Knockharley Landfill Limited

KNOCKHARLEY LANDFILL EXPANSION SERVICES REPORT

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1 INTRODUCTION

This document presents the Engineering Services Report for the proposed development involving a westward expansion of the existing Knockharley Facility. The proposed extension will increase the landfill area by approximately 18 ha and add an additional 4.12 million m^3 of void capacity. This extension is designed to enhance the operational lifespan of the facility while aligning with environmental and regulatory standards.

1.1 SITE LOCATION

Knockharley Landfill Limited (KLL) operates a residual waste facility, known as Knockharley Landfill, at Knockharley, Kentstown, Navan, Co. Meath (includes townlands of Tuiterath and Flemingstown) under Waste Licence No. W0146-04.

The site encompasses approximately 135 hectares, of which the existing landfilling footprint will cover approximately 31 hectares and is located adjacent to the N2 National Primary Route approximately 1.5 km north of Kentstown village and 7 km south of Slane, Co. Meath. The surrounding areas to the facility are agricultural lands with some residential properties. Drawing IE0037029.9627-002 submitted with the planning application shows the ownership boundary of the facility in blue.

The main entrance to the facility is from a private gated entrance road via the N2 national primary route which provides direct vehicular access to the national roads network. A secondary gate access for emergencies only, is also available via an entrance to the north of the facility from the Rathdrinagh / Knockharley road. IE0037029.9627-003 submitted with the planning application shows the planning application boundary of the facility in red, while drawing IE0037029.9627-004 shows the layout of the existing knockharley facility.

1.2 TOPOGRAPHY

Topographical surveys conducted by Landmark Engineering & Surveying on Site in October 2024 and July 2025 are presented in drawing IE0037029.9627-004 showing the layout of the existing Knockharley facility and a contour map of the ownership lands and the relevant features. The topographic contours for the overall site show a higher elevation to the north and west of the facility, 70 m above ordnance datum (AOD) grading to the southeast at an elevation of 52 m AOD.

The topography for the expansion footprint, located to the west and north, ranges from 66 m AOD to 62 m AOD for the north of the expansion while the west expansion footprint ranges from 70 m AOD to 60 m AOD. Both north and west boundaries of the facility are enclosed by commercial tree plantations, elevations associated within these forestry areas are from historical data prior to planting.

The Knockharley Stream flows west to east through the northern portion of the site and then flows along the eastern boundary of the site where it then travels south /southeast away from the site and joins the Nanny River.

The majority of the footprint of the expansion area is dominated by various stockpiles of clay spoil from cell construction over the years. This area was predominantly used for the storage and processing of clay liner for cell construction. As such. It presents as a dynamic topography area of man-made hills, valleys and slopes created by the stockpiling of bulk clay materials.

1.3 EXISTING SITE INFRASTRUCTURE

The existing Knockharley Facility waste infrastructure consists of an engineered non-hazardous waste landfill and an Incinerator Bottom Ash (IBA) facility and is licensed by the EPA with an Industrial Emissions (IE) Licence W0146-04. The proposed planning boundary (red line), Knockharley ownership boundary (blue line) and the existing Knockharley Facility infrastructure are showing in drawing IE0037029.9627-004 and comprise of the following;

- Main access roads and perimeter access roads;
- Two Weighbridges and Weighbridge Building;
- Administration Building;
- Carpark
- Portable Cabins for storage
- Waste Inspection Bund
- Quarantine Bund
- Maintenance Building
- Wheel Wash
- Leachate Treatment Facility
- Two Leachate Storage Lagoons
- Gas Treatment Compound and Substation
- Southern Surface Water Attenuation System
- IBA Processing Building & Substation
- Northern Surface Water Attenuation System

The site encompasses approximately 135 hectares, of which the existing landfilling footprint will cover approximately 31 hectares; 25 hectares is associated with the existing waste cells footprint while the IBA Facility covers 6 hectares.

The entrance to the facility is from a private gated entrance road via the N2 national primary route which directs vehicles to the weighbridge and the administration building and carpark. The Leachate Treatment Facility and leachate lagoons, Gas Compound and Substation and Southern Attenuation System which manages surface water runoff from the south of the facility are located to the south and east of the facility.

Located to the northeast of the facility, is the IBA Facility consisting of 3 designated IBA Cells 27 – 29 and the IBA Processing Building located within Cell 29. Further north is the designated ESB Substation for the facility and the Northern Attenuation System which manages surface water runoff from the north of the facility.

1.3.1 EXISTING ENGINEERED WASTE LANDFILL

The existing engineered landfill non-hazardous waste cells are the dominant infrastructure associated with the facility. The facility was initially developed in 2003 and opened in late 2004 accepting residual waste. The landfill accepts residual non-hazardous household, commercial, Industrial and Construction and Demolition wastes and IBA waste. The combined tonnage of these wastes accepted must not exceed 440,000 [1] tonnes per annum as specified in Schedule A of the facility licence. The existing engineered landfill non-hazardous waste cells have an annual intake of 285,000 tonnes of non-hazardous household, commercial, Industrial and Construction and Demolition wastes. It is expected that at the current permitted rate of waste intake, the existing landfill cells will reach their capacity in 2029.

The existing engineered waste cells were developed in 7 phases, operating form south to north involving Cells 1 - 26. To date, all 7 phases have been constructed and as of August 2025, Cells 21 – 26 are operational and accepting waste. An intermediate cap covers Cells 15 – 20 with a permanent lining cap of the cells due to commence in 2026. The remaining Cells 1 – 14 have been permanently capped.

The existing engineered waste cells were constructed in accordance with the facilities licence, the EPA Landfill Site Design and in accordance with EU regulation. The lining system for the existing cells consists of a composite lining system comprising of a minimum of 1 m depth of compacted clay with a maximum hydraulic conductivity of 1 x 10^{-9} m/s, a 2 mm thick high-density polyethylene (HDPE) geomembrane and a geotextile protective layer for the cell bases, bunds and embankment upstream side slopes. The clay component of the lining system was won from material excavated during the construction of the cells. The clay was screened by mechanical means to eliminate stone sizes greater than 50 mm. The clay was placed and compacted in layers, to achieve the required degree of permeability. Each cell grades to low point with a sump that contains leachate pumps.

1.3.2 EXISTING IBA FACILITY

Situated to the northeast of the facility is the IBA Facility. Construction of the IBA Facility was completed in July 2025, consisting of non-hazardous IBA Cells 27 – 29 and the IBA Processing Building located within IBA Cell 29. A further, Cell 30, a future “piggy back” cell for the IBA facility, which bridges between IBA Cell 29 and the existing waste landfill cells, is also permitted but not constructed. The IBA Facility is permitted to accept 150,000 tonnes per annum of IBA material for processing and began accepting IBA waste in July 2025.

The IBA Processing Building, initially receives the imported IBA waste. In the IBA Building, is the process system equipment that involves the crushing, screening of the IBA, separating the ferrous and non-ferrous metals and then final product stockpiling which is deposited within IBA Cells 27 – 29.

Roller doors located on the southwest side of the IBA Processing Building open and the IBA is deposited onto the floor. The south section of the IBA Processing Building, the “Maturation Hall” contains the weathering process, here the received IBA is stored in windrows. These windrows are arranged in order of duration and temperature in preparation for processing. Generally, the IBA contains a high proportion of recoverable metal. This mix of ferrous and non-ferrous metal is

[1] A maximum of 5,000 tonnes per annum of Stable, Non-reactive Hazardous Waste is permitted to be accepted at the Knockharley Facility. However, to date this waste stream has not been imported to the facility.

recovered using Magnetic Separators and Eddy Current Separators. Initially, the IBA material is deposited within the feeder hopper with a loading shovel where large or oversized / unburnt material above 400 mm will be extracted, this oversized unburnt material is then returned to the incinerator for repeated incineration.

The remaining IBA material is passed along on conveyor belts, where the belt feeder then regulates the flow rate of material entering the system. Firstly, the IBA material is passed through large magnets that removes the ferrous IBA elements and is then sorted into different fractions based on the size of the residues.

Following this, non-ferrous IBA is also separated for onward reprocessing. This is passed through eddy current separators, to separate the different types of non-ferrous metal, at different distances according to their reaction to changing magnetic fields.

Both the ferrous and non-ferrous metals are separated into their various bays and bulk bags and then recovered for recycling. The remaining IBA residue after the process will be deposited within the IBA Facility designated Cells 27 – 29. The option for further use of the IBA Residue as a by-product is to be trialled over the coming months.

1.3.3 EXISTING LEACHATE MANAGEMENT INFRASTRUCTURE

A leachate treatment facility is located to the south of the weighbridge and main entrance, it consists of;

- Two leachate lagoons with floating covers are currently in operation at the facility. Leachate Lagoon LL1 serves the original waste cells and has a storage capacity of 2,500 m³, incorporating a 750 mm freeboard for safety and containment. Leachate Lagoon LL3 is designated specifically for IBA Cells 27–29 and has a larger capacity of 5,300 m³, also with a 750 mm freeboard.
- The facility includes two reinforced concrete bunds: the Leachate Plant Bund and the Leachate Storage Bund.
    - Leachate Plant Bund: Measuring 20.5 m × 17 m, this bund houses a 40-foot container that supports a Reverse Osmosis (RO) treatment plant with a processing capacity of 5 m³/hour. It also accommodates three polymer tanks, each with a capacity of 25 m³. Two of these tanks store raw leachate for supply to the RO system, while the third tank collects the concentrate discharged from the RO process.
    - Leachate Storage Bund: Slightly larger at 20.5 m × 18 m, this bund supports six polymer tanks, each also with a capacity of 25 m³. Five of these tanks store permeate produced by the RO system, which is subsequently pumped to the IBA Facility for use in dust suppression. The remaining tank receives leachate direct from the IBA Building, which is then transferred for treatment at the RO plant.
- It is also noted that, under existing planning permissions, Leachate Lagoon LL2 and Leachate Lagoon LL4 have been approved for development. Each lagoon is designed with a storage capacity of 5,300 m³ and includes a 750 mm freeboard to ensure safe containment. Although construction has not yet commenced, both lagoons are scheduled for development in 2026 and will provide essential additional leachate storage capacity to support ongoing operations at the facility.

All the cells associated with the Knockharley Facility, waste cells 1 – 26 and IBA Cells 27 – 29, contain a leachate collection and extraction system. A herringbone leachate collection slotted pipe

network installed within a 500 mm thick drainage stone blanket installed on each of the cell bases which will flow to a leachate collection sump for extraction by a side slope riser pipe, in accordance with the facility licence. The drainage stone has a minimum hydraulic conductivity of 1 x 10^{-3} m/s and consists of pre-washed, uncrushed, granular, rounded stone (16 mm to 32 mm diameter grain size).

Leachate is pumped from the side slope riser pumps to the perimeter leachate collection ring main. The leachate collection ring main is installed around the entire perimeter of the landfill cells and consists of two x 160 mm SDR 17 HDPE pipes which discharges leachate to the leachate lagoons.

Leachate from the waste cells and leachate from the IBA cells are processed through the RO treatment plant. The RO process is a two-stage process which extracts clean water from the aqueous solution of organic and inorganic contaminants that constitute the landfill leachate. Pressure is applied to the leachate against a semipermeable membrane forcing the water molecules to pass through the membrane, thus forming the clean Permeate. Most of the solutes or contaminants will be left behind forming the Concentrate.

Permeate is used for dust suppression to the IBA Facility. Concentrate is recirculated through waste Cell 1 – 10 as approved by the EPA. The benefits of leachate recirculation include faster stabilization of the landfill and enhance gas production. Excess leachate, if necessary, may be tankered off-site to a licensed wastewater treatment plant, in accordance with existing licence and planning conditions.

The various elements to the leachate infrastructure are showing in drawings IE0037029.9627-030.

1.3.4 EXISTING GAS MANAGEMENT FACILITY

Landfill Gas extraction at the Knockharley Facility is accomplished by utilization of engines and flares owned and operated by Bioverda Power Systems Ltd, located in the gas compound to the southeast of the facility and north of the Southern Attenuation System.

Currently, there are four engines on site. Two engines run continuously as lead engines, one engine provides back-up, and one is currently out of commission. The current gas yield is managed by two engines with no supplementary flaring. Standby capacity is provided by one 2,500 m^3/hr flare and two 1,500 m^3/hr enclosed flares. There is an ESB substation in the compound to facilitate the transfer of energy generated by the plant to the national grid via an overhead 20 kV power line. The landfill gas plant was commissioned in 2010 and has been exporting power to the grid since then.

The design philosophy for gas extraction assumes a vertical well spacing of 25 m. Subsequent vertical wells are installed either as vertical manhole rings, once the waste depth exceeds 5.0m, or retrospectively drilled at the same spacing once the waste has reached its designed elevation. These wells are extended progressively upwards as waste is deposited in the cells and are installed atop the leachate drainage stone layer.

Gas extraction commences from each cell once sufficient waste has been placed above the leachate drainage stone layer to prevent air infiltration into the gas extraction system. In addition, short-term use of driven extraction pipes (‘pin wells’) are used as a temporary gas collection measure, close to the working face. A slotted horizontal gas collection pipe also is installed at the top of the cell side-slopes to intercept any gas travelling up the cell embankments.

Landfill gas is fed via both temporary over-ground and permanent below-ground HDPE pipes to a 355 mm HDPE gas ring main located above ground and offset from the crest of the embankments of

the waste cells. The ring main transfers landfill gas from the cells to the landfill gas compound via two condensate knock-out pots located 'upstream' of the gas compound.

At present, Cells 1 to 14 are fully capped. As part of these works, there is a permanent gas collection system connected to the ring main. The gas extraction wells arrangement, gas compound and details are showing in drawings IE0037029.9627-033.

1.3.5 EXISTING SURFACE WATER

Surface water runoff for the facility is split into two catchments, draining by gravity to the north and to the south to designated attenuation systems. The surface water infrastructure consists of various pipeline networks, swales, surface water attenuation ponds and wetlands. The surface water system to the Knockharley Facility is showing in drawing IE0037029.9627-026.

The Southern Attenuation System receives surface water flows from the capped landfill cells, access roads and hardstanding areas associated with the administration building and maintenance building to a surface water trunk main collection pipe. This surface water trunk is located on the eastern side of the perimeter access road and runs between the administration building to the southern surface water attenuation pond. This below ground pipe main varies from 225 mm diameter up to 750 mm diameter. There is also a 450 mm diameter spur from this pipe main to the north of the permitted C&D Fines Treatment Facility building which runs from east to west and turns north to receive runoff from the main site access road. The pipe discharges to an existing attenuation pond and wetland at the south of the site, via a Class 1 bypass proprietary oil/water separator. This interceptor treats any accidental discharge of hydrocarbons within stormwater run-off prior to stormwater run-off discharging to the attenuation pond and further treatment provided by a wetland. The discharge pipe from the Attenuation Pond is controlled by a slam shut valve that prevents surface water discharging if continuous monitoring indicates potential contamination of the surface water.

Similarly, the Northern Attenuation System receives surface water flows from the northern half of the facility. Surface water runoff from the IBA Building roof is collected in rainwater harvest tanks, while surface water runoff from the IBA Building yards is captured in the IBA cells or in the IBA chamber and sent to the IBA Leachate Lagoon 3 for storage before being treated in the Treatment Plant. Elsewhere, surface water runoff from access roads and the eastern berm are collected and directed via perimeter swales to the northern attenuation system. These swales are of approximate depth 600 mm with a bottom width of 500 mm and side slopes of 1 in 3. The perimeter swales divert underground to a network of 350 SDR 17 HDPE pipes where surface water is conveyed to a silt chamber before entering the Class 1 bypass proprietary oil/water separator. From here, surface water is discharged to the Holding Pond, then the Attenuation Lagoon before entering the wetlands. The Holding Pond is primarily designed to contain and isolate any contaminated surface water if spillage occurs from the facility, and the Attenuation Lagoon is primarily designed to attenuate and manage the discharge rate and volume of stormwater. The discharge pipe from the Holding Pond to the Attenuation Lagoon is controlled by a slam shut valve that prevents surface water discharging if continuous monitoring indicates potential contamination of the surface water.

The wetland polishes any remaining sediment over and above statutory requirements.

After treatment, surface water is discharged form each system to the Knockharley Stream in accordance with the Knockharley Facility EPA licence W0146-04.

1.3.6 EXISTING UTILITIES

The existing utilities to the Knockharley Facility are showing in drawings IE0037029.9627-025-01 and are detailed below.

Electricity

There are existing overhead power lines which traverse the footprint of the Knockharley Facility. A 220 kVA running north south and adjacent to the western boundary of the existing landfill footprint. A 20 kVA overhead power line running north south on the eastern boundary provides power to the facility at the ESB substation north of the IBA Facility. An ESB substation located within the Gas Compound exports power to the grid via the 20 kVA line. Local electrical power distribution for the facility is through underground ducting.

Networks

Internet and CCTV cables are also installed in underground ducts, mainly running alongside the main access road and internal access roads. Wireless internet connection is provided at the weighbridge, administration building and at the IBA Processing Building.

Water

The Knockharley Facility is connected to the water mains. Supply is provided from connection at main entrance road at N2.

Foul Water

All foul effluent generated from administration welfare facilities is collected on site and passed through a ‘biocycle’ treatment unit. After treatment, the effluent is discharged to Leachate Lagoon 1, via underground pipework.

Gas

The Knockharley Facility has no connection to the gas main. However, there is an existing underground natural gas main pipeline traversing the Site to the south.

2 PROPOSED DEVELOPMENT

The proposed development will consist of a phased extension of the existing Knockharley Facility landfill cells and details are showing on drawing IE0037029.9627-007 and comprises of the following;

- An extension of the existing landfill cells footprint area by approximately 18 ha to the western boundary of the Knockharley Facility. The construction of ten (10 no.) additional engineered landfill cells, including the 'Piggyback Cell'. A piggyback landfill cell is a waste cell built on top of a landfill to expand capacity vertically, reusing existing infrastructure and minimising land use.
- The proposed development will provide approximately 4.12 million m^3 storage for the continued disposal of waste. The total proposed footprint of landfill cells will be 109 ha.
- The design of the proposed landfill extension will have a final post settlement contour height of 85 m AOD and the embankment heights will match and merge to the existing embankment levels. The proposed development will be fully integrated with the existing landfill layout and will adhere to the same engineering, environmental protection, and operational standards currently in place.
- All associated leachate collection and landfill gas infrastructure for the proposed expansion shall connect to the existing landfill cells utilities. The existing utilities for leachate and landfill gas can accommodate the cells for the expansion without new infrastructure required.
- The extension of existing below ground infrastructure, power, water, telemetry to provide services to the proposed expansion works.
- The existing 220 kV overhead ESB powerline currently crosses the site north to south through the footprint of the proposed development. This 220 kV powerline is required to be realigned to facilitate the expansion. In consultation with the ESB, 7 new 220 kV towers will be needed to divert the powerlines around the footprint of the expansion and the decommissioning and removal of the existing 3 towers in the works. The new towers will be between 20.06 and 26.175 m high.
- To accommodate the proposed footprint of the expansion, the Knockharley Stream will be required to be diverted around the expansion outline. The Knockharley Stream has been previously diverted for the existing waste cells and a similar process will be required for the proposed expansion. To provide access to the north gate in case of emergencies and the northern part of the site, it will be necessary to install a new culvert across the Knockharley Stream. A Section 50 application in accordance with the Office of Public Works (OPW) document 'A Guide to Applying for Consent under Section 50 of the EU (Assessment and Management of Flood Risks) Regulations SI 122 of 2010 and Section 50 of The Arterial Drainage Act, 1945' will be submitted to the OPW to seek permission for this crossing. In accordance with best practises and in consultation with Inland Fisheries Ireland (IFI) the culvert will be buried to a minimum depth of 0.5 m below the stream bed and the gradient in the culvert should not exceed 3%. The culvert shall be approximately 8 m long and 2.5 m wide at the base.
- Surface water runoff arising from the proposed new development will be required to be captured and diverted to its relevant attenuation system. Surface water runoff for the facility is split into two catchments, draining by gravity to the north and to the south to designated attenuation systems. The new surface water infrastructure will consist of various pipeline networks and swales to convey water to the existing attenuation systems. Prior to closure, the attenuation lagoon of the

Southern Attenuation System will be required to be expanded to facilitate the additional volume of surface water runoff from the proposed expansion.

- The installation of groundwater infrastructure will be required to collect and control groundwater seepage during the excavation of the proposed development waste cells. Groundwater seepage will be collected with an underground French drain and collector pipe network, directed to a sump and then pumped to the surface water system.
- The construction of additional screening berms along the northern and eastern boundary and an increase in the height of the previously permitted western berm. The northern boundary berms height will range from 10 – 14 m high. The western boundary berms height will range from 9 – 12 m high. The eastern boundary berms will be to a maximum height of 6 m. Access roads will be constructed adjacent the berm footprint.
- Tree feeling and new planting of trees are required for the proposed development. The proposed expansion footprint, screening berms and the relocation of powerlines require the felling of circa. 15 ha of the existing commercial forestry. New planting will cover the loss of the commercial forestry. Additional new planting of 3.9 km of hedgerows / tree lines of new woodland will also off-set the loss of the commercial forestry.
- The proposed development will require the construction of additional perimeter roads, access roads and haul roads.
- Upon completion of acceptance of waste for the expansion cells, capping of the waste cells and all associated infrastructure and utility works to complete the restoration of the facility will be required.

2.1 PROPOSED DEVELOPMENT DETAILS

2.1.1 NON-HAZARDOUS WASTE LANDFILL CELLS

The proposed development is an extension of the existing landfill cells footprint area by approximately 18 ha to the western boundary of the Knockharley Facility. This includes the construction of ten (10 no.) additional engineered landfill cells, including the 'Piggyback Cell'. A piggyback landfill cell is a waste cell built on top of a landfill to expand capacity vertically, reusing existing infrastructure and minimising land use.

The Knockharley Facility has an annual intake of 285,000 tonnes of non-hazardous household, commercial, Industrial and Construction and Demolition wastes. The proposed development will provide approximately 4.12 million m^3 storage for the continued disposal of waste. The total proposed footprint of landfill cells will be 109 ha.

The overall design for the extension incorporates landfill with the bases grading towards the sumps located at the corner of each cell adjacent to the inter-cell bund. Cell depths below existing ground level will continue as per the existing planning permission and IED Licence. Cell bases are approximately 112 m long and 95 m wide and are located approximately 8 - 17 m below the crest and grade at 1(V):100(H) and 1(V):150(H) towards the sump. Cell base elevations are approximately 55.5 m AOD at the high internal corners and approximately 54.0 m AOD at the low external corner where the sump is located. The base of the sumps are at a further depth of 53.0 m AOD.

The embankment upstream side-slopes are battered at no steeper than 1(V):3(H) with a final crest width of approximately 16.5 m. Embankment crest elevations along the west side of the proposed landfill cells peak at an elevation of 71.0 m AOD and grades to the northeast crest elevation of 66.5 m AOD and grades to the southeast crest elevation of 62.75 m AOD. The embankments for the proposed extension cells will merge with the embankments of the existing landfill cells embankments. The embankment crest elevations grade gently at approximately 1(V):400(H) from the western embankment to the north of the eastern embankment (existing Embankment) and 1(V):70 (H) from western embankment to the south of the eastern embankment (existing Embankment) with the highest point on the western embankment and the lowest point on the southeastern embankment. This gentle grading facilitates the draining of condensate from the gas ring main via a drip leg system and to facilitate surface water movement while still allowing ease of access for waste trucks.

Cell divider bunds are proposed to be constructed at 12 no. discrete locations, typically 2 no. within each cell. These bunds comprise a minimum 1 – 1.5 m high bund above the cell base elevation with a 0.5 m wide crest and sides slopes of 1(V):2(H). The bund crest is at a level elevation of c. 56.5 m AOD which leads to an increase in bund height as the cell base elevation decreases. The bunds shall be constructed of compacted clay liner material with a maximum hydraulic conductivity of 1 x 10^{-9} m/s, above the 1 m depth of compacted clay basal liner and trimmed to grade

As with the other cells at Knockharley and in accordance with Condition 3.29.1 of the licence, a composite lining system comprising of a minimum of 1 m depth of compacted clay liner with a maximum hydraulic conductivity of 1 x 10^{-9} m/s, a 2 mm thick HDPE geomembrane and a geotextile protective layer is proposed for the cell bases, bunds and embankment upstream side slopes. The HDPE geomembrane and geotextile protection layer are secured in an anchor trench measuring 0.6 m wide x 0.6 m deep excavated on the crest of the embankments, offset by 1 m.

The proposed material to be used to construct the compacted clay liner is the indigenous clay soil found at the site. The excavation will provide an adequate supply of boulder clay from the footprint of the proposed landfill expansion. A portion of selected excavated material will be screened to provide clay liner material for the cells. The excavated material has been a proven sources of suitable clay liner material for previous cells constructed at the facility. Oversized cobbles and boulders from the clay liner screening will be used on site as granular fill for haul roads and internal roads.

A 2 mm thick HDPE geomembrane (double textured on side slopes and smooth on the cell base and bunds) shall be installed above the compacted clay liner. The double textured liner shall extend a minimum of 1.5 m onto the cell floor from the toe of the upstream side slopes. The installation of the HDPE geomembrane will be subject to strict CQA in accordance with the EPA's Landfill Design Manual.

A protection geotextile shall be placed above the HDPE geomembrane liner. The grade of the geotextile required will be dependent on the leachate stone size, grading and angularity procured for the Works and will be determined using the Cylinder Test in accordance with the EPA Landfill Site Design Manual.

As with all previous cells at the facility, a herringbone leachate collection slotted pipe network will be installed within a 500 mm thick drainage stone blanket, in turn installed on each of the cell bases. Within this system, leachate will flow to a leachate collection sump for extraction by a pump installed

within a side slope riser pipe; this is in accordance with the facility licence and will require leachate removal. The drainage stone has a minimum hydraulic conductivity of 1 x 10^{-3} m/s.

During cell construction, the perimeter gas collection pipework will be extended from the in-situ above ground system on-site. Horizontal and vertical gas collection pipework will be installed during construction and during filling of the cells with waste to facilitate extraction, under negative pressure, of landfill gas from the proposed landfill cells to the gas compound. A gas booster pump will be required to enable the captured gas to reach the gas compound.

Further detail on the design of the landfill is provided in Chapter 2 of the EIAR. Sections through the proposed landfill are shown in Drawing No.'s IE0037029.9627-023-01 and IE0037029.9627-023-02. Details of the proposed cells are included in Drawing No.'s IE0037029.9627-035 and IE0037029.9627-036.

2.1.2 RELOCATION OF EXISTING OVERHEAD POWERLINES

As part of the proposed extension, it is necessary to relocate an existing 220 kV overhead ESB powerline. This high-voltage powerline currently traverses the western boundary of the existing landfill site and would conflict with the footprint of the proposed landfill extension. The existing alignment of the 220 kV transmission line presents a conflict with the footprint of the proposed landfill extension, necessitating its realignment to eliminate infrastructure overlap and ensure regulatory compliance

The proposed infrastructure upgrade entails the reconfiguration and horizontal realignment of the existing 220 kV overhead transmission corridor within the defined facility site perimeter. The relocation works includes the systematic decommissioning and dismantling of the three existing 220 kV transmission structures currently intersecting the site.

In consultation with the ESB, a total of seven new 220 kV self-supporting steel frame towers will be erected along a re-engineered alignment designed to optimize clearance for the proposed landfill extension infrastructure and ensure compliance with ESB Networks' statutory design and safety parameters. The proposed structures will range in height from approximately 20.06 m to 26.175 m, subject to final structural design specifications and geotechnical constraints. Refer to ESB Networks drawing references PG567-D004-708-001-000 and PG567-D004-711-001-000 and Drawing No.'s IE0037029.9627-025-02 and IE0037029.9627-035 as submitted in the planning documentation.

2.1.3 KNOCKHARLEY STREAM DIVERSION

To accommodate the footprint requirements of the proposed landfill extension, the existing alignment of the Knockharley Stream must be hydrologically diverted. The stream realignment is necessary to eliminate direct overlap with the extended landfill footprint and ensure compliance with environmental and infrastructural design standards.

The reconfigured watercourse will predominantly remain an open-channel system, preserving natural flow dynamics and ecological connectivity and will not result in any significant changes to flow regime, connectivity, or water quality. The open channel sections will be designed to mimic natural conditions and will incorporate geomorphological features such as, pools and riffles where feasible, along with appropriate bed and bank materials to promote aquatic and riparian habitat.

However, at the point of intersection with the existing access road, a culverted crossing will be introduced to facilitate vehicular passage while maintaining hydraulic continuity. This vehicular

access is required to the north of the facility to enable access to licensed environmental monitoring points and to facilitate an alternative emergency access to the Facility via the north gate if required.

The culvert design will adhere to best practice in engineering, incorporating appropriate sizing, invert levels, and flow capacity to mitigate flood risk and ensure long-term structural integrity. A separate Section 50 consent application is being submitted to the Office of Public Works (OPW) for approval of the culverted segment, in accordance with the statutory provisions of the Arterial Drainage Act 1945 (as amended).

Consultation has taken place with Inland Fisheries Ireland (IFI) regarding the design of the stream diversion and culvert. IFI conducted a site visit on 8th May 2025 as part of the consultation and following the visit issued correspondence to note they were satisfied with what was being proposed. Requirements for the culvert construction were agreed on and incorporated into the design. Specifically, that the culvert will be buried to a minimum depth of 0.5 m below the stream bed and that the gradient in the culvert should not exceed 3%. The material used to embed the culvert will be similar to that of the existing stream bed.

A Culvert Hydrologic and Hydraulic Assessment has been prepared by WSP (IE0037027.9697-R9.V0) and submitted with the planning application documentation. The report summarises the methodologies employed and outcomes from the completed hydrologic and hydraulic assessment.

The location of the diversion and culvert are shown in Drawing No.'s IE0037029.9627-007 and IE0037029.9627-027. Details of the proposed diversion and culvert are included in Appendix B the drawings for the Culvert Hydrologic and Hydraulic Assessment Report.

2.1.4 SURFACE WATER DRAINAGE NETWORK

The proposed extension will require a surface water drainage network designed to collect, convey, and discharge rainwater runoff from impermeable surfaces (e.g., roads, landfill caps) to prevent flooding, erosion, and water pollution. This drainage system for the facility is split into two catchments, draining by gravity to the north and to the south to designated attenuation systems.

The west of the proposed extension exhibits a local topographical high point at the intersection of Cells 35 and 37. This elevated terrain functions as a natural hydrological divide, influencing the directional flow of surface water runoff.

- Northward runoff from this peak is conveyed toward the northern attenuation system which includes a holding pond, the Northern Attenuation Lagoon and an Integrated Constructed Wetland,
- Southward runoff is directed to the southern attenuation system which includes a southern attenuation lagoon and an Integrated Constructed Wetland.

This runoff is collected by the proposed swale network as shown on Drawing No.'s IE0037029.9627-027 and IE0037029.9627-028 and travels by gravity to its designated attenuation system. Grassed swales have been proposed to provide treatment and convey surface water runoff to the attenuation ponds. One continuous swale will be constructed around the newly proposed landfill cell perimeter at the toe of the embankments.
The grassed swales during the active landfill will be maximum 600 mm deep, with 1:3 side slopes and a bottom width of 500 mm. There may be some minor tweaks to the dimensions of the swale laid out above which will take place at detailed design stage for closure for the facility.

Northern Attenuation System

The Northern Attenuation System has been designed to only provide long-term storage (no short-term storage) which will discharge at a maximum rate of 69 l/s and 109 l/s during a 1:1 and 1:100 AEP event, respectively.

The Northern Attenuation Lagoon and Holding Pond have a total live storage volume of 7,921 m^3 (6,317 m^3 and 1,604 m^3 respectively). The total storage volume required to attenuate the 1:100 AEP event is 7,901 m^3, therefore the Northern Attenuation Lagoon and the Holding Pond will be sufficient to accommodate the design storage volume, however modification will be required to the discharge pipe arrangements. The two ponds are hydraulicly connected, with a large diameter pipe, and will function as a single attenuation system. An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

Southern Attenuation Pond

The Southern Attenuation Pond has been designed to provide long-term and short-term storage. The long-term storage will discharge at a maximum rate of 102 l/s and 107 l/s during a 1:1 and 1:100 AEP event, respectively. The maximum short-term storage volume will be 11,491 m^3 and will be discharged at a maximum rate of 505 l/s.

Southern Attenuation Pond has a total live storage volume of 6,888 m^3. The total storage volume required to attenuate the 1:100 AEP event is 9,464 m^3. The current attenuation capacity provided by the Southern Attenuation Pond will need to be increased from approximately 6,888 m^3 to the proposed total capacity of approximately 12,700 m^3. Additionally, modifications to the configuration of the outlet pipes will be required. An emergency spillway has been provided within the design to safely pass any exceedance flows above the 1:100 AEP level.

The location of the Attenuation Systems and layouts and details is shown in Drawing No. IE0037029.9627-028.

2.1.5 SCREENING BERMS

As part of the proposed development, perimeter screening berms will be constructed using excavated materials generated during the formation of landfill cells. This method involves the strategic reuse of site-won soils, aligning with best practices in resource efficiency and sustainable management.

By repurposing excavated material on-site, the development significantly reduces the need for off-site disposal and minimises reliance on imported fill. This approach not only lowers the environmental footprint associated with transportation and material sourcing but also supports circular economy principles by retaining valuable resources within the project boundary.

The berms will be located along site boundaries to provide effective visual screening of operational areas from nearby receptors, including residential dwellings and local roadways. The berms will also serve to reduce the transmission of noise and dust beyond the site boundary.

Several permitted screening berms have already been constructed on-site, with additional berms approved under previous planning applications. The current proposal introduces modifications to the footprint and volume of these permitted berms and includes the construction of new berms to support the evolving site layout.

The proposed berms will vary in height from 6 to 14 m, with side slopes designed at a gradient of 1V:3H, ensuring both stability and ease of maintenance. The total volume of berm material including both newly proposed and partially permitted berms is estimated at 317,454 m^3. To facilitate construction, haul roads will be located within or immediately adjacent to the berm footprints, minimizing land disturbance and optimizing material movement across the site.

Following construction, berms will be covered with a layer of topsoil and seeded with appropriate grass and wildflower mixes to encourage vegetation establishment, soil stabilisation and habitat development. Where appropriate, native trees and hedgerows will be planted on or at the foot of the berms to further enhance biodiversity and contribute to the site's long-term restoration objectives.

The location of the berms is shown in Drawing No. IE0037029.9627-007. Details of the Landscape Strategy prepared by Macroworks and the Biodiversity Management Plan prepared by Scott Cawley, submitted with the planning application.

2.1.6 INTERNAL ROADS

To support the safe and efficient movement of vehicles within the Facility, a series of new internal roads will be developed. These roads are designed to optimise traffic flow, enhance operational logistics, and ensure secure access throughout the facility.

A key component of the proposal includes the phased construction of a new perimeter road encircling the footprint of the proposed landfill extension. This new route will seamlessly integrate with the existing perimeter road surrounding the current landfill, creating a continuous and cohesive internal transport network.

The road layout will be engineered to accommodate heavy vehicle traffic, with appropriate turning radii, surface grading, and drainage provisions. This infrastructure will also support haul routes for berm construction and other site activities, minimising disruption and improving overall site efficiency

The road design incorporates cross falls and longitudinal gradients to promote effective surface water drainage. These engineered slopes will direct runoff away from trafficked areas, reducing the risk of surface water accumulation. Surface water drainage around the landfill footprint will primarily consist of open swales, which offer a sustainable and low-impact method of conveying runoff. These swales will channel water towards designated attenuation systems, where flow rates can be controlled and water quality managed.

To ensure environmental protection, all collected runoff will pass through a Class 1 bypass fuel/oil interceptor prior to discharge into the attenuation systems. The existing designed bituminous road will be extended to the north of the embankment for Cells 25 & 26. All other roads during will typically comprise of site recovered stone aggregate compacted using vibrating rollers on separation membranes or stabilised clay covered with site recovered stone aggregate.

The location of the internal roads is shown in Drawing No. IE0037029.9627-024.

2.1.7 PERMANENT CAPPING

Future permanent capping will be implemented on a phased basis, covering both the existing waste cells and the proposed extension cells. This approach ensures long-term containment, environmental protection, and compliance with the facility licence.

A fully engineered cap has already been installed over waste Cells 1-14. This capping system comprises:

- Gas Collection Layer: Facilitates extraction and management of landfill gas.
- Geomembrane Barrier: 1 mm thick fully welded LLDPE geomembrane providing a low-permeability seal.
- Sub-Surface Drainage Layer: Manages infiltration and prevents water accumulation above the cap.
- Subsoil Layer: Supports vegetation and contributes to structural stability.
- Topsoil Layer: Final surface layer for landscaping and erosion control.

The combined thickness of the subsoil and topsoil layers is 1 metre, in accordance with the requirements of the facility licence.

The proposed extension waste cells will also receive a permanent cap after waste infilling has been completed and initial settlement period to allow for subsidence and stabilisation has passed. The plan of the capped cells and details is shown in Drawing No. IE0037029.9627-022 and IE0037029.9627-037.

2.1.8 TELEMETRY SYSTEM

One room within the administration building is dedicated to a supervisory control and data acquisition (SCADA) system. The SCADA system manages all electronic data arising on site. The system also exercises control over certain elements of the site such as:

- Leachate pumps;
- Stormwater pumps;
- Stormwater control valves;
- Traffic management barriers etc.;
- CCTV; and
- Internal and external alarms

Data logged includes information from:

- The weather station;
- Level sensors in all tanks and lagoons;
- Continuous monitors (both environmental and safety);
- The weighbridge computer;
- Electrical power usage;
- Active landfill gas management system (flare); and
- Run/overload status on all motors.

The SCADA system is equipped with an internal backup system that transmits all data off site on a daily basis. The SCADA system will be updated to take account of all new elements for the proposed extension.

3 CONSTRUCTION

For the landfill extension construction, significant earthworks are required and suitably experienced civil engineering and earthworks personnel shall be employed to construct the cell bases and embankments as well as for the installation of the lining system and other associated infrastructure. The Works shall be overseen by a suitably experienced civil engineering consultant.

3.1 CONSTRUCTION PROGRAMME

The landfill extension shall be constructed in a leapfrog strategy, where new landfill cells are built ahead of or adjacent to active cells, rather than in a strictly linear sequence. This methodology allows for continuous operation, optimized land use, and flexible infrastructure deployment.

The landfill extension will require significant earthworks, executed through a cut and fill construction strategy to prepare the site for waste cell development and associated infrastructure. The scope of major activities includes:

- Excavation to Formation Level: Material will be excavated to achieve the design base level for each proposed waste cell, ensuring proper grading and subgrade stability;
- Embankment Construction: Fill material will be placed and compacted to form perimeter embankments, providing structural containment and access routes;
- Clay Liner Placement: Engineered clay will be placed and compacted to meet permeability requirements, forming the base of the liner system;
- Screening Berms: Earth berms will be constructed to provide visual and environmental screening, using suitable fill material sourced from on-site excavation;
- Capping Preparation: Final earthworks will include shaping and grading for future capping layers.

As part of the landfill extension, infrastructure elements will be constructed in parallel with the phased development of waste containment cells. This approach ensures operational readiness, minimizes disruption, and supports environmental compliance throughout the construction lifecycle.

The proposed cell layout and phasing for the proposed development are presented in Drawing No.'s IE0037029.9627-007, IE0037029.9627-020-1 and IE0037029.9627-020-2 and the phasing presented in Table 3-1. Concurrent Infrastructure provision will be developed with cell construction, including:

- Access Roads: Internal haul roads and perimeter roads will be extended progressively to service active and future cells;
- Power Supply: Electrical infrastructure (cabling) will be installed to support telemetry, pumping stations, and site operations;
- Telemetry Systems: Real-time monitoring equipment for gas, leachate, and environmental parameters will be deployed as each cell becomes operational;
- Gas Collection Network: Vertical extraction wells and header pipes will be installed in active cells, with connections to the Gas Compound;
- Leachate Management: Collection pipes, sumps, and pumping infrastructure will be embedded during cell construction and commissioned upon completion;
- Surface Water Controls: Swales, sumps and discharge points will be constructed to manage runoff and prevent contamination;

- Groundwater Controls: Sub-liner feeder drains, collector drains and sumps will be installed to manage groundwater during cell excavation;
- Landfill gas monitoring boreholes shall be installed at 50 m intervals around the periphery of the proposed landfill extension footprint in accordance with Drawing No. IE0037029.9627-019.

Table 3-1 – Proposed Phasing

Infrastructure	Construction Programme (Post Planning Permission) Years	Waste Cells Filling (Post Planning Permission) Years	Capping Years (Post Planning Permission) Years	Phase
Tree Felling, Site clearance, CEMP and EIAR Mitigation Requirements	0 - 2			1
Screening Berms 1 – 3, 10 – 12	0 - 2			1
Surface Water Infrastructure	0 - 2			1
Stream Diversion & Culvert	0 - 2			1
Cells 31 - 32	0 - 2	3 - 4		1
Cells 33 - 34	3 - 4	4 - 7		2
Cells 35 - 36	6 - 7	7 - 10		3
Cells 37 - 38	9 - 10	10 - 14		4
Screening Berms 4, 5 & 7	9 - 10			4
Cell 39	13 - 14	15 - 16		5
Cell 40 Piggyback	16 - 17	17 - 19		6
Cells 31 - 32			6 - 7	3
Cells 33 - 34			9 - 10	4
Cells 35 - 36			12 - 13	5
Cells 37 - 38			16 - 17	6
Cell 39			18 - 19	7
Cell 40 Piggyback			19 - 21	7

3.2 EARTHWORKS BALANCE

The proposed landfill cells extension involves the bulk excavation of the in-situ material to the formation level of the base and embankments of the proposed cells. An estimated excavation

volume of 1,799,042 m^3 will be required. A portion of the embankments will require a level of filling of material to achieve the formation elevation, some circa. 120,689 m^3 and the proposed screening berms will require some circa. 627,682 m^3 of fill. It is currently envisaged that the 10 no. landfill cells will be excavated on a phased basis over a 17-year period. The total quantities of cut and fill on site to allow the proposed development to proceed are noted in Table 3-2 and Table 3-3.

Table 3-2 – Earthworks Balance Cut

Item	Volume m^3
Cell Construction Formation Cut	1,746,402
South Attenuation Pond Extension	52,640
Total Cut	**1,799,042**

Table 3-3 – Earthworks Balance Fill

Item	Volume m^3
Screening Berms	627,682
Stream Diversion & Lower Road Fill	37,918
Cell Construction Fill Volume	120,689
Compacted Clay Liner Cells	168,443
South Attenuation Pond Extension Clay Liner	12,943
Capping Volume Existing Cells 15 – 26	162,325
Capping Volume Proposed Cells 31 – 40	301,977
Total Fill	**1,431,977**

The earthworks balance assessment for the proposed landfill extension indicates a surplus amount of soil and stone material of 367,065 m^3. While this excess is currently identified as surplus, further opportunities for reuse may emerge during the construction phase.

Specifically, the use of soil and stone as daily cover material for active waste cells or for landscaping may present viable options for incorporating additional volumes of this material. These applications will be assessed dynamically as construction progresses, with decisions guided by:

- Material suitability (e.g. grading, compaction, permeability)
- Operational needs
- Environmental compliance
- Visual and ecological enhancement goals

This adaptive reuse strategy supports the project's commitment to minimizing off-site disposal, reducing traffic on public roads, and aligning with sustainable resource management principles. The

proposed design levels for the landfill extension including associated infrastructure such as internal roads have been carefully aligned with existing ground levels wherever feasible and existing landfill cells. This approach is intended to minimize the scale of earthworks, reduce environmental disturbance, and optimize material reuse. Proposed site levels are illustrated in the relevant planning drawings. Final levels and grading details will be confirmed during the detailed design stage, following validation and regulatory review.

4 WATER

For the proposed extension to the Knockharley Facility, no new water connection is required. The existing mains water connection for the facility is adequate.

Mains water supplies the site for use in water dispensers in offices and welfare facilities for drinking. This practice will continue under the new development.

4.1 FIRE WATER RETENTION

Firewater generated during firefighting activities at the facility will be managed in strict accordance with:

- The EPA's Guidance on Retention Requirements for Firewater Run-Off (2019);
- Condition 3.13 of the Industrial Emissions (IE) Licence issued by the EPA.

Knockharley has a documented response procedure, EMS-OP-28 Fire Prevention Plan and EMS-SP-07(A) Emergency Preparedness & Response (Internal), for a fire outbreak in the landfill cells and a copy is in Appendix B.

Based on operational experience, fires within landfill cells are typically extinguished rapidly. The firewater used in suppression is:

- Absorbed by the in-situ waste, or
- Directed into the leachate collection system, where it is contained within the individual landfill cells and leachate storage lagoon.

This ensures that potentially contaminated firewater is effectively isolated from the wider environment.

Fires occurring outside the landfill cells may generate contaminated firewater, which is managed as follows:

- Collected via the site surface water drainage system;
- Directed to and retained within the Northern and Southern Attenuation Systems

If contamination is detected:

- Automated slam shut valves are triggered by sensor readings

These valves close the pipe outlets, isolating the firewater within:

- The Holding Pond (Northern Attenuation System)
- The Attenuation Lagoon (Southern Attenuation System)

Contaminated water can be extracted using vacuum tankers and transported off-site to a suitably licensed wastewater treatment plant for safe disposal.

4.2 FIREFIGHTING WATER

For the proposed extension, the existing firefighting water system will continue to supply water, requiring no new infrastructure. It is primarily fed from the mains line, with backup provided by attenuation ponds and a dedicated 25 m³ rainwater harvesting tank at the IBA Process Building.

Two mains-supplied hydrants located at the main office and weighbridge offer immediate access, while the IBA Process Building is served by a six-hydrant ring main supplied by a 108 m³ fire water tank connected to the mains as shown on Drawing No IE0037029.9627-025-01.

Furthermore, should additional water be required, the existing Northern Attenuation System can provide a storage volume of approximately 9,000 m^3, while the Southern Attenuation System can provide a storage volume of approximately 6,900 m^3.

The hydrants' locations and pressure requirements for fire main system are in accordance with the current Technical Guidance Document B – Fire Safety of the Building Regulations and other requirements of the EPA for waste treatment facilities in accordance with the requirements of an Industrial Emissions (IE) Licence.

4.3 ANCILLARY WATER REQUIREMENTS

As a result of the proposed development, certain existing water demands at the facility are expected to increase slightly. These include:

- Facility wash-down and cleaning activities;
- Replenishment of wheel wash systems; and
- Dust suppression measures across operational areas.

To meet these increased demands, water will be sourced sustainably from:

- Rainwater harvesting tanks located at the IBA Building; and
- Ponds connected to the Northern and Southern Attenuation Systems.

This approach ensures that the facility continues to operate efficiently while minimizing reliance on the mains water supply.

5 SURFACE WATER

5.1 GENERAL

As discussed in Section 2.1.4, west of the proposed extension exhibits a local topographical high point at the intersection of Cells 35 and 37. This elevated terrain functions as a natural hydrological divide, influencing the directional flow of surface water runoff.

- Northward runoff from this peak is conveyed toward the northern attenuation system which includes a holding pond, northern attenuation lagoon and an Integrated Constructed Wetland,
- Southward runoff is directed to the southern attenuation system which includes a southern attenuation lagoon and an Integrated Constructed Wetland.

All clean surface water collected from the proposed landfill extension, and its subsequent capping, will discharge to surface water swales around the perimeter of the landfill embankment as shown on Drawing No's IE0037029.9627-027 and IE0037029.9627-028 where it will flow by gravity to its designated attenuation system.

5.2 SURFACE WATER DESIGN

The surface water system has been designed to meet the requirements set out in the Greater Dublin Regional Code of Practice for Drainage Works V6.0, in line with the Greater Dublin Strategic Drainage Study (GDSDS) and the CIRIA SuDS Manual C753.

The facility surface water design has been sized for the closure phase, which is defined as the phase after the facility has been capped but prior to the decommissioning of the hardstanding areas such as roads, etc. which will be rehabilitated prior to post-closure. This is deemed the worst-case scenario for surface water runoff catchments.

A 10% increase in the precipitation depth has been incorporated into the design to allow for climate change, based on section 3.12 of the Greater Dublin Regional Code of Practice. Consideration was also given to Flood Risk Management, Climate Change Sectoral Adaptation Plan (CCSAP), prepared by the OPW under the National Adaptation Framework, which recommends an increase of 20% in extreme rainfall depth for the Mid-Range Future Scenario (MRFS). However, given the short timeframe over which active closure will occur, and the relatively short facility lifetime, application of this more extreme climate change allowances in design was considered excessively conservative.

A high-level analysis of storage requirements during post-closure has been undertaken to confirm that the High-Range Future Scenario 30% increase in extreme rainfall can be accommodated in the proposed attenuation ponds.

To meet all the criteria, the combined discharge rate from the two discharge points, the northern and southern attenuation ponds, for the post-development site will be limited to:

- A maximum discharge rate of 218 l/s for all attenuated stormwater from a 1:1 AEP event; and,
- A maximum discharge rate of 218 l/s for long-term storage; and,
- A maximum discharge rate of 636 l/s for short-term storage for up to 18,798 m^3.

The current attenuation capacity provided by the Northern Attenuation Pond and the Holding Pond will be sufficient to accommodate the design storage volume, however modification will be required to the discharge pipe arrangements.

The current attenuation capacity provided by the Southern Attenuation Pond will need to be increased from approximately 6,900 m^3 to the proposed total capacity of approximately 12,700 m^3. Additionally, modifications to the configuration of the outlet pipes will be required.

During the operational phase, the catchment reporting to the swales will be significantly smaller and only a nominally sized swale will be constructed on site until the closure stage has been reached. However, for closure, swales will be 600 mm deep, with 1V: 3H side slopes and a bottom width of 1 m.

At closure, the long-term attenuation systems will be further refined during the detailed design phase, ensuring compliance with evolving climate and flood risk standards.

Additional details and calculations for the surface water design are presented in Technical Memorandum IE0037027.9697-TM12.V1 included in the EIAR.

6 LEACHATE GENERATION

6.1 GENERAL

Leachate will be generated from the proposed expansion to the landfill. This leachate will primarily result from rainwater percolating through the waste mass, where it will absorb suspended and soluble contaminants originating from the waste materials.

As discussed in Sections 1.3.3 and 2.1.1, leachate will be collected via a herringbone leachate collection slotted pipe network installed within a 500 mm thick drainage stone blanket installed on each of the cell bases. This system will ensure that leachate will flow to a leachate collection sump for extraction by a pump installed in a side slope riser pipe; this is in accordance with the facility licence will requires leachate removal. The drainage stone has a minimum hydraulic conductivity of 1×10^{-3} m/s.

This system is designed in accordance with the EPA Landfill Design Manual, and in such a way to prevent excessive leachate levels in the landfill. Level sensors submerged in the leachate activate pumps which pump leachate out of the waste body when the level reaches a designated height. This pumped leachate from the cell sumps is conveyed via HDPE pipe perimeter ringmain to its designated leachate lagoon, waste cells 1 – 26 are directed to Leachate Lagoon 1 while leachate in IBA Cells 27 – 29 is directed to Leachate Lagoon 3.

From here, leachate is then pumped via a HDPE pipe network to the Treatment Facility, where leachate is treated using a Reverse Osmosis process. Excess leachate, if necessary, may be tankered off-site to a licensed wastewater treatment plant, in accordance with existing licence and planning conditions.

Efficient leachate management is critical to the environmental performance of the Knockharley Waste Management Facility. A key component of this strategy is the minimisation of leachate generation, which can be achieved through the implementation of sound operational practices, including:

- Minimising the active tipping face: Reducing the exposed waste area limits rainfall infiltration and subsequent leachate production.
- Applying temporary and intermediate capping: These measures act as barriers to precipitation, significantly decreasing the volume of water entering the waste mass.

As part of the proposed facility expansion, leachate generation quantities have been estimated to inform infrastructure design and ensure compliance with regulatory requirements. These estimates will guide the sizing of leachate collection, storage, and treatment systems, ensuring they are capable of handling projected volumes under varying operational and climatic conditions.

6.2 EXISTING LEACHATE AND PERMITTED INFRASTRUCTURE

The current leachate infrastructure at the Knockharley Facility consists of;

- Leachate Lagoon LL1, the original waste cells lagoon with a capacity of 2,500 m^3 with 750 mm freeboard;
- Leachate Lagoon LL3, a designated leachate lagoon for the Incinerator Bottom Ash (IBA) cells. The IBA lagoon has a capacity of 5,300 m^3 with 750 mm freeboard;

- A Reverse Osmosis (RO) treatment plant with a capacity of 5 m^3/hr. The RO treatment plant will run from Monday – Friday for 24-hour days.
- 9 no. 25 m^3 holding tanks (T1 to T9) within the treatment plant

The permitted planning infrastructure but not yet constructed at the Knockharley Facility consists of;

- 2 no. additional Leachate Lagoons, LL2 & LL4, each lagoon has a capacity of 5,300 m^3 with 750 mm freeboard.

The leachate treatment capacity and storage volumes are set out in Table 6-1 and Table 6-2 and respectively.

Table 6-1 – Knockharley Facility Annual Leachate Treatment Capacity

Infrastructure ID	Details	Volume m^3
RO Plant	5 m^3 / hr for 24 hrs for 5 days for 48[2] weeks	28,800
	Total Annual Leachate Treatment Capacity	**28,800**

Table 6-2 – Knockharley Facility Annual Permitted Leachate Storage Capacity

Infrastructure ID	Details	Volume m^3
LL1	Original Waste Leachate Lagoon, existing	2,500
LL2	Permitted Leachate Lagoon, not constructed	5,300
LL3	IBA Leachate Lagoon, existing	5,300
LL4	Permitted Leachate Lagoon, not constructed	5,300
T1 – T9	9 x 25 m^3 storage tanks, existing	225
	Total Permitted Storage Capacity	**18,625**

6.3 LEACHATE GENERATION METHOD

A leachate generation calculation was carried out for the proposed landfill extension and in accordance with the proposed phasing plan in Table 3-1.

The calculation was carried out in accordance with the Water Balance Calculation guidelines set out in section 7.2 of the Environmental Protection Agency's (EPA) Manual on Landfill Site Design, 2000. These guidelines use the following equation;

[2] An allowance of 4 weeks per year for maintenance has been allocated.

L0 = [ER(A) + LW + IRCA + ER(l)] – [aW]

Where:

L0 = leachate produced (m^3)
ER = effective rainfall (actual rainfall (R) used for active cells) (m)
A = area of cell (m^2)
LW = liquid waste (m^3) (note: this is not applicable as the Knockharley Facility does not accept liquid waste)
IRCA = infiltration through restored and capped areas (m)
l = surface area of lagoons (m^2) (note: this is not relevant at existing or proposed development as lagoons are for clean surface water only)
a = absorptive capacity of waste (m^3/t)
W = weight of waste deposited (t/a).

Factors required for the leachate generation are detailed below and any presumed values have been taken as a conservative approach.

- Effective Rainfall – 755 mm - Five-year average from Dublin Airport Met Eireann Station - per year (2020-2024).
- Liquid Waste – 0 – landfill accepts no liquid waste.
- Annual Evaporation = 0 mm per year (conservative).
- Annual Transpiration = 0 mm per year (conservative).
- Infiltration of Restored / Capped Area = 10%.
- Infiltration of Temp Capped Area = 30%.
- Annual Waste Intake = 285,000 t.
- Annual IBA Waste Intake to Cell = 120,000 t.
- Waste Density = 1.1 tonne / m^3.
- Waste Absorption Capacity = 0.025 m^3/m.

In estimating leachate quantities, precipitation data from the Dublin Airport Met Éireann Station was used, as it is the nearest available and historically referenced dataset for the Knockharley Facility. The Dublin Airport station is considered a highly reliable source and has consistently served as a benchmark for weather-related assessments at the site. Average annual rainfall was calculated using five years of recorded data from the station, providing a representative estimate of typical weather conditions at the facility. Conservative figure guidelines from the EPA are used for Evaporation, Transpiration, infiltration and waste absorption. The annual IBA waste intake has been allocated such that after metal recovery, approximately 120,000 tonnes of IBA residual will be deposited in the IBA cells.

The outcome of the assessment is summarised in Table 6-3 based on phasing plan and the IBA Facility remaining active throughout the waste filing process for the proposed extension cells. Refer to Appendix A for the calculations.

Table 6-3 – Knockharley Facility Leachate Generation Summary

Infrastructure	Phase	Leachate Volume per year m^3
Active IBA Cells Only	0	44,076
Existing Landfill Cells 1 - 18 Capped Temporary Capped Cells 19 - 24. Active Waste Filling Cells 25,26. Active IBA Cells	0	90,876
Existing Landfill Cells 1 - 18 Capped. Temporary Capped Cells 19 - 24. Active Waste Filling Cells 25,26,31,32. Active IBA Cells	1	122,660
Existing Landfill Cells 1 - 22 Capped. Temporary Capped Cells 23 - 26. Active Waste Filling Cells 31 - 34. Active IBA Cells.	2	118,901
Existing Landfill Cells 1 - 26 Capped. Temporary Capped Cells 31 - 32. Active Waste Filling Cells 33 - 36. Active IBA Cells.	3	109,608
Existing Landfill Cells 1 - 26 Capped. Cells 31 - 32 Capped. Temporary Capped Cells 33 - 34. Active Waste Filling Cells 35 - 38. Active IBA Cells.	4	120,389
Existing Landfill Cells 1 - 26 Capped. Cells 31 - 34 Capped. Temporary Capped Cells 35 - 36. Active Waste Filling Cells 37 - 39. Active IBA Cells.	5	118,849
Existing Landfill Cells 1 - 26 Capped. Cells 31 - 36 Capped. Temporary Capped Cells 37 - 38. Active Waste Cells 39 - 40. Active IBA Cells.	6	107,896
Existing Landfill Cells 1 - 26 Capped. Cells 31 - 40 Capped. Active IBA Cells.	7	80,616

6.4 KNOCKHARLEY FACILITY LEACHATE MANAGEMENT

As previously outlined, several measures have been implemented to minimize leachate generation at the Knockharley Facility. To further enhance leachate management, treated leachate, specifically

the permeate has been repurposed for dust suppression activities. The currently authorized IBA Building, as detailed in Section 1.3.2, incorporates a dust suppression system during the processing of IBA waste. To mitigate airborne particulate emissions during the handling and processing of IBA, a comprehensive dust suppression system has been integrated into the facility's operational design. This system is engineered to enhance air quality, ensure regulatory compliance, and improve working conditions across the site. This system comprises of spray bars, high-pressure rain guns, atomisers, perimeter water line and a truck wash area.

The IBA processing operation requires approximately 90 m^3 of water per day and is scheduled to run Monday through Saturday for 9-hour shifts.

Additionally, the permitted Construction and Demolition (C&D) Building yet to be constructed, will also incorporate a dust suppression system for waste processing activities. It is anticipated that the C&D Building will require a comparable annual volume of permeate to that used by the existing IBA Building. Accordingly, the same annual allocation for dust suppression has been designated. To support this demand, a second Reverse Osmosis (RO) treatment plant unit will be installed to supply treated leachate for dust suppression within the C&D Building.

Treated leachate, permeate shall be used as dust suppression for both the IBA Building and the C&D Building. The annual dust suppression volumes required are set out in Table 6-4 below.

Table 6-4 – Knockharley Facility Annual Dust Suppression Volumes

Infrastructure ID	Details	Treated Leachate Volume per year m^3
IBA Building	90 m^3 / hr for 9 hrs for 6 days for 48[3] weeks	25,920
C&D Building	Similar to IBA Building	25,920
	Total Annual Dust Suppression Volume	51,840

When estimating the expected annual leachate generation volumes for the facility, the assessment incorporates the phasing plan for the proposed extension landfill cells, the existing landfill cells, and the continuously active IBA cells. These projected volumes are balanced against the permitted leachate storage capacities and the total authorized annual demand for dust suppression. A summary of the expected leachate volumes to be managed is presented in Table 6-5.

Any annual excess leachate volumes generated beyond on-site treatment and reuse capacity will be managed in accordance with the facility's current permitted arrangements. This includes either recirculating the leachate within the landfill to enhance waste degradation and moisture balance or collecting and transporting it off-site to an appropriately licensed wastewater treatment plant for further processing.

[3] An allowance of 4 weeks per year for maintenance has been allocated.

Table 6-5 – Knockharley Facility Annual Leachate Management Summary

Phase	Leachate Volume per year m^3	Storage Volume [4]& Dust Suppression per year m^3	Excess Leachate per year m^3
0	90,876	70,105	20,771
1	122,660	70,105	52,555
2	118,901	70,105	48,796
3	109,608	70,105	39,503
4	120,389	70,105	50,284
5	118,849	70,105	48,744
6	107,896	70,105	37,791
7	80,616	70,105	10,511

[4] This analysis assumes the storage volume is fully emptied at the end of each calendar year, resetting the available capacity annually

7 CONSTRUCTION QUALITY ASSURANCE

To ensure the proposed development is constructed in full compliance with the intended design and technical specifications, a comprehensive Construction Quality Assurance (CQA) Plan will be implemented throughout the construction phase.

The CQA Plan identifies the personnel involved in the construction quality verification / confirmation, their inter-relationships and responsibilities. The CQA Plan also establishes the material reviewing and approving certification, reporting requirements, verification testing methods, sampling and analyses, and monitoring during remedial action,

An independent, suitably qualified CQA Engineer and / or Technician shall be present during the construction works to ensure application of and compliance with the CQA Plan. A full CQA validation report will be produced, following completion of the project to demonstrate compliance with this CQA Plan.

The major goals of this CQA Plan are the verification that:

- The Quality Control Standards are valid for the construction objective;
- The Specified Tests are being implemented and correctly performed; and
- The Quality Control Plan is working, and the records are verified and maintained.

The CQA inspection activities shall solely address the construction and the installation of all the components for the Project, to ensure that the works meet or exceed the Specification. below addresses the general CQA activities applicable for the construction items required for the works.

Table 7-1 – CQA Activities for Construction

CONSTRUCTION ITEM	CQA ACTIVITIES
Survey Works	▪ Review survey alignments, chainage and layouts; ▪ Confirm as-built surveys of compacted clay liner layers and sample locations; ▪ Confirm as-built surveys of geomembrane liner panels, destruct samples and repair locations; ▪ Confirm as-built survey of the works has been completed; and ▪ Approve field adjustments.
Excavation Works	▪ Inspect excavation works and materials excavated in the footprint of the works and assess for suitability for use in the works;
Soil Material Stockpiles and Borrow Areas	▪ Inspect screened clay liner material and assess for use in the works
Construction Materials	▪ Review Submittals for acceptance/rejection/additional info; ▪ Complete CQA Form Sheets for material deliveries; ▪ Conduct visual inspection of the materials delivered; ▪ Monitor conformance sampling; ▪ Review conformance testing results;

	▪ Review MQC documents; and ▪ Provide photographic record.
Subgrade Inspection	▪ Inspect the trimmed and compacted subgrade following excavation works; ▪ Communicate acceptance/rejection / remedial actions; ▪ Monitor and verify remedial actions; ▪ Provide adjustments for design changes and/or unusual conditions; ▪ Complete CQA Form Sheets; and ▪ Provide photographic records.
Fill Placement **(Suitable and Unsuitable Materials, Compacted Clay Liner Material, Drainage Stone and Leachate Drainage Stone)**	▪ Monitor fill material stockpile / borrow area quality, delivery, placement and compaction to confirm Specifications are being met; ▪ Monitor conformance sampling and in-situ testing; ▪ Conduct checks of position, elevation, lift thickness and slope gradient; ▪ Ensure weather conditions are appropriate for placement; ▪ Provide adjustments for design changes; ▪ Communicate acceptance/rejection/remedial action; ▪ Monitor and verify remedial actions; ▪ Review conformance testing results; and ▪ Provide photographic records.
Geotextile Placement **(Protection and Separation)**	▪ Confirm roll certification and report non-conformance; ▪ Monitor geotextile delivery, placement and lapping to confirm Specifications are being met; ▪ Monitor secure placement of the protection geotextile in the anchor trench, appropriate overlap with previous cells protection geotextile and sufficient external extent beyond berms for gravity anchor; ▪ Monitor secure placement and overlap of the separation geotextile in the sub-liner drainage trench; ▪ Monitor conformance sampling; ▪ Ensure weather conditions are appropriate for placement; ▪ Provide adjustments for design changes; ▪ Communicate acceptance/rejection/remedial actions; ▪ Monitoring and verify remedial actions; ▪ Complete CQA Form Sheets; ▪ Review conformance testing results; and ▪ Provide photographic record.
Geomembrane Placement	▪ Confirm material certification and report non-conformance; ▪ Monitor geomembrane delivery, placement and seaming to confirm Specifications are being met; ▪ Monitor placement of appropriate geomembrane for respective locations (smooth on the base and double-textured on the slopes and berms); ▪ Monitor secure placement in the anchor trench, connection to previous cells geomembrane and sufficient external extent beyond berms for gravity anchor; ▪ Monitor conformance sampling;

	▪ Ensure weather conditions are appropriate for placement; ▪ Provide adjustments for design changes; ▪ Communicate acceptance/rejection/remedial action; ▪ Monitor and verify remedial actions; ▪ Monitor trial seam testing and field testing of seams; ▪ Monitor and verify repairs; ▪ Complete CQA Form Sheets; ▪ Review conformance testing results; ▪ Provide photographic record; and ▪ Monitor Leak Location Survey following placement of protective geotextile and leachate drainage stone and ensure remedial actions are conducted and monitored, if necessary.
Surface Water Management **(Cell 25 - 26 Works Area)**	▪ Monitor and performance and adequacy of surface water management systems installed; ▪ Conduct checks of discharged water quality; ▪ Communicate acceptance/rejection/remedial action; ▪ Monitor and verify remedial actions; and ▪ Provide photographic records.
Pipework **(Sub-liner Drainage, Leachate Drainage, Side-Slope Risers, Service Duct and Leachate Ring Main)**	▪ Confirm material certification and report non-conformance; ▪ Monitor pipework delivery, installation and connection to confirm Specifications are being met; ▪ Confirm pipework location, elevation and grade; ▪ Monitor grade, bedding and backfilling of pipework; ▪ Monitor protection measures for side-slope risers; ▪ Provide changes or adjustment for design changes; ▪ Communicate acceptance/rejection/remedial action; ▪ Monitor and verify remedial actions; and ▪ Provide photographic records.
Reinforced Concrete Works	▪ Review survey alignments, chainage and layout; ▪ Confirm material certification and report non-conformance; ▪ Provide changes or adjustment for design changes; ▪ Communicate acceptance/rejection/remedial action; ▪ Monitor and verify remedial actions; and ▪ Provide photographic records.
Mechanical & Electrical	▪ Confirm pipework connection locations and details; ▪ Confirm material certification and report non-conformance; ▪ Monitor and assess in-situ testing; ▪ Provide changes or adjustment for design changes; ▪ Communicate acceptance/rejection/remedial action; ▪ Monitor and verify remedial actions; and ▪ Provide photographic records.

8 SUSTAINABILITY

Sustainability principles have been carefully integrated into every aspect of the Proposed Development's design. From site layout, material selection and reuse, to energy efficiency and water management, each design element reflects a commitment to minimizing environmental impact, enhancing resource efficiency, and supporting long-term operational resilience. These measures align with best practices in sustainable development and materially improve the facility's overall environmental performance.

The proposed cut and fill design utilizes excavated material on-site as fill, significantly reducing transport-related emissions and costs while minimizing environmental disruption. Additionally, the implementation of leapfrog phased construction for the facility extension mitigates soil erosion, limits sediment generation, and enhances operational efficiency. This approach optimizes machinery usage and fuel consumption, contributing to a lower overall carbon footprint.

The proposed infrastructure has been strategically optimized to maximize use of existing physical infrastructure and utilities already in place at the facility. Existing leachate storage, leachate treatment, leachate recirculation and landfill gas treatment systems within the current landfill will be integrated with the new landfill extension. This approach avoids the need for additional infrastructure and ensures continued use of proven systems throughout the lifetime of the facility.

Appendix A

LEACHATE GENERATION CALCULATIONS

Infrastructure	Phase	Existing Cells Active Area m^2	IBA Active Area m^2	Project West Active Area m^2	Active Area m^2	Annual Precipitation m	Active Area Infiltration rate * m^3	Fully Restored Area m^2	Restored Area Infiltration Fully Capped ** m^3	Temp Restored Area m^2	Restored Area Infiltration Temp Capped *** m^3	Liquid Waste **** m^3	Total Water m^3	Cumulative Water m^3	Absorptive Capacity AW m^3	Cumulative Absorptive Capacity AW m^3	Leachate Produced m^3
Active IBA Cells leachate only	0	0	62352.0	0.0	62352.00	0.755	47075.76	0.00	0.00	0.00	0.00	0.00	47075.76	47075.76	3000.00	0.00	44,076
Capped Existing landfill Cells leachate Only	0	0	0.0	0.0	0.00	0.755	0.00	284474.00	21477.79	0.00	0.00	0.00	21477.79	21477.79	0.00	0.00	21,478
Existing Landfill Cells 1 - 18 Capped. Temp Cells 19 - 24. Active Cells 25,26 Active IBA Cells	0	35658	62352.0	0.0	98010.00	0.755	73997.55	194396.00	14676.90	54420.00	12326.13	0.00	101000.58	101000.58	10125.00	0.00	90,876
Existing Landfill Cells 1 - 18 Capped. Temp Cells 19 - 24. Active Cells 25,26,31,32 Active IBA Cells	1	35658	62352.0	42098.0	140108.00	0.755	105781.54	194396.00	14676.90	54420.00	12326.13	0.00	132784.57	132784.57	10125.00	10125.00	122,660
Existing Landfill Cells 1 - 22 Capped. Temp Cells 23 - 26. Active Cells 31 - 34. Active IBA Cells.	2	0	62352.0	69459.0	131811.00	0.755	99517.31	231287.00	17462.17	53187.00	12046.86	0.00	129026.33	129026.33	10125.00	20250.00	118,901
Existing Landfill Cells 1 - 26 Capped. Temp Cells 31 - 32. Active Cells 33 - 36. Active IBA Cells.	3	0	62352.0	55359.0	117711.00	0.755	88871.81	284474.00	21477.79	41426.00	9382.99	0.00	119732.58	119732.58	10125.00	30375.00	109,608
Existing Landfill Cells 1 - 26 Capped. Cells 31 - 32 Capped. Temp Cells 33 - 34. Active Cells 35 - 38. Active IBA Cells.	4	0	62352.0	62813.0	125165.00	0.755	94499.58	325900.00	24605.45	50370.00	11408.81	0.00	130513.83	130513.83	10125.00	40500.00	120,389
Existing Landfill Cells 1 - 26 Capped. Cells 31 - 34 Capped. Temp Cells 35 - 36. Active Cells 37 - 39. Active IBA Cells.	5	0	62352.0	55721.0	118073.00	0.755	89145.12	376270.00	28408.39	50423.00	11420.81	0.00	128974.31	128974.31	10125.00	50625.00	118,849
Existing Landfill Cells 1 - 26 Capped. Cells 31 - 36 Capped. Temp Cells 37 - 38. Active Cells 39 - 40. Active IBA Cells.	6	0	62352.0	36171.0	98523.00	0.755	74384.87	426693.00	32215.32	50423.00	11420.81	0.00	118021.00	118021.00	10125.00	60750.00	107,896
Existing Landfill Cells 1 - 26 Capped. Cells 31 - 40 Capped. Active IBA Cells.	7	0	62352.0	0.0	62352.00	0.755	47075.76	483980.00	36540.49	0.00	0.00	0.00	83616.25	83616.25	3000.00	0.00	80,616

Annual Precipitation = Fiver year average from Dublin Airport Met Eireann Station - 755 mm per year (2020-2024)
Annual Evaporation = 0 mm per year.
Annual Transpiration = 0 mm per year.
Infiltration of Restored / Capped Area = 10%
Infiltration of Temp Capped Area = 30%
Annual Waste Intake = 285,000 T
Waste Density = 1.1 tonne / m^3
Waste Absorption Capacity = 0.025 m^3/m^3
Surface water captured on lagoon cover goes to Storm Water System
IBA Facility Cap included - active area 62,352 m^2.
Annual IBA Waste Intake = 120 000 T
Existing Landfill Capped Area = 284,474 m^2.

Appendix B

KNOCKHARLEY LANDFILL OPERATING PROCEDURES

Public

EMS-SP-07(a) EMERGENCY PREPAREDESS & RESPONSE (INTERNAL)

Revision No.	Revision Date	Description	Sections Affected	Revised By	Approved By
001	27/01/16	EMS-SP-07(a) Emergency Preparedness & Response (Internal)	All	GH	TF
002	06/07/16	Updated EPR regarding Biological hazards	All	MW	TF
003	19/09/16	Updated ERP with reference to gas detection alarm system and our EPD/Atex zones	4.4/4.5	MW	TF
004	29/08/17	Updated ERP with lone worker and BPS emergency procedures	6.0 & 7.0	MW	TF
005	09/02/18	Emergency contact list updated	Contact list	MW	MW
006	17/12/18	Updated management structure & emergency contact list	2.5.2 & 2.5.3	MW	MW
007	23/03/23	Full document review	All	SK	SS
008	15/04/24	Contact list	All	SS	SS

1.0 Scope

To provide for the preparedness for and response to emergencies at Knockharley Landfill.

2.0 Contact Information

2.1. Site Information:

Site Address: Knockharley Landfill
Knockharley
Kentstown
County Meath

Telephone: 041 – 98 21 650

Registered Office: One Earlsfort Centre, Earlsfort Terrace, Dublin 2

2.2. Regulatory Information:

2.2.1. Shown below are the main regulatory bodies relating to Knockharley Landfill. Stipulated in the licence conditions, should an environmental incident occur, then the EPA, the Fisheries Board (in the event of discharges to surface water) and Meath County Council (in the event of an incident which affects their interests), should be informed as applicable no later that 10.00 am the following day. Such contacts should only be made after consultation with the Landfill Manager, or Director(s).

2.2.2. Should a serious accident or incident relating to Health and Safety occur then the Health and Safety Authority should be informed by telephone as soon as possible thereafter by Landfill Manager.

2.3. Regulatory Contacts:

2.3.1. Environmental Protection Agency - To be contacted in the event of any incident.

Environmental Protection Agency
Regional Inspectorate
McCumiskey House
Richview
Clonskeagh Road
Dublin 14

Telephone: 01 – 268 01 00
Fax: 01 – 268 01 99
24-hour Emerg. No: 053 – 60 600

2.3.2. Inland Fisheries Ireland - To be contacted in the event of any pollution of a waterway.

Inland Fisheries Ireland
Swords Business Campus
Swords
County Dublin

Telephone: 01 – 8842-600
Fax: 01 – 8360-060

2.3.3. Meath County Council - To be contacted in the event of any incident affecting their interests. In their function as Fire Authority to be contacted in the event of any fire or related incident.

Meath County Council
County Hall
Navan
County Meath

Telephone: 046 – 9097-000
Fax: 046 – 9097-001
Emergency line: 1890-445-335

2.3.4. Health and Safety Authority - To be contacted in the event of any reportable injury or incident.

Health and Safety Authority
The Metropolitan Building
James Joyce Street
Dublin 1

Telephone: 1890-289-389
Fax: 01 - 614 7020

2.4. Non-regulatory Contacts:

Kentstown National School
Duleek Road
Kentstown
Co. Meath

Telephone: 041 – 98 25 458

Emergency contacts for Kentstown National School:

Mr. Austin O'Driscoll (Chairperson, Board of Management): 087 – 637 19 97

Mrs. Bernie McDonnell (Deputy Principal): 086 – 311 47 28

2.5. Emergency Contacts and Employee Contact Information:

2.5.1. Emergency Contact Information - In the event of an emergency always dial 112.

2.5.2. Emergency Callout Priorities- The following call out system should be used in the case of an incident on site out of hours:

Call Out Priority	
1) On Call Phone	086 – 818 95 33
2) Sean Smith – General manager	087 – 264 41 12
3)Deputy - Michael Noone	086 – 385 92 19
4) Site EHS – Rebecca McDonagh	086 -- 190 27 70

2.5.3. First Aiders on Site

First Aiders	
Michael Noone	086 – 385 92 19
Rebecca McDonagh	086 -- 190 27 70
Sean Corrigan	085 –129 60 36
Andrew Morgan	086—367 46 68

2.6. Contractor Contact Information

Listed below are the main contractor contacts for Knockharley Landfill.

Company Name	Operation	Contact	Phone Number
Bioverda Power Systems	Landfill Gas Utilisation Plant	Noel Mc Dermott	087– 2858192
Eastern Pest Control	Vermin Control Contractor	Peter Flanagan	085 – 253 22 39
Net Watch	Security Contractor	Head Office	059 – 913 9698
Net Watch	Security Contractor	Control Centre	1890 457 025
Shaw Automation	SCADA and Automation	Micaela	0044 2825658100

3.0 References:

EMS-EF-16	Non Compliance & Corrective Action Incident Register Eden EPA Portal
EMS-EF-11	Emergency Procedure Test Record

4.0 Emergency Procedures:

4.1. General Information

Specific emergency procedures have been developed for Knockharley. These procedures are detailed below. It is not possible to list every possible emergency and those procedures shown below should be applied as appropriate.

Emergency Procedures listed:

4.2 General Emergency Procedures
4.3 Site Closure / Suspension of Site Operations
4.4 Gas in Building Emergency
4.5 Fire Procedures
4.6 Overturned Vehicles
4.7 Spillage Procedures
4.8 Handling Hazardous, Chemical/Clinic and Biological Waste

4.2. General Emergency Procedures

4.2.1. This instruction lists the actions to be taken when an emergency occurs on the landfill site. An emergency may constitute:

- Personnel (staff, customers or visitors) involved in a serious accident.
- Personnel involved in a medical emergency.
- Personnel incapacitated by landfill gas or inert gases in confined spaces such as manholes or pump chambers etc. (*Note: Staff must not enter a confined space to rescue trapped personnel without taking the appropriate precautions*)
- Fire, Explosion, Spillage and unexpected hazardous, clinical or Biological waste.

4.2.2. This procedure is written in a general manner to cover all emergencies. Certain suggested actions may not be appropriate.

4.2.3. *Immediate Action:* If an employee sees any personnel in difficulties he/she should:

- Consider own safety - employee may need to withdraw from the area immediately.
- Contact a more senior member of staff as soon as possible and ideally by radio.
- The Site Supervisor will then (not necessarily in the order given):
  - Give instructions to the person making the report regarding assistance and possible evacuation of the person in difficulties.
  - Instruct the Weighbridge Operator to control vehicle entry to the site to prevent traffic problems.
  - Instruct the trained First Aid Staff to attend the incident (if it is safe to do so).
  - Arrange for the evacuation of other personnel if appropriate. This may involve the abandoning of certain vehicles or plant.
  - Arrange for safe transportation of staff to hospital or the attendance of an ambulance.
  - Inform the hospital in advance giving as many details as possible.
  - In the case of a serious incident inform senior management at head office.

4.2.4. *Subsequent Actions (Site Supervisor)*

- Contact the Landfill Manager.
- Close off any relevant areas of the site and inform the Weighbridge of any temporary arrangements for traffic movement on the site.
- Record the names and addresses of any personnel witnessing the accident. Also record the vehicle numbers of any vehicles involved together with weighbridge tickets and load details.

4.2.5. *Subsequent Actions (Landfill Manager)*

- Arrange to inspect the area where the incident occurred.
- Inform the Environmental Protection Agency as appropriate. The Landfill Manager should contact the Head of Landfill Operations or Environment Director if possible before contacting the EPA.
- Arrange to take statements from persons witnessing the incident.
- Inform the Health and Safety Authority about the incident if appropriate. The Landfill Manager should contact the Head of Landfill Operations or Environment Director if possible before contacting the HSA.
- In the case of an emergency situation which is likely, or has the potential, to impact on health and safety of staff members or pupils of Kentstown National School, the School or at least one of the contacts listed in Section 2.4 needs to be informed of the nature of the incident and the potential impact.
- Inform the next-of-kin of persons involved in the incident if appropriate.
- Where a person involved in the incident is not a member of staff, their employer should be informed as soon as possible.
- A report should be compiled including all the witness statements.
- A non-conformance report should be written, if applicable.
- The accident book should be completed.

4.2.6. In the case of subsequent absence from work due to injuries caused by an incident, the company policies, as outlined in the staff handbook, regarding sick leave etc. shall apply.

4.3. Site Closure/Suspension of Site Operations

4.3.1. Under certain conditions it may be necessary to close the site either partially or completely to customers and/or visitors. Possible situations where site closure may be necessary include:

- Emergency situation/accident on site.
- Adverse weather conditions preventing safe disposal of waste.
- Fire on site.

4.3.2. Should these situations occur the Landfill Manager will consult with the Director(s) before any action is taken to discuss possible options.

4.3.3. Where possible, customers will be contacted with as much advance notice as possible to inform them that the site will close. If known, re-opening information will also be given.

4.3.4. If applicable, the EPA and other appropriate bodies will be informed of the closure and the reasons for it.

4.4. Gas in Building Emergency

4.4.1. The facility is an engineered landfill, designed not to permit any uncontrolled emissions of liquid or gaseous contaminants into the environment. In particular, the control of landfill gas is facilitated by the artificial lining and the constructed clay layer. Active landfill gas extraction is applied in all sections of the landfill footprint where landfill gas is generated.

4.4.2. Should however either natural or landfill gas be detected in any site buildings ((the offices gas detectors installed sound off when gas is detected with each zone referenced on the panel for investigation purposes) at or above the trigger levels specified within the Site Licence, the following procedures should be followed:

- Immediately evacuate the buildings and move people to a safe distance.

- Do not re-enter building until it has been declared free from gas and it is safe to do so.

- Do not switch on or off any electrical appliances as this may create sparks, which could ignite any build up of gas.
- Do not light any naked flames or smoke in the vicinity of the building.
- If possible open all doors and windows to allow air to vent the offices.
- Inform the Landfill Manager/Site Supervisor to arrange for specialist gas testing to be carried out.
- Remember, landfill gas is asphyxiating as well as explosive and is heavier than air so particular attention shall be paid to confined or sheltered areas.
- It may be necessary to contact the emergency services depending on the situation.

4.5. Fire Procedures

4.5.1. The immediate actions to take should a fire occur are:

i. Raise the alarm by informing all members of staff using the site radios and internal telephones.
ii. If there is release of odour, fumes, smoke, gas or dust, evacuate to a safe distance. Stay upwind of any smoke or fumes. Keep others away.
iii. Call the Fire Brigade.
iv. If safe to do so, tackle the fire using the water bowser (10,000 l), which is always to be available filled with water, and the fire hose, sand or extinguishers as appropriate. Do not take risks.
v. When fire is out and cold, treat as a spillage (using appropriate precautions as toxic/hazardous substances may be present).

4.5.2. There are several potential causes of explosions or fires. The principal ones are as follows:

Explosion:

- Migrating landfill gas building up in a confined area.
- Partially full gas cylinders coming in with waste.
- Fuel supply systems.

Fires:

- Incoming load on fire.
- Landfill gas fire.
- Fire within the waste itself.
- Fire following an explosion.

4.5.3. Explosion:

4.5.3.1. The most likely cause of an explosion is landfill gas building up in a confined area (refer to Explosive Protection Document which covers all the Atex zones/information ect). Examples of such confined areas are: manholes, pump chambers, leachate storage lagoon, Bio-cycle units, building foundations, poorly vented spaces within the buildings, weighbridge pits, rarely used pipe runs, and duct runs. Trigger values will be used to determine evacuation or other action.

Gas Trigger Levels are:	Methane (CH_4)	1.0% v/v
	Carbon Dioxide (CO_2)	1.5% v/v

4.5.3.2. All information will be placed on the gas-monitoring plan covering the normal routine gas monitoring on the site. If appropriate, gas alarms will be fitted in certain installations/buildings where regular access is required. The site, as a whole, will be designated a Non Smoking area with a gas free Smoking area designated by management.

4.5.3.3. No Smoking rules must be strictly adhered to at all times.

4.5.3.4. The leachate storage lagoon is particularly vulnerable and will be vented to atmosphere.

4.5.3.5. Incoming gas bottles of any description will not be accepted for tipping at the landfill site. Customers will be informed that these items are not acceptable, and where discovered these should be placed in the bunded quarantine area and then removed from the site.

4.5.3.6. Fuel supply systems will be labelled up to ensure awareness of the explosion risk and normal precautions be taken to prevent

fire or explosion. Flame arresters will be used on vent pipes from any fuel systems.

4.5.4. Fire:

4.5.4.1. The most common causes of fires on the landfill site are incoming loads on fire.

4.5.4.2. If a load is identified as being on fire whilst still in the lorry, the lorry will be parked in an isolated part of the site outside the landfill footprint. Site equipment is adequate to put out small fires, or slow-burning fires, but if the load is fully on fire, emergency services must be called and no personnel put at risk tackling the fire. The area should be kept clear in case of explosion.

4.5.4.3. Often, the fire may only become apparent when the vehicle tips its load and air feeds the fire. Under these circumstances, the fire may be put out using site equipment (Water bowser and fire hose), if possible, but the emergency services must also be called.

4.5.4.4. In the unlikely event of waste itself or landfill gas generated within the waste catching fire, site staff should attempt to smother the fire, by utilising the water bowser/fire hose or other appropriate firefighting equipment. Landfill fires are problematic and difficult to deal with, but they are usually most effectively dealt with by smothering.

4.5.4.5. Adequate compaction of the waste should prevent wide spread of any fire, and in modern landfill with good compaction fires are usually confined to the top surface. Landfill gas fires will rarely be put out by the addition of water by the Fire Brigade and should be dealt with by site staff, where possible.

4.5.4.6. In the event of a fire on site, the EPA will normally be notified and a judgement made by the Landfill Manager regarding the potential damage to the site containment. In extreme circumstances measures will be taken to expose the site containment closest to the fire to inspect whether any damage has occurred.

4.5.4.7. In the case of a fire with the potential to affect neighbouring properties immediately either with direct impact of fire or with smoke or fumes being blown away from the facility, the neighbouring residents need to be contacted. In particular where the National School might be affected, immediate notification of staff as outlined in Section 2.5 is required.

4.6. Overturned Vehicles

4.6.1. If a tipping (or other) vehicle should overturn:

i. Attend to the driver and call qualified First Aid staff if required.
ii. Contact Emergency Services if necessary
iii. Implement Emergency Action Plan (see below).

4.6.2. Emergency Action Plan

ENSURE YOUR OWN SAFETY AT ALL TIMES

- Remove all other vehicles and personnel from the immediate area
- Call for assistance and emergency services as necessary
- Inform Site Supervisor/ Landfill Manager, preferably via radio
- Check the location of all personnel and their conditions. Remember to check under and inside the overturned vehicle
- If injured parties complain of back/chest/neck pain, do not move them unless absolutely necessary as this could cause further injuries. Only move the casualty in situations where they are in immediate danger, for example, fire etc.
- Switch off the ignition in all vehicles to reduce the risk of fire.
- Check for leaking fuel, fire etc.
- If vehicles are on fire, ensure all personnel are clear and retreat to a safe distance. Remember, burning tyres, fuel tanks, air tanks etc. can suddenly explode without warning
- Once area is made safe, consult with the Landfill Manager to arrange the most suitable method of removing the overturned vehicles

4.6.3. Once the situation has been stabilised and the overturned vehicle (s) removed the Landfill Manager will arrange for an investigation into the incident to be carried out as soon as possible.

4.7. Spillage Procedure

4.7.1. The most likely situation to arise is a leachate spillage. Other possible spillages may take place during refuelling operations.

4.7.2. Immediate actions to take in the event of a spillage:

- Raise the alarm. Inform the Site Supervisor and Landfill Manager as soon as possible and preferably by radio.
- If there is release of odour, fumes, smoke, gas or dust, evacuate to a safe distance. Stay upwind in such cases. Keep others away.
- If safe to do so, use appropriate PPE and contain and cover the spillage using sand or granules. Place containment booms around the spillage if appropriate. Immediate priority is to prevent contamination of watercourses, surface water drains, and sensitive areas.
- Clean up the spillage into a suitable container. Store in the quarantine bay until appropriate disposal can be arranged. This may involve the use of specialist contractors.

4.7.3. Report the incident to Site Management. The regulatory authorities will then be contacted such as EPA and Meath County Council, if appropriate.

4.7.4. A leachate spillage is only likely to occur during the transfer of leachate into the tankers for removal off site. Any spillage is likely therefore to be one of two types:

- Small spillages resulting from failure to shut valves during the coupling or uncoupling process; or
- A major spillage due to a failure of a valve, or the neglect of an operator to shut a valve.

4.7.5. The most extreme, though unlikely, circumstance is that a tanker could be allowed to drain completely. It is highly unlikely that such an event would go unnoticed and even more unlikely that such a spillage would be unnoticed before the vehicle was moved.

4.7.6. The site is designed so that spilt leachate will drain back into the leachate lagoon via the current drainage system. In the most extreme circumstances the tanker would have just filled from the lagoon, and therefore, void space will be adequate within the lagoon to contain any spillage.

4.7.7. In the unlikely event that the drain point to the lagoon became blocked leachate spilt will be contained within the hardened area of the site. An emergency pump will be held on site to pump it back into the landfall site, or back into the pump chamber.

4.7.8. For smaller spills, (e.g. diesel spills), absorbent material will be held on site. Such absorbent material will be collected up after use and disposed of as appropriate in accordance with the appropriate regulations. If absorbent material contains liquids other than leachate then it will be assessed as to whether specialist disposal is required.

4.8. Handling Hazardous, Chemical and Biological Waste

4.8.1. This instruction gives guidance on the procedure to deal with unexpected hazardous, chemical, clinical or biological waste that arrives at the site. It also describes the controls to ensure that, wherever possible, waste can be identified and dealt with correctly.

4.8.2. The most likely circumstances for waste of this type being found are that it is discovered:

- At the weighbridge.
- During tipping with the identity of the haulier known.
- On site with no means to identify who had hauled the waste in.

4.8.3. Action Plans - Different action will be taken depending on when the waste is discovered and the ease with which it can be identified.

- If waste arrives at the weighbridge and is identified whilst still in the lorry, the lorry will be turned away at the weighbridge and the EPA notified that this has occurred. Where possible, AGB will endeavour to determine where the load will be taken. (This latter action is a precaution against the haulier tipping elsewhere but claiming legitimate disposal at the Knockharley site).

- If waste is discovered during tipping, the unacceptable waste should be re-loaded into the lorry that delivered it and the waste removed from site. Again, as a precautionary measure, the EPA should be notified first.

- No liquids may be deposited on site; however, it is possible that a load may contain drums or containers of liquid within it. If such a load is

deposited on site, machinery will be used to remove as much of the contaminated material as is necessary, and the haulier will be required to take it off site.

- If liquid waste in drums arrives on site and is not easily traceable to a haulier, the waste should be put to one side in the quarantine area and either contained, or bunded to prevent access or further contamination (appropriate PPE must be worn at all times, if in doubt ask!). The waste should be moved as little as possible sufficient only to continue operating the site until a final decision is taken as to its disposal route. If the waste is clearly identified as non-conforming within the site licence, arrangements will have to be made by the site for disposal at a suitable disposal point. Haulage and any legal notifications will be required and the EPA will be notified whilst the waste is still at the Landfill Site for inspection, if required.

- If the waste is not easily identified, specialist scientific advice will be called in to help identify the waste and determine an appropriate disposal route.

4.8.4 Biological Hazardous Hazards are grouped under the following headings:

a) a "group 1 biological agent" means one that is unlikely to cause human disease to employees;

(*b*) a "group 2 biological agent" means one that can cause human disease and might be a hazard to employees, although it is unlikely to spread to the community and in respect of which there is usually effective prophylaxis or treatment available;

(*c*) a "group 3 biological agent" means one that can cause severe human disease and presents a serious hazard to employees and that may present a risk of spreading to the community, though there is usually effective prophylaxis or treatment available;

(*d*) a "group 4 biological agent" means one that causes severe human disease and is a serious hazard to employees and that may present a high risk of spreading to the community and in respect of which there is usually no effective prophylaxis or treatment available.

(Refer to Risk assessment on Biological hazards for more information)

For health and safety purposes, non-conforming waste should always be treated with caution and expert advice sought on its identification if this is not clear (you must always consult with your site foremen/manager first). Where containers are leaking copious quantities of liquid (or/and you see the bio-hazard sign on a container) the EPA (or fire brigade for advice) should be consulted as to whether or not it is appropriate to return the load to the haulier, since leakage and/or fumes maybe released into the general environment on route to another site which could be a problem.

5.0 Emergency Test Procedure

- Testing of emergency procedures shall be undertaken every 6 months.
- Tests will be undertaken by a trained Fire Marshall.
- Details of the test shall be recorded on form EMS-EF-11 and all records retained in the Emergency Procedure Test Records file.

6.0 Actions to be taken if an emergency is incurred during lone working

- In the event of an emergency situation when working alone, activate your SOS button or your lone working alarm from your smart phone. The alarm system must be switched on at all times during lone working. If persons are found to be working without enabling the lone working system AGB Disciplinary procedure will be implemented.
- Notification from the lone working alarm will be sent directly to the nominated person listed on the Emergency Contact List.
- The notified person will accept the notification and attempt to contact the lone worker to assess the situation as per the Lone Worker Procedure.
- In the event of no contact with the lone worker contact emergency services immediately and if required the Gardaí, giving the persons last known GPS position.
- The contact person will go to the work area but will not enter the site without the emergency services and/or the Gardaí unless it has been assessed safe to do so.
- If the contact person is not the landfill Manager or site supervisor contact should be made with them as soon as possible.
- On arrival at the site assess the situation and only approach the lone worker if it is safe to do so.

- If you are trained and competent to do so you may administer First Aid.
- If ambulance is called make sure exact location is given and that the ambulance can access the location as near as possible to the injured person.
- Establish location of the hospital and travel with the injured person.
- The landfill Manager or supervisor shall notify the family or next of kin of the injured person.
- If the HSA are required to inspect the premises location & cause of the accident, do not move anything unless further serious risk has to be avoided.
- Gather all information immediately about the accident and what led to it.
- Obtain witness statements, write them down as they are given.
- Communicate with the Landfill Manager to document the accident on the Accident Report Form.

7.0 BPS gas Compound

Bioverda Power Systems (BPS) are specialises in the maintenance and operation of gas reciprocating engines on KNH landfill.

7.1 There are 4 gas engine working in the gas compound in KNH.

7.2 Actions/procedures taken in case of emergencies in gas compound:

Gas compressors:

- The gas compression modules contain a compressor to raise the landfill gas pressure from slightly negative (typically -50 mbar) to sufficiently positive (typically 200 mbar) for combustion in the gas engine or flare system.
- The gas compressors are fitted with a double mechanical seal which is oil immersed.
- The pipework and fittings on the inlet and outlet of the compressor are also sealed and therefore the potential for a leak to arise from the compressor and form an explosive atmosphere is minimised.
- The outlet of all gas compressors is monitored for temperature and linked to the automatic shutdown system such that the temperature does not exceed 160°C.

Landfill Gas flaring system:

- Landfill gas not utilised by the gas engines is flared in a purpose designed flare stack.
- All pipework to the flare is sealed (welded pipework) and is explosion resistant (PN6).
- The flare is fitted with a self-activated ignition system and flame monitoring.
- The flare system is designed to shut down on minimum flow, based on pressure differential measurement, such that a forward velocity of 20 m/s is maintained.

Landfill Gas engines:

- The gas engine modules are contained in standalone 40 ft containers, with the module divided into a main compartment housing the gas inlet pipework, the internal combustion engine and the electrical generator and a smaller section sealed from the engine compartment housing the control equipment and interfaces.
- The engine compartments are provided with ventilation, primarily for cooling the engine although the ventilation also provides protection against the accumulation of landfill gas in the (unlikely) event of a leak from the gas pipework or engine.
- The gas pipework and fittings are sealed (welded or flanged) and gas detectors are installed in the engine compartment linked to the automatic shutdown system.

Flame arrestor:

- The main hazard associated with flaring is the prevention of flame and explosion propagation, namely the flash back of the combustion flame into the gas supply line.
- The gas supply line to the flare is equipped with a metal element flame arrestor, including temperature monitoring linked to the automatic shutdown system.
- The temperature monitoring on the flame arrestor shuts down the system if burning is detected on the flame arrestor elements.
- The gas supply line to the gas engine is also fitted with a flame arrestor, equipped with temperature monitoring.

Gas Monitoring:

- The oxygen and methane content of the landfill gas is monitored on the inlet to the compressor system and is linked to the shut-down sequence, which ensures that the inlet gas to the compressor is above the upper explosion limit and therefore does not give rise to the formation of a potentially explosive mixture.
- The sample response time and shut down response time are designed to ensure that shut down is activated before a potentially explosive mixture reaches the failsafe shut off valve and downstream compression system.
- Once the shutdown has been activated, landfill gas is allowed to build-up in the landfill and disperses directly to atmosphere

Ventilation:

- The majority of the areas in which a potentially explosive atmosphere may form are located outdoors and are provided with a high degree and good availability of natural ventilation.
- In the landfill gas engine modules (containers), the gas detection system is linked to an automatic shut down and mechanical ventilation system.
- The gas detector has two alarm levels: level one turns on the fan and sets off an alarm for the operator, and level two shuts down all non- ex-rated devices, while the ventilation fan continues to operate (it is an ex-rated fan).
- A minimum of 10 air changes per hour is provided in the compressor compartment.

Control System:

- The landfill gas plant system is controlled in the Haase module, which includes a safety chain that monitors critical functions and alarms and initiates an automatic shutdown in the event that they deviate from the required parameters.
- The system shuts down the plant and requires the call out of a Bioverda technician before it can be restarted. The key variables in the safety chain (the Emergency Stop Chain), include:

• inlet methane and oxygen concentrations
• background flammable concentrations in gas compressor and gas engine modules
• gas compression pressure, measured at suction and discharge

- gas compression outlet temperature
- flame arrestor temperature on flare inlet
- minimum flowrate to flare, measured by a dynamic pressure switch
- ventilation status in gas compressor and engine compartments
- emergency stop buttons

The ESC triggers the following functions:

- gas compressors switched off
- flare switched off
- slam shut valves on gas inlet closed
    - If the ESC is triggered by an ambient air monitoring device, all the electrical devices in the compressor compartment are isolated with the exception of the EX rated ventilation fan and EX rated lighting. In the event of a power failure or the failure of one of the monitoring devices, the system goes shuts down (fails safe).

Appendix 1
Emergency contact list

Emergency Type	Company	Contact name	Contact number
Emergency Services	Fire Brigade/Ambulance/Police		112 or 999
Medical	Drogheda Hospital Our Lady of Lourdes	A&E Department Main hospital number	041 980 8329 041 983 7601
Site	Knockharley Landfill	Site Office	041 982 1650
		General Manager Sean Smith	087 264 4112
		Health & Safety Officer Jane Brophy or Ciaran Rogers	086 1372919 086 032 6543
		Environmental Officer Siobhan Kelly Rebecca McDonagh	0861372999 0861902770
		Out of Hours Mobile no.	086 818 9533
		Site Assistant Manager Michael Noone	086 385 9219
		First aider Michael Noone	086 385 9219
		First aider Sean Corrigan Rebecca McDonagh	085 129 6036 0861902770
Management Team Knockharley Landfill Ltd		Operations Director Sean Smith	087 264 4112
		CEO Brian Mc Cabe	087 997 8422
		Environmental Manager David Naughton	086 137 0125
		Health and Safety Mgr. Joe Nicholson	086 137 1702
Breach of the waste licence, pollution incident	Environmental Protection Agency (Dublin)	Emergency number	01 268 0100
Pollution of a waterway	Inland Fisheries Ireland	Emergency number	1890 347 424
Pollution incident or major breach of the waste licence	Meath County Council	Emergency number	1890 445 335
Reportable injury or accident	Health & Safety Authority	Emergency number	1890 289 389
Minor accidents	Drogheda Hospital Our Lady of Lourdes	A&E Department Main hospital number	041 980 8329 041 983 7601
BPS Personnel	Bioverda Power Services	Noel McDermott James Smith	087 285 8192 086 0433973
Power cut	ESB Networks	Emergency number	1850 372 999

1.0 Purpose

The purpose of this procedure is to identify fire prevention measures in order to:

- Minimise the risk of Fire.
- Ensure earliest possible detection of the outbreak of fire.
- Ensure earliest possible response in the event of fire.
- Ensure to follow the Procedure for selection & Procurement of Equipment for use in potentially Explosive Atmospheres at all times.
- Ensure in so far as is reasonably practicable that first aid and fire-fighting equipment are in place.
- Ensure that the Emergency evacuation controls are in place and implemented to safeguard the safety of site personnel, visitors and neighbours.

2.0 Scope

This procedure applies to all Knockharley activities

3.0 Responsibility

3.1 The Landfill Manager is responsible for implementation of this procedure and for ensuring that the necessary measures are in place to prevent fire across the site in line with this procedure, the site specific Emergency Preparedness Response Plan and the Explosive protection document 2016.

3.2 The operations/site supervisor is responsible for ensuring that:

- This procedure is implemented and maintained
- Site employees understand their responsibilities in relation to fire prevention and are aware of actions to be taken in the event of a fire.
- Appropriate emergency equipment is readily available, serviced and usable.

3.3 Site staff must adhere to the requirements defined in the Emergency Preparedness Response Plan, the requirements of this procedure and the explosive protection document 2016.

4.0 References

EMS-EF-11 Emergency Procedure Test

EMS-OP-11 WASTE ACCEPTANCE AT WEIGHBRIDGE

EMS-OP-05 FUEL STORAGE & DISTRIBUTION

EMS-EMP-04 LANDFILL GAS BALANCING & MONITORING

EMS-SOP-06 LANDFILL GAS FLARE MONITORING

EMS-EF-30 DAILY SITE CONDITION REPORT

EMS-EF-16 Non-Conformance & Corrective Action Record

EMS-SP-12 AGB and BPS communication procedure

HS-SF-034 Weekly fire safety inspection

IED Licence W0146-04

EPD/Atex (Explosive Protection Document 2016)

Procedure for selection & Procurement of Equipment for use in potentially Explosive Atmospheres Document

BPS Emergency Response Plan and risk assessments

5.0 Procedure

5.1 The following sources of ignition may cause a fire on the landfill/site:

- Fire/explosion at the diesel tank
- Incoming load on fire
- Landfill gas fire/explosion
- Fire within the waste
- Pressurised Containers in waste
- Electrical or mobile plant/equipment overheating catching fire
- Smoking on site

5.2 The following control measures are initiated to control the sources of Ignition.

Waste/gas:

- All loads checked at weigh bridge
- No mattress policy inforce
- Hazardous/flammable material such as pressurised containers are not allowed to be tipped at the site (as per clause 1.8 of our waste licence) Customers also informed of what waste we do not accept.
- Tractor and water bowser available on site to reduce dust concentrations and prevent fire
- Trained WFCO on site
- CCTV is in operation
- Landfill gas detection system in place and in offices (as per clause 3.20 of our waste licence).
- Atex assessed (EPD 2016)
- Electrical equipment used near leachate transfer sites are suitable
- LFG flares and engines are operating and burning off gas to prevent gas build up (as per clause 3.33.7 of our waste licence).

- Gas monitoring is carried on a weekly basis by a dedicated person to identify the potential for the release of odours and build-up of gas. Following the gas balancing & monitoring, flares/engines can be used to increase suction (or decrease suction) to prevent gas build ups (or odours), to mitigate the risk of a fire/explosion from happening.
- Flares are ATEX approved and fitted with gas monitoring and ventilation.
- Flares are maintained in accordance with manufacturer's instructions
- Waste is compacted to prevent build-up of air and gases

5.3 Material Storage:

- Diesel tank is fenced off/ bunded
- Diesel tank pump is locked at all times, controlled by supervisor
- All spills are cleaned up immediately
- MSDS sheets are available
- Timely turnaround of waste containers
- No smoking policy on site with a designated smoking area provided and adequate signage provided

5.4 Electrical/Mechanical:

- Adequate firefighting equipment available
- Pre-op checks carried out on all machinery
- Maintenance schedule in operation
- All portable electrical equipment tested annually
- Maintenance shop area to be kept tidy and gas bottles chained up
- Electrical switch rooms to be kept tidy and locked
- Mobile plant/equipment to be cleaned down regularly
- All mobile plant are equipped with fire extinguishers

5.5 Emergency Response:

Site specific Emergency Preparedness Response (EMS-SP-07a) is in Place (as per clause 9.2 in our licence) (and an EPD review has been carried out in 2016) to include:

- Weekly checking of all fire equipment to include fire extinguishers, fire hydrants and fire hoses.
- Ensure any extinguishers that are spent are refilled or replaced

- Annual checking and maintenance of all firefighting equipment as required by legislation.
- Six monthly fire drills (different scenario used each time)
- All Electrical equipment is selected as per "Procedure for selection & Procurement of Equipment for use in potentially Explosive Atmospheres" document.
- Trained fire wardens
- Fire detection systems are in place and serviced
- Permit to work system in place
- Contractor induction training on the ERP & the EPD/Atex areas

Revision No.	Revision Date	Description	Sections Affected	Revised BY	Approved BY
001	07/06/2016	EMS-OP-28 FIRE PREVENTION PLAN	All	MW	TF
002	19/09/16	EPD 2016 reference	All	MW	TF
003	30/08/17	Reference to gas monitoring as a fire prevention measure	4.2	MW	TF
004	25/05/18	Reference to procurement of equipment for use in potentially explosive atmospheres	4.2 & 4.5	MW	TF
005	31/05/18	Reference change to EMS-EMP-04 Landfill gas Balancing & Monitoring Procedure	1.0 & 4.0	MW	TF
006	21/06/19	Name Change	Header	POR	SS

007	29/04/20	Review	5.1 & 5.2	BB	SS
008	11/01/24	Updated licence number and conditions reference	All	RM	SS

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