, the EPA initiated a review of the licence to bring it into conformance with the EU Landfill Directive and the revised licence (W0146-02) was issued in 2010.

In 2013 the licence was transitioned to an IE Licence. Also in 2013 the EPA initially amended the licence (Technical Amendment A) to insert a condition relating to groundwater risk screening and subsequently (Technical Amendment B) to allow a trial for IBA metals recovery.

A third amendment (Technical Amendment C) was effected in 2016 to allow a temporary increase in the amount of waste accepted for disposal to meet a shortfall in national disposal capacity. In 2018, the licence was further amended (Technical Amendment D) for a second temporary increase in waste acceptance rates to accommodate wastes from an unauthorised landfill remediation.

3. Existing Installation

The site is in a rural area, approximately 1.5 km north of the village of Kentstown and 7 km south of Slane. The licensed area encompasses 135.2 ha. The landfill footprint, where residual waste is currently deposited in engineered landfill cells, is located in the centre of the site. The current licence authorises the construction of 28 landfill cells.

The existing infrastructure comprises the operational landfill cells, intermediate and final capped cells, 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.

The installation is designed and constructed in accordance with the design criteria specified in EU Landfill Directive 1999/31/EC and the requirements of original and current licence. The landfill cells are provided with bottom and side lining systems and final capping whose construction is the subject of independent quality assurance validation.

There are groundwater drains beneath the engineered lining system to maintain water table below the base of the cells. The water is pumped to a surface water attenuation lagoon to the south of the landfill cells. The flow from the lagoon enters a wetland and this overflows to the Knockharley Stream. There is a shut-off valve on the outfall from the lagoon to the wetland that can be closed in the event of an incident that has the potential to contaminate the run-off.

Rainwater run-off from roads and hard standing areas is directed to a surface water trunk main that discharges to the attenuation pond via a Class 1 oil/water separator. Run-off from the completed

landfill cells where there is no risk of contamination occurring is collected in a perimeter swale and directed to the attenuation lagoon.

Leachate is managed by a collection system placed on top of the bottom liner. It is pumped to a perimeter ring main via side-riser pipes that connects to a leachate storage lagoon, from where it is tankered off-site for treatment.

Landfill gas is extracted from all active and filled cells via vertical and horizontal gas wells and fed to a gas ring main located outside the perimeter of the waste cells. The main connects to a gas utilisation compound. There are four gas fired electricity generators (with two running continuously) and three enclosed back-up flares in the compound, along with an electrical substation that connects feeds the electricity generated by the engines to the national grid.

The landfill cell where waste is deposited is covered at the end of each working day. When the final waste levels are reached in the cells a temporary cap is placed pending the installation of the permanent cap. The permanent cap comprises: a gas collection layer, 1 mm fully welded synthetic liner, sub-surface drainage layer, subsoil layer and a topsoil layer.

Cells 1-12 have been fully capped and there is an intermediate cap on Cells 13 and 14. Landfilling is on-going in Cells 15, 16, 17 and 18. Cells 19 and 20 are being constructed.

4. Proposed Changes

The proposed changes are:

- Expanding the annual waste disposal rate to 435,000 tonnes/year of non-hazardous wastes and up to 5,000 tonnes per annum of SNRHW. The increased intake is needed to deal with the quantities of IBA arising, provide contingency capacity for residual MSW in the event of disruption to the national and overseas thermal treatment plants and accommodate illegally disposed waste repatriated from Northern Ireland and illegal disposal sites in the Republic.
- Increasing the height of the landfill body from a post settlement final level of 74 mOD to 85 mOD;
- The construction and operation of an IBA Area made up of five lined landfill cells where the IBA will be weathered and then stored while recovery trials are conducted. The trials will involve the removal of metals, crushing and washing to produce an aggregate for use in construction projects. If the trials are successful full scale processing may be carried out subject to the EPA's prior approval;
- The construction and operation of a building for the contingency storage of baled recyclables and baled residual waste;
- Construction and operation of a leachate management facility comprising three lagoons, five storage tanks, a modular treatment plant and articulated tank loading areas.

- Construction of screening berms along the western boundary and to the north of the proposed IBA area.
- Provision of additional surface management controls to the north of the landfill comprising a holding pond, storm water attenuation pond, a wetland, a flood compensation culvert, stream channel diversion and a new storm water emission point to the Knockharley Stream.
- Felling of 12.5 ha of the existing commercial broadleaf/conifer mix plantations to allow the construction of the screening berms and development of Phase 7 Cells 27 and 26 and the new northern surface water attenuation pond. Compensatory replanting and additional planting will be carried out over 16.8 ha.
- Relocation of 20kV overhead power lines and the construction of two sub-stations.
- Ancillary plant, infrastructure (including roads and hard standings) and landscaping.

5. Classes of Activity

The classes of activities as listed in the First Schedule of the EPA Act as amended will be.

Class	Description
11.1	The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.
11.5	Landfills, within the meaning of section 5 (amended by Regulation 11(1) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 524 of 2008)) of the Act of 1996, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25,000 tonnes, other than landfills of inert waste.
11.4 (b)	Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, (other than activities to which the Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001) apply): (i) biological treatment; (iii) treatment of slags and ashes;
11.4.(a)	Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities: (i) biological treatment; (ii) physico-chemical treatment;

6. BAT Documents

The landfill has been assessed against the BAT Conclusions in Final Draft BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities.

7. Waste Management Policies

The proposed development will ensure adherence to the principles of self-sufficiency and proximity by providing disposal and recovery infrastructure for the management of waste generated both within the region and nationally.

The Eastern Midlands Regional Waste Management Plan 2015 – 2021 acknowledges the need for the ongoing provision of landfill capacity in the region, as well as for contingency and repatriation requirements. While the preferred policy for residual waste management is thermal treatment, its implementation will result in the production of IBA. In addition, the Plan highlights the increasing quantities of C&D wastes being generated and the decreasing capacity for the management this waste stream.

8. Resource Consumption and Energy Use

The current and proposed activities involve energy (electricity) and resource (diesel, water) consumption. In 2018 electricity consumption was 145 MWhrs. Diesel consumption was 372,230 litres and water usage was 4,286m³.

Water is obtained from the mains supply and used for potable supply and in dust suppression.

Landfill gas is used to generate electricity and the current capacity is 2.71 MW. The solar farm that will be located on the restored areas of the landfill cells will be a source of renewable energy.

9. Sources of Emissions

Potential and actual emissions associated with the waste activities include rainwater run-off, leachate, sanitary wastewater, dust, noise, landfill gas, the landfill gas flares and engines, vehicle exhaust gases and odours.

Rain water runoff from roads and hard standing areas discharges to a main collection pipe on the eastern side of the perimeter access road that connects to the southern surface water attenuation lagoon and wetland via a Class 1 bypass oil/water separator. Rainwater run-off from the restored landfill cells drains via the main landfill perimeter swale to the storm water attenuation pond and constructed wetland.

Leachate is tankered off site for treatment. Sanitary wastewater from the staff welfare facilities is treated in an on-site proprietary system. The noise sources include waste offloading, waste handling and vehicle loading. The gas engines and flares are point emission sources to air. The weathering of the IBA will be a temporary, diffuse source of hydrogen gas. Vehicle movements are sources of exhaust emissions and potential sources of dust.

10 Environmental Monitoring

Environmental monitoring is carried out in accordance with Condition 6 and Schedule C of the Licence, which requires noise, dust deposition, landfill gas, surface water (chemical and biological), groundwater and air emission point monitoring. The licence specified emission limit values that must be complied with to ensure waste.

11 Existing Environment, Potential Impacts, Mitigation and Residual Impacts

11.1 Roads, Traffic & Transport

The site is in the townland of Knockharley, approximately 6km south of Slane on the west side of the N2 National Primary Route. Navan is approximately 13km to the west of the site and is accessed 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.

Construction Phase

A construction traffic appraisal has established the delivery of construction materials will generate 25 No. heavy goods vehicles (HGV) trips per day. This will result in a negligible, temporary direct impact on the local road network, which can be readily accommodated. An outline Construction Traffic Management Plan has been prepared as part of the outline Construction Environmental Management Plan.

Operational Phase

A traffic appraisal has identified there will be 156 daily HGV movements (78 arrivals and 78 departures) and 70 daily light goods vehicles (LGV) movements (35 arrivals and 35 departures) in the operational phase.

The development peak hour will not correspond with the recorded network peak hours on the N2 and adjoining regional roads and this reduces the potential for impacts upon the efficiency of the wider road network. 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 development will result in modest increases in traffic flows relative to the strategic road network serving the site and therefore the impact on the existing receiving road network will not be significant. Given the safety record of the existing access, it is reasonable to presume that the additional traffic movements will not result in a significant traffic hazard.

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

11.2 Land, Soil & Geology

The subsoils comprise glacial tills. There are two alluvium deposits 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. The tills vary in thickness from 12 to 21.5 m, 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 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.

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

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 subsoils is characterised by naturally elevated ammonia, sodium, potassium and sulphate levels.

The groundwater in the bedrock displays a similar natural groundwater signature to the shallow groundwater with elevated ammonia, sodium, potassium and sulphate levels. In addition elevated manganese levels again are a characteristic of the Namurian rock type, with reducing conditions encouraging the mobilisation of this metal in the groundwater regime.

The main potential impact to soils and geology is associated with excavation and removal of topsoil and subsoil during the construction phase. The development of the IBA weathering and storage areas will involve a significant amount of excavation extending to 7m below ground level across an area of 57,829m².

The development also includes the construction of screening berms on the northern and western boundaries of the site and to facilitate this, felling is required. Forestry felling, if not properly

implemented, can cause or contribute to ground instability due to vibration and ground loading from tree felling equipment. The potential impact of forestry felling on soils and geology is considered to be minimal.

A significant proportion of the glacial till will be removed during the construction. This may temporarily increase the vulnerability of the underlying aquifer; however, given the overall thickness of the till the impact is unlikely to be significant. The excavation will result in some local lowering of the water table in the subsoils and may reduce the baseflow contribution to local watercourses. The magnitude of these potential impacts to the hydrogeological regime, prior to mitigation, is considered to be of slight significance.

Construction will be phased to minimise the amount of clearing and soil excavation required at any one time. Excavated subsoils will be reused as far as possible. To mitigate against erosion of the exposed soils all excavations will be backfilled as quickly as possible and works will stop during heavy rainfall events. To mitigate against possible contamination of the exposed bedrock/aquifer, refuelling of machinery and plant will only occur at designated refuelling areas in the site compound. The proposed development will have a low impact on the receiving environment.

11.3 Hydrology & Surface Water

The development site is in the catchment of Nanny-Delvin River. The Knockharley or Flemingstown stream was diverted around the landfill cell footprint of the site during the initial development. The Knockharley or Flemingstown stream 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.

Surface water run-off from the existing operational areas where there is no risk of contamination is directed to a storm water attenuation pond and then to a constructed wetland that overflows to the Knockharley Stream. The attenuation pond is sized to receive all surface water run-off from the existing development 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 to the wetland and it is also fitted with an automated shut-off valve. The constructed wetland further polishes the water.

In the construction stage there is the potential for the following impacts. 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

In the operational stage 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.

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

In the construction phase mitigation measures that will be implemented will include.

- Refuelling of plant in designated refuelling areas;
- Training of all personnel working on site in in pollution incident control response
- A new attenuation pond will be installed at the start of the construction stage.
- Measures to prevent runoff erosion from vulnerable areas and consequent sediment release into the nearby watercourses.

In the operational stage the surface water management infrastructure (four-stage treatment train (swale – holding pond- attenuation – wetland) will mitigate the impacts of increased run-off and sediment loading on watercourses. Leachate and surface water will continue to be managed in accordance with the licence requirements and the design of the proposed new leachate and surface water management infrastructure will be subject to EPA prior approval.

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 monitoring is and will continue to be carried out in accordance with the licence conditions and any incidents will be notified to the EPA. The potential impact post mitigation on hydrology and surface water is not significant.

11.4 Biodiversity

There are three European Sites and twelve Potential Natural Heritage Areas (pNHAs) within 15 km of the site. There are no Candidate Special Areas of Conservation (cSACs) or Natural Heritage Areas (NHA) within this radius.

The on-site habitats have been modified as part of the existing landfill site development. The lands surrounding the operational areas are dominated by mixed broadleaved/coniferous woodland, which was planted as part of the initial site development. The woodlands are classified as mixed broadleaf and conifer woodland, the trees are largely less than 4-5 m high in the still immature sections and comprise a mixture of Alder, Silver Birch, Beech and Willow species.

The remainder of the site which has not been planted is dominated by wet grassland and a mosaic of wet grassland and improved agricultural grassland. There are areas of improved agricultural grassland around the administration buildings, landfill gas compound and in the north-east of the site. The field boundaries comprise hedgerows predominantly, but some treelines also occur in the northern and eastern portion of the site.

In 2010, seven mammal species were recorded during a site walkover. In 2015, four species were observed (fox, badger, otter and brown) and recorded during the survey. No badger setts were found there was no evidence of breeding badgers or otter. A hare track was recorded along the fence line. Other mammal species not recorded on the site, but which are likely to occur, are pygmy shrew, Irish stoat and hedgehog.

Three butterfly species, a ladybird species, a species of bumblebee and common frog were recorded. The common frog is protected by the Wildlife Act (1976 and Amendment 2000). It is also listed as a species of International Importance in the Irish Red Data Book and as species of community interest under Annex V of the EU Habitats Directive. A total of 24 bird species were recorded during avian surveys in 2010, a further 2 species were recorded in 2015, and a further 9 in 2016.

As the site is not within a designated conservation site the development will have no direct impacts on such sites. There is no connection between the development area and the designated conservation sites within 15km. A tributary of the River Nanny flows through Balrath Woods. However, this site is not designated for aquatic species.

The construction of the IBA weathering and storage areas, the contingency storage building, surface water controls and screening berms will result in a loss of agricultural grassland, wet grassland, mixed broadleaved/coniferous woodland and deciduous woodland, and section of hedgerow and treeline.

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 and treeline will be limited. These habitats provide cover and foraging habitat to local wildlife and their loss will have a permanent

moderate impact. Improved agricultural grassland/wet grassland mosaic is of Local Importance (lower value) and its loss will have a permanent slight impact.

The construction of the berms to the east of the IBA cells and to the west and south of the site 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.

No protected flora was identified within the site and therefore the development will have no impact on protected species. 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 IBA cells are close to an area where evidence of badgers was observed; however as no evidence of breeding was recorded (setts) no long-term impacts are predicted. There will be slight temporary disturbance impacts to badgers 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.

No Annex 1 birds listed in the EU Birds Directive were recorded, but three red-listed species of conservation concern (meadow pipit, herring gull and black-headed gull) were identified. The construction stage will have the highest impacts on bird species in terms of disturbance and loss of nesting habitat. This stage will be temporary and will take place phases that will allow disturbed birds to relocate to alternative suitable habitats on the site.

The operational phase will have a lesser impact on the local ecology. There will be no further habitat loss and 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. Mammals are likely to continue to use the site and the new woodland areas will provide habitats for cover and foraging. Also, as the replanted trees mature, they will provide nesting habitat for birds, which is a slight positive impact.

To minimise disturbance to habitats and flora, the area of the proposed works will be kept to the minimum necessary. To minimise disturbances to mammals, construction operations will take place during daylight hours. The removal of vegetation will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive) so as to protect nesting birds. The conditions of the bat derogation licence for the site will be adhered to in full. A pre-construction mammal survey will be undertaken to reconfirm the finding of the preplanning surveys.

All construction staff will be made aware of the potential impact to badgers and the local ecology of the site. A project ecologist will be appointed to oversee the construction works. He/she will have the authority to stop construction activity should it have the potential to result in significant adverse ecological impacts. He/she will undertake regular ecological walkover surveys to examine the area for newly established invasive species.

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 overall habitats within the site boundary. The application of the mitigation measures described above will ensure the residual impact will be imperceptible.

11.5 Air Quality & Climate

Air quality monitoring data collected at the nearest EPA monitoring station over the last 3 years indicates that air quality meets the relevant ambient air quality standards. The current licence requires monitoring for dust deposition, landfill gas, exhaust gases from the gas flares and utilisation plant, as well as volatile organic compounds (VOC) from the surface of the landfill. The emissions have been generally compliant with the emission limit values set in the licence.

Climate

A desktop assessment of the potential impacts on climate established that the construction stage will have an imperceptible impact on the general and national climate. In the operational stage, the activity will positively impact the local and national climate by reducing the emission of greenhouse gases through the treatment of the organic MSW fines to reduce the biodegradable content prior to use as cover material and by the generation of energy in the landfill gas utilisation plant and the subsequent savings of fossil fuels.

Vehicle Emissions

The vehicle emissions associated with the construction stage will be comfortably within the relevant air quality guidelines and will have an imperceptible impact on ambient air quality. During the operational stage there will be an imperceptible impact. No mitigation measures are required.

Dust/Particulate Emissions

The risk of dust emissions from earthworks, construction and trackout activities during the construction and operational stages is deemed to be low. With regard to ecology, the risks are deemed to be negligible.

The mitigation measures implemented during the construction and operational stages include covered loads, use of vehicle wheel wash, the spraying of access roads and internal site roads during periods of dry weather, the implementation of speed limits on facility roads and regular inspections to check compliance with a dust control plan.

Following the implementation of the mitigation measures, no adverse impacts on receptors will arise from dust generation and the residual impacts are considered to be 'not significant.'

Landfill Gas Utilisation Emissions

The results of the air quality modelling assessment indicate that predicted emissions will be 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'. Servicing of the landfill gas utilisation plant will be carried out in accordance with the manufacturer's recommendations.

Odour Emissions

No odour generation will be associated with the construction stage and therefore no mitigation measures are required phase. The proposal to accept 440,000 tonnes per annum of varying types of waste has the following potential to influence odour emissions.

- The quantity and quality of the waste received will change and over time as will the location of the operational areas. This includes the development of the IBA weathering and storage areas.
- The additional leachate storage lagoons, tanks and treatment plant

An 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.

The odour emissions generated from the site 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 that will be achieved by the proposed development and the fact that the majority of the additional waste inputs will be stabilised, inert or non-biodegradable with a low gas and odour generation potential.

The odour exposure levels around the site will decrease compared to the baseline and Scenario 1. A residual risk of impact will remain at 1 property year 4 and at 3 properties during the worst case (year 6), based on application of the precautionary indicative odour impact criteria applied in the study.

The overall conclusion is that the development will have a positive effect on odour exposure and reduce the risk of impact compared to current operations. However, in accordance with best practice a range of odour control measures will be incorporated into the design to mitigate such potential emissions. The odour management plan for the facility will be updated to refer to the additional control measures which will include:

- A phased filling schedule. 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 use of hermetically sealed geo-multicovers for intermediate capping to mitigate the potential for fugitive emissions.

There will be an overall positive impact on climate associated with the development and it will not have a significant impact on ambient air quality.

11.6 Noise & Vibration

The existing environment 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 undertaken at four boundary locations. The results of the most recent surveys confirm that the site is compliant with the limits set in the licence.

There is potential for noise and vibration impacts during the operational and construction stages. In the construction phase the sources of noise will be 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.

Noise sources during the operational stage will include the construction of landfill cells and waste placement, the IBA processing area, landfill gas utilisation plant and site traffic. As part of the development, earth berms will be provided 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 construction of the berms.

Wastes are not accepted during the evening and night-time periods, however the existing landfill gas utilisation plant will operate during these hours. The predicted noise levels from these activities are well below the evening and night-time noise limits typically set in EPA licences.

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 construction and operational areas to the nearest sensitive locations, it is expected that vibration arising from the development will not be perceptible at the sensitive locations, and any vibration arising from such activities will be significantly below any thresholds for structural damage to property.

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 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 the Construction Environmental Management Plan (CEMP).

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 impacts will be mitigated by the construction of the berms, use of temporary barriers where practicable, phasing of the works and maintenance of mobile plant.

In the construction and operational stages, noise emissions will not exceed the licence emission limit values set in the current licence and there will be no residual impacts.

11.7 Population & Human Health

Settlement Patterns

The construction of the proposed development will take place on a phased basis and the site will continue to operate during this stage. Construction workers will travel daily to the site from the wider area. The impact on the permanent population and settlement patterns will be imperceptible.

It is not envisaged that the operational stage of the proposed development will give rise to any direct or indirect effects on the population or settlement patterns as a result of population change.

The lands in the vicinity of the site are not zoned for any particular use and are not designated for specific residential or other commercial use. The future development of residential dwellings in the area will not be curtailed by the proposed changes. The impact of the operational phase will be imperceptible.

Land Use

The extension of the landfill area to include the IBA weathering and storage areas will result in a loss of grassland and planted forestry. As the land is within the footprint of an existing waste facility, the potential for alternative land use is limited and therefore the impact will not be significant. The impact on land use beyond the proposed development boundary during the construction phase will be imperceptible.

Socio-Economics

The proposed development will positively affect employment in the area through the provision of up to 30 temporary construction jobs. This will benefit the economy of the area both directly through and indirectly through the purchase of construction materials from local suppliers.

The operational stage will also positively directly affect employment in the area, with an estimated 10 further long-term employment positions, primarily associated with the extra staffing requirement to operate the IBA facility and the leachate management facility.

The site will also provide an outlet for commercial and industrial wastes, thus indirectly and positively supporting the economic activity of the Greater Dublin Area, and beyond, and contribute to meeting national and regional waste management capacity requirements. This is positive, medium to long term and not significant.

Visual Intrusion

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

Recreation & Amenity

The construction phase will not affect recreation options and open spaces outside the licensed boundary. The operational phase will have a positive, direct, medium to long term effect through the continued support provided to local sporting facilities and teams by KLL, 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.

Health

The operation of the engineered non-hazardous landfill; IBA weathering and storage areas and recovery trials; leachate management facility have the potential for a wide variety of health exposure

scenarios. In the absence of appropriate engineering controls and abatement, the primary risks to human health are emissions to air and water.

A detailed air quality assessment concluded that the impact of emissions to air from the proposed development will be low. An odour impact assessment concluded that the development will have a beneficial effect on odour exposure over the next four years compared to the 'do-nothing scenario'. in the next four years. A residual risk of impact will remain for four properties during this period and up to six properties until the landfill is completed.

During the construction stage 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.

Mitigation measures are not required relation to population, given the lack of significant direct construction and operational phase effects. Traffic mitigation measures are also not required, save for a commitment to adhere to the existing traffic routing arrangements.

Mitigation measures are not required in relation to land use, recreation, amenity and tourism given the lack of significant direct and indirect effects by the development.

11.8 Landscape & Visual Impact

The surrounding landscape character is dominated by agricultural fields with associated hedgerow boundaries. While the development of the existing site has involved the removal of hedgerows, significant sections have remained untouched and have been supplemented by planting, particularly along the boundaries.

The site is in gently undulating terrain, between the River Boyne to the north and the River Nanny to the south. The general topography is low-lying and the site slopes from 70 m Ordnance Datum (OD) in the north-west to 55 mOD in the south-east. The vast majority of the area in a 5 km radius area is farmed landscape consisting of fields of crops and pastures.

The visual envelope for the proposed development is defined by views from:

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

The Landscape Character Assessment for County Meath in 2007 which forms part of the County Development Plan, identifies four generic Landscape Character Types (LCTs)

Hills and Upland Areas;

Lowland Areas;
River Corridors and Estuaries and;
Coastal Areas.

The site is within the 'Lowland Landscape', which is sub-divided into specific landscape character areas (LCAs) and the existing and proposed development is in LCA 6 Central Lowlands. For this LCA it is a recommendation of the County Development Plan to "maintain the visual quality of the landscape by avoiding development that would adversely affect short range views between drumlins".

The main impacts associated with the proposed development will be the removal of the 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 development will not result in significant changes in the size, elevation or landscape character and will continue to impact the landscape character in the same degree as before. In conjunction with the permitted solar farm, the highest visual impact of the proposed development is deemed to be Slight-Imperceptible from two Viewpoints.

Avoidance and reduction mitigation measures are integral to design of the development and include:

- The contingency storage building 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 weathering and storage areas west of that point; and
- Careful selection of colour finishes for elevations of the proposed buildings.

No significant residual impacts are envisaged after the mitigation measures have been implemented.

11.9 Archaeology, Architecture and Cultural Heritage

There are no Recorded Monuments either within the proposed development site or a 1 km radius. The closest Recorded Monument is approximately 1.3 km west of the site boundary and is described as a possible ringfort.

Previous field surveys identified substantial archaeological remains within the immediate vicinity of the proposed development area. Therefore there is a potential direct construction impact on previously unrecorded archaeological remains of unknown significance. A pre-construction survey will be carried out comprising a geophysical assessment followed by test trenching under licence to the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs

11.10 Material Assets & Resource Consumption

An overhead 220 kV electricity line runs north-south across the site along the western boundary of the landfill footprint. A 20 kV line also runs north south on the eastern boundary parallel to the existing local road and this supplies power to the facility and the wider community. There is a 20kV electrical substation in the gas compound onsite that connects to the national grid. There is a Gas Networks Ireland pipeline running west to east through the south of the site, just south of the existing landfill footprint. Potable water is obtained from the mains supply, which also supplies the on-site fire hydrant.

The entire development site and a number of immediate surrounding agricultural fields are owned by the applicant. 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.

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 renewable electricity output from the gas engines was 18,872 MWh.

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 due to the relocation of the 20kv line to facilitate the construction of the screening berms and during connection of the two proposed new substations.

In the operational stage the leachate treatment plant will increase electricity consumption. The total 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.

There will be an indirect impact at wastewater treatment plants in the wider region due to the increased volumes of leachate produced; however, with onsite pre-treatment the contaminant loading will be reduced, thus increasing the number of facilities that may accept this leachate and reducing the 'loading' at those facilities where it is currently accepted.

Given the temporary nature of the interruption of the power supply during the relocation of the power lines, no specific mitigation measures are required, other than those typically undertaken by ESB Networks in such an event, which includes prior notification end users, as well as all health and safety precautions.

Non-renewable resources and water will be consumed during the construction and operational phases and will have a negligible residual depletion impact. There will be no further residual impacts.

11.11 Interaction of the Foregoing

Potential impacts *associated with the proposed* development, prior to mitigation are as follows:

Potential Negative Effects

- Increased noise levels during construction and operational phase
- Dust generation during construction phase
- Odour generation during operational phase
- Climate impact during operational phase
- Impact on existing biodiversity of the site during construction phase
- Impact on surface water quality during construction and operational phase
- Impacts on soils and hydrogeology during the construction and operational phase
- 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 *proposed* mitigating measures and best practice techniques implemented during construction and operation, the proposed development 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, the proposed development will not result in greater cumulative impacts than those identified for the proposed development alone.

12. Proposed technology and other techniques to prevent or eliminate, or where this is not practicable, limit, reduce or abate emissions from the installation

The current licence specifies the manner in which the facility must operate so as to ensure that pollution and or nuisance to neighbours and the general public is prevented. The licence conditions require the site management team to have the appropriate training and qualifications; they specify the types of wastes and processes that can be carried out; stipulate how wastes and raw materials that have the potential to cause pollution are handled and stored; describe the control measures that must be applied to prevent nuisance, for example odour and dust control, and require appropriate emergency response procedures to be in place.

13. Measures to Comply with Waste Management Hierarchy

The proposed development will contribute to the implementation of the principles of the waste hierarchy 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 Waste Directive.

In addition, the proposed development will support other national waste infrastructure that operates on 'higher' tiers in the waste hierarchy, through the provision of management capacity for the outputs produced from these processes e.g. management of Incinerator Bottom Ash from thermal treatment & stabilised residual fines management from recovered fuel production.

14. Abnormal Operating Conditions

KLL has adopted an Emergency Response Procedure and a Firewater Retention Risk Assessment. The ERP identifies the responsibilities and actions required to deal quickly and efficiently with an emergency. KLL has also prepared a procedure for operations in adverse wind conditions.

15. Avoidance of the Risk of Environmental Pollution due to Closure of the Facility

Knockharley Landfill has prepared an Environmental Liability Risk Assessment (ELRA) and a Closure, Restoration and Aftercare Management Plan (CRAMP) for the facility and these, along with a proposal for Financial Provision, have been submitted to the Agency.

16. Environmental Monitoring

Knockharley Landfill currently conducts monitoring of the following:

- surface water
- noise
- dust and PM10
- odour
- surface emissions (VOCs)
- stack emissions (flares and engines)

17. Measures to Comply with an Environmental Quality Standard

The emission limit values set in the current Licence are based on achieving compliance with the relevant EQS. The measures also effectively minimise the risk of pollution over long distances.

The environmental quality standards that are relevant to the overall assessment for the licence application are those specified in:

- European Communities Environmental Objectives (Surface Water) Regulations S.I. No 272 of 2009;
- European Communities Environmental Objectives (Groundwater) Regulations S.I. No 9 of 2010;
- Air Quality Standards Regulations (S.I. No 271 of 2002);
- Directive 2008/50 EC on ambient air quality and cleaner air for Europe.

18. Measures to comply with Council Directive 80/68/EEC and 2006/118/EC in relation to the protection of groundwater.

There are no direct discharges to groundwater. The facility was designed, constructed and is being operated in accordance with the EU Landfill Directive 1999/31/EC. The landfill liner system is a 1 m thick composite barrier comprising HDPE membrane and clay basal layer with a permeability of 1×10^{-9} m/s or similar approved, complying with both EU regulation and the licence conditions.

19. The Main Alternatives to the Proposed Technology, Techniques and Measures

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 the EIAR.

Upon identification of the preferred locations for the IBA storage and leachate treatment infrastructure, 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.