4 Description of the Proposed Development

4.1 Introduction

Indaver Ireland Limited (Indaver) currently operates a Waste to Energy (WtE) facility (waste incinerator) at its site in Carranstown, Duleek, Co Meath. Indaver proposes to carry out a new development at this site. The proposed development is collectively referred to as the Site Sustainability Project in this Environmental Impact Assessment Report (EIAR) and in the planning application. Indaver has submitted an application to An Bord Pleanála (ABP) under Section 37E of the Planning and Development Act 2000, as amended (Strategic Infrastructure Development, SID) for a 10-year planning permission to construct the proposed Site Sustainability Project.

This chapter presents a description of the proposed Site Sustainability Project. The existing site location and neighbouring land uses are described in **Section 4.2**. The current site layout and facilities are described in **Section 4.3**. The operation of the existing Waste to Energy facility is described in **Section 4.4**. The main features of the proposed Site Sustainability Project development are described in **Section 4.5**. **Section 4.6** describes the stormwater & firewater management on site and **Section 4.7** outlines additional site service requirements. Commissioning (**Section 4.8**), health, safety and environmental aspects (**Section 4.9**), regulatory control of the facility (**Section 4.10**) and references to the best available technologies (BAT) are (**Section 4.11**) also described. Decommissioning of the site is described in **Section 4.12**.

A number of figures accompany this chapter and in **Chapter 1 *Introduction*** and are referred to throughout. Refer also to the planning and engineering drawings which form part of the planning application package.

4.2 Site Location and Neighbouring Land Uses

4.2.1 Location of existing Indaver facility

Indaver currently operates a Waste to Energy (WtE) facility (waste incinerator) at the site in Carranstown, Duleek, Co Meath. Refer to **Figures 1.1** to **1.3** of **Chapter 1 *Introduction*** of this EIAR. The existing facility has been in operation since August 2011 and is licensed under an Industrial Emissions Licence (No. W0167-03) by the Environmental Protection Agency (EPA).

4.2.2 Current Activities

The existing facility treats up to 235,000 tonnes per annum of residual household, commercial and industrial non-hazardous and hazardous waste and recovers energy. Of the 235,000 tonnes of waste, up to 10,000 tonnes per annum of suitable hazardous waste is currently treated at the facility.

The existing facility extracts and recovers valuable material (in the form of ferrous and non-ferrous metals) and energy (in the form of up to 21.5 megawatts of electricity (MW_e)) resources from residual waste.

4.2.3 Neighbouring Land Uses

The facility is located 1.8km west of the M1, bound to the south by the R152 regional road and surrounded by greenfield on all other sides. Irish Cement Platin is to the immediate north of the site and the rest of the surrounding land is used for industrial, agricultural and residential purposes. There are nine private residences located within 200m of the site boundary with one directly adjacent at the north eastern site boundary. The village of Duleek is located approximately 2.7km south west of the site.

The main hydrological feature in the vicinity of the site is the River Nanny, which is located about 2km to the south of the site. Stormwater/surface water runoff from the site currently passes through a class 1 interceptor and attenuation pond before discharging to a semi-dry ditch which drains to the Cruicerath stream c.130m to the west of the site, which in turn leads to the River Nanny. Refer to **Section 4.3** for further details on drainage.

4.3 Current Site Layout and Facilities

4.3.1 Existing Site Layout

The existing site consists of the following infrastructure to accommodate the acceptance and treatment of up to 235,000 tonnes of waste per annum and the generation of up to 21.5 MW_e, of which up to 19 MW_e of electricity are exported to the national grid:

- Facility entrance, weighbridge, gatehouse (security) & staff car park;
- Waste to energy process building which includes (dimensions in L x W x H):
    - Waste tipping hall and waste bunker for solid waste acceptance and storage (tipping hall: 32m x 35m x 20m; bunker: 35m x 18m x 35m);
    - Furnace and boiler hall for waste treatment and recovery of energy (33m x 28m x 41m);
    - Steam-condensate area with associated steam turbine and electricity generator (18m x 28m x 41m);
    - Flue gas cleaning area and 65m high stack complete with emissions monitoring system (79m x 28m x 30m);
    - Bottom ash hall for metals removal and storage (45m x 28m x 12m);
    - Boiler ash and flue gas cleaning residue tanker loading area (11m x 6.5m x 12m);
    - Boiler ash and flue gas cleaning residue pre-treatment area (11m x 8.5m x 12m);

  - Control room and office accommodation for Indaver staff (22m x 8m x 21m).
- Air-cooled condenser for re-circulating low pressure steam from the turbine as condensate to the steam-condensate system;
- 38kV import/export compound for electricity;
- 70m^3 mobile tank and associated aqueous waste unloading area;
- 44m^3 Fuel oil tank for fuelling the burners used for start-up and maintaining the minimum temperature of 850°C in the furnace when required;
- 60m^3 Aqueous ammonia tank which is used for NO_x reduction in the flue gases.

The site layout can be seen in **Figure 4.1** below.

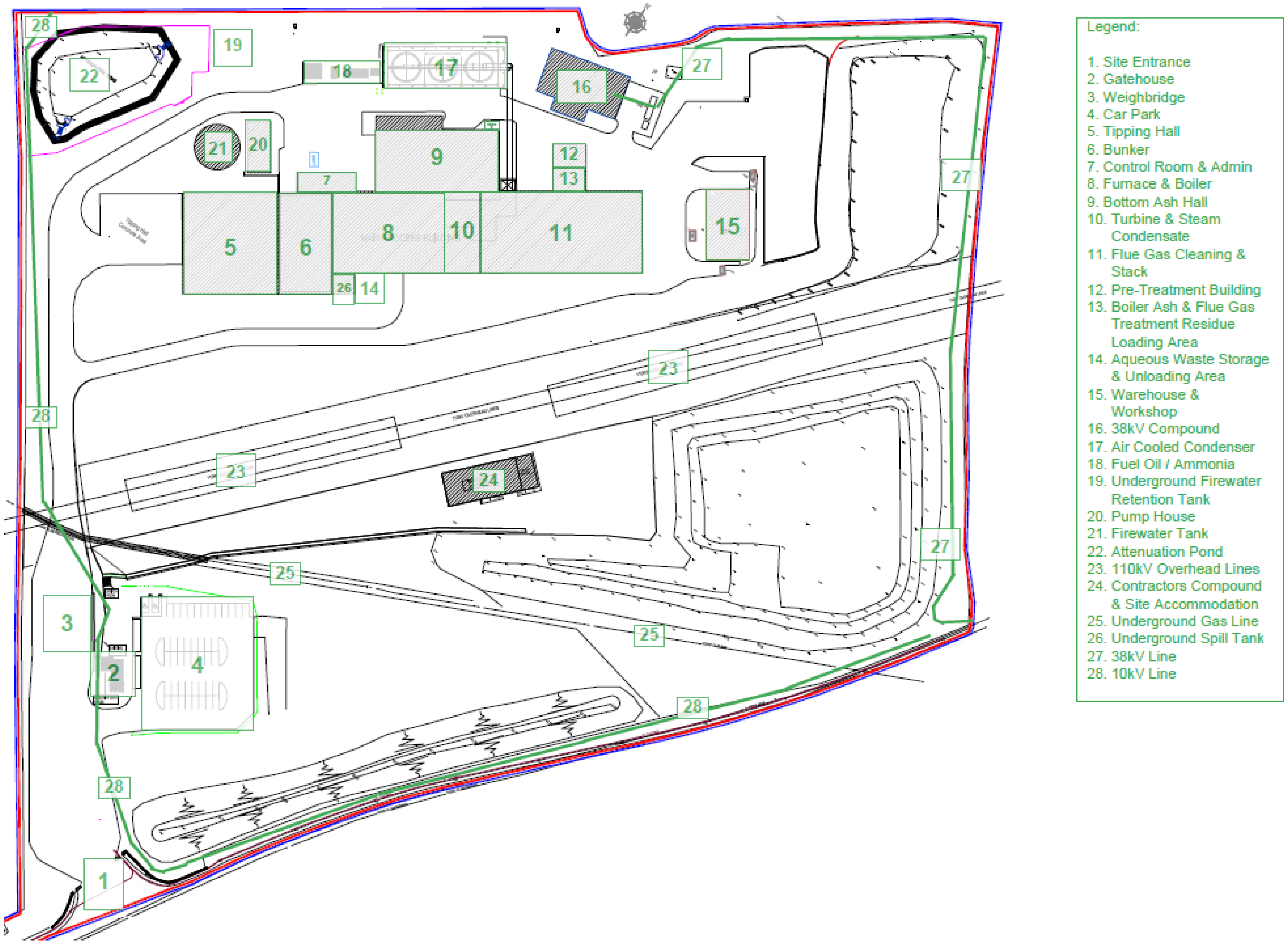


Figure 4.1 Existing Indaver Site Layout. Not to scale.

The waste to energy process and the infrastructure associated with it are described in detail in **Section 4.4** below. Also included in **Section 4.4** is a description of the acceptance of the incoming waste, the residues generated for off-site treatment, raw materials used in the process and the conversion of steam to electricity for export to the national grid.

In addition to the infrastructure for the waste to energy process listed above, the following facilities and systems are also in place to support this activity on the site:

- Warehouse for spare parts and workshop for the mechanical maintenance team;
- Contractors compound and Indaver modular site offices for ancillary Indaver staff;
- Firewater / process water tank and associated firewater pumphouse;
- Stormwater drainage network and attenuation pond of 2,887 m^3;
- Underground firewater/contaminated water retention tank of 300m^3;
- Sanitary effluent collection and treatment systems.

The warehouse is required for storage of critical spare parts and to support the routine maintenance of the plant. Safety equipment and personal protective equipment (PPE) is also stored there. The workshop comprises an office area for the mechanical maintenance team, a welding booth and workbenches for maintenance activities.

The contractors compound is primarily used for annual shutdowns for temporary contractor accommodation and welfare facilities.

The Indaver modular site office houses some specialist maintenance contractors during these shutdown periods and is also used year round by Indaver support staff that work on the site, attend site for meetings or to work on specific projects.

The stormwater, firewater and sanitary drainage systems on site are described in **Sections 4.3.2** to **4.3.4** below. Existing wayleaves for the underground 70 bar gas transmission main, 10kV underground powerline traversing the site and 38kV underground power line connecting the site for import and export of electricity are indicated on **Figure 4.1** and also described in detail in **Section 16.3.2.5** in **Chapter 16 *Material Assets***.

4.3.2 Existing stormwater control and management

4.3.2.1 Process Building

All waters produced from wash down etc. within the waste processing building are directed to a spill tank located to the east of the bunker building and underground. The spill tank has a capacity of 100m^3. Water from this spill tank is used to supplement process water requirements. There is no process effluent from the facility.

4.3.2.2 Site Drainage

The existing site stormwater drainage system has been designed in general accordance with Sustainable Drainage Systems (SuDS) principles and collects rainwater from all roofs, hardstands, roads and landscaped areas which fall naturally towards paved areas and that can reasonably be deemed to add to the flow of water through the drainage system. The existing design has been agreed and is in accordance with the requirements of Meath County Council.

Sustainable drainage systems aim to mimic as closely as possible the natural drainage of a site in order to reduce the impact of flooding and water pollution. The site is essentially divided into two parts, firstly the northern approximately 6.5 Ha. ‘developed’ part of the site, and secondly the southern approximately 3.5 Ha. ‘undeveloped’ part of the site. The southern ‘undeveloped’ part of the site, is drained naturally. This is shown on drawing **29043-CD-019** in **Appendix 5.2** of **Volume 3** of this EIAR.

Due to the natural south to north slope of the ground, stormwaters emanating from the developed part of the site cannot flow naturally to the undeveloped part of the site. Landscaping works have been fully established in the undeveloped part of the site and have the beneficial effect of increasing the “residence time” of the storm flows thereby reducing downstream effects.

The design principle for the northern portion of the site is to largely manage runoff flows and pollutants on the site rather than directing them to the nearest receiving waters. In addition to good housekeeping practices, retention and regular monitoring (i.e. testing) ensure the potential for contamination is minimised.

Good housekeeping measures include reusing waste contaminated water in the process itself in the spill tank provided, as detailed above. Waste contaminated water that is not required in the waste to energy process is diverted to the spilled water tank and sent for disposal or treatment at an appropriately licensed facility.

It is therefore highly unlikely for such waste contaminated water to pollute any receiving waters. In the eight years of operations to date, no such pollution event has occurred. In accordance with SuDS, consideration was given in the original design to surfacing roads and hard standings with pervious paving. However, given the risk of spillage onto these areas from attending refuse lorries, with subsequent possible contaminated runoff, the existing stormwater drainage system routes the surface water from roads and hardstanding to a monitoring station and from there to the firewater retention tank if contaminated, or to the natural watercourse via a petrol interceptor if uncontaminated.

In order to prevent flooding of the ditches downstream of the facility a discharge rate from the site based on the Dublin City Council Stormwater Management Policy and by agreement with Meath County Council of 59.8 litres/second has been incorporated into the existing drainage design. Attenuation for a 1 in 30-year storm is provided by the stormwater attenuation pond which discharges via a pump to an external drainage ditch. Attenuation of 1 in 100-year storm occurrences are also contained within the attenuation pond.

The existing site drainage system is outlined in detail on drawing **29043-CD-001** in **Appendix 5.2** and in basic flowchart format in **Figure 4.2** below.

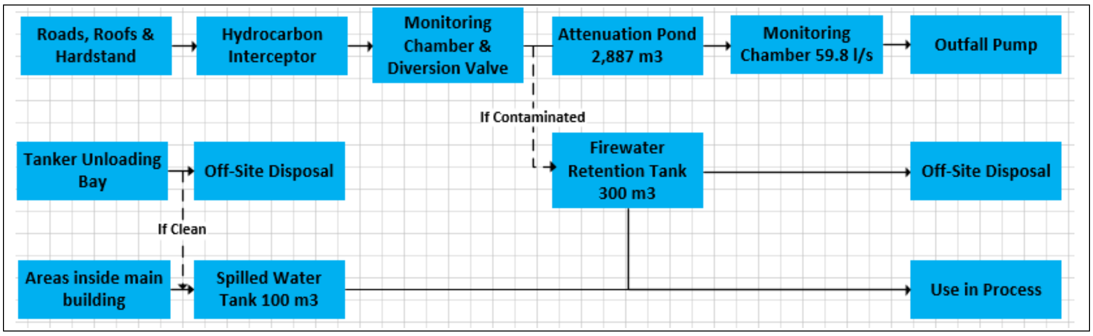


Figure 4.2 Existing Drainage System

4.3.3 Existing firefighting and firewater retention systems

Fire suppression is provided by an on-site dual-purpose water storage tank. This tank has an overall capacity of 2,185m^3 with an effective fire-fighting storage volume of 1,855m^3 and a process water storage capacity of 330m^3. The firefighting effort is supported by 3 No. diesel fire pumps connected to a fire main and hydrant system throughout both the site and buildings.

In the event of a fire, the process water requirement will not be needed and potentially all 2,185m^3 of process water is available for firefighting.

The facility has achieved compliance with the Building Regulations with particular reference to Part B (Fire), i.e. a Fire Safety Certificate has been obtained; and will continue insofar as practicable follow the recommendations in the Code of Practice for Fire Safety in Buildings – BS5588 which is referred to in Technical Guidance Document B (Fire) to the Building Regulations.

The greatest potential for fire at the facility arises within the waste bunker where localised heating can occur due to decomposition of organic material. If such a fire occurs, the waste is immediately transferred by the grab crane into the hopper and then covered with another grab of fresh waste. In the event of a larger fire where this is not possible, water cannons are used to douse the fire. Up to the level of the tipping hall, the bunker has a capacity of 5,670m^3 approximately. If a 50% voidage ratio is assumed for the waste, then there would be a retention capacity of 2,835m^3 within the waste bunker. With 2,185m^3 of water available for firefighting, this demonstrates that all of the water will be retained within the bunker even in the most extreme fire event.

If a fire occurred in the turbine area, the firefighting water would be collected in the cellar beneath the turbine which has a capacity of circa 1,000 m^3. The waste bunker has been designed conservatively with 1.1m thick walls and 800mm base and secondary containment system. It will therefore retain any fire water generated within the bunker.

4.3.4 Existing sanitary effluent collection and treatment systems

All effluent generated from toilets, showers and utility areas (with the exception of the modular offices and portacabins in the contractors compound) is collected in a domestic type effluent collection system. All effluent is passed through a septic tank and secondary treatment system (Puraflo) before being discharged to the percolation area. The wastewater treatment area is located on the northern boundary of the site . A second smaller effluent collection and discharge system is provided at the gatehouse building.

Two effluent holding tanks are also utilised on site, one for the modular offices in the contractors compound and one for the temporary portacabins which are used during the annual maintenance shutdown. The contents of these holding tanks are transported off site for treatment regularly.

4.4 Description of Current Process

4.4.1 Waste to Energy Process

In 2019, the facility accepted a total of 230,531 tonnes of waste, of which 9,310 tonnes were classified as hazardous. Energy is recovered from the combustion of the waste via a conventional steam boiler and converted to electricity for export to the national grid. In 2019 alone, approximately 141,177 megawatt hours of electricity was exported to the national grid.

The facility operates in strict compliance with an industrial emissions licence issued by the EPA (Industrial Emissions Licence Number: W0167-03).

The facility accepts waste six days per week between the hours outlined below but the installation runs 24 hours per day and for over 8,000 hours per annum.

- Monday – Friday 07:00 to 18:30
- Saturday 08:00 to 14:00.

Waste arriving at the facility must be checked in at the gatehouse and pass over the weighbridge before being directed to the tipping hall (solid waste deliveries) or to the tanker unloading area (aqueous waste deliveries). Acceptance checks are performed at both acceptance points to ensure that the waste delivered meets the required specifications. Additional controls for the acceptance of hazardous waste are included the EPA licence for the facility (W0163-03).

Solid waste is unloaded from trucks to the waste bunker from the tipping hall where two waste cranes mix the waste prior to feeding towards the waste hopper and feeding chute prior to introduction to the furnace. Aqueous waste is unloaded to the temporary storage tank (70m^3 capacity) on site and either pumped from the tank or directly from an incoming tanker for treatment in the furnace. This activity is also licensed by the EPA under W0167-03.

Energy is recovered from the resulting flue gases in the furnace using a conventional steam boiler.

The resulting steam is fed to a turbine and up to 21.5 MW of electricity is generated. Approximately 2.5 MW_e is consumed by the equipment in the plant and the other 19 MW_e is then available for export to the national grid.

Reduction of the oxides of Nitrogen (NO_x) in the flue gases is achieved via injection of aqueous ammonia into the flue gases in the boiler in a process called selective non-catalytic reduction or SNCR.

Bottom ash is produced as a residue of the combustion process in the furnace. Once extracted from the furnace via a water quench bath, the bottom ash is transported by conveyor to the bottom ash hall for metal recovery and storage. Ferrous and non-ferrous metals are recovered from the bottom ash using overband magnets and an eddy current separator. The metals and the residual bottom ash are stored in the bottom ash hall prior to sending off-site for recovery.

The bottom ash is sent to landfill for use as daily cover for the landfill cells and also for road construction on the landfill itself. Three landfills are currently utilised for this process, Knockharley Landfill Limited, Drehid Landfill and Ballynagran Landfill. Further details on the uses and destinations of bottom ash offsite are provided in **Section 16.5.3.10** of **Chapter 16 *Material Assets.*** Ferrous metals are sent for recovery in Ireland and non-ferrous metals are exported to mainland Europe for recovery. A summary of the quantities produced of each residue is provided in **Table 4.1** below.

Table 4.1 Summary of residues from furnace produced/recovered on site in 2019.

Residue	Tonnage Produced	As % of waste input
Bottom Ash	35,124	15%
Metals - Ferrous	2,760	1.2%
Metals – Non-Ferrous	437	0.2%

An overview of the complete waste to energy process can also be seen below in **Figure 4.3**.

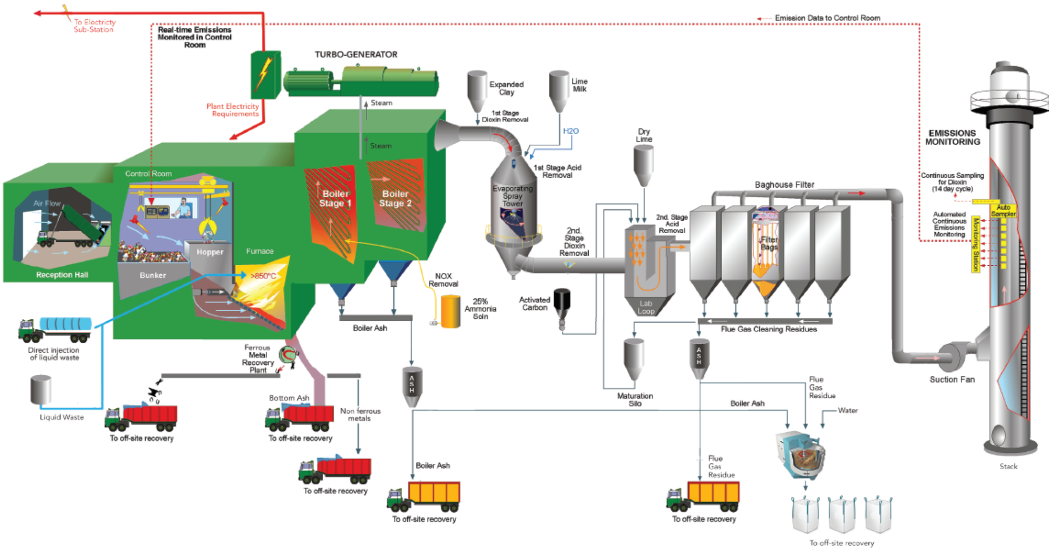


Figure 4.3 Schematic of the waste to energy process

4.4.2 Flue Gas Cleaning Process

After leaving the boiler, the flue gases must be cleaned before they can be discharged through the stack. This is done by the injection of lime and a mixture of activated carbon and expanded clay.

Lime is introduced to the process in two forms, as a slurry mixed with water and also in dry form to control the acid gas concentration in the flue gases to the levels required in the EPA licence for the site. Separate silos for the storage of quick lime and hydrated lime are provided in the flue gas cleaning part of the main process building.

A mixture of activated carbon and clay is used in the process to control the heavy metals and dioxins. This is also stored in a silo in the same area as the lime silos.

Additional water may be injected to control the temperature of the flue gases entering the baghouse filter. Water for use in the process is abstracted from a groundwater well on site and pumped to the combined firewater and process water tank, which is 2,185m^3 in capacity. The top 330m^3 of this tank is reserved for process water.

Residues are also created as a by-product of the flue gas cleaning process. Boiler ash is collected from the on-line cleaning of the boiler and flue gas cleaning residues are generated by the introduction of lime milk, dry lime, activated carbon and clay to clean the resultant flue gases. **Figure 4.3** above shows the flue gas cleaning process and the various inputs and outputs involved.

A summary of the annual quantities of boiler ash and flue gas cleaning residues produced is given in **Table 4.2** below.

Table 4.2 Boiler ash and flue gas cleaning residues produced on site in 2019.

Residue	Tonnage Produced	As % of waste input
Boiler Ash (BA)	1,908	0.7%
Flue Gas Cleaning Residues (FGCR)	10,018	4%

A baghouse filter is utilised to remove the carbon, clay and lime that has reacted to form the flue gas cleaning residues. The residues are trapped on the surface of the individual sleeves (approximately 2,000 sleeves in total) of the baghouse filter and collected in six hoppers underneath each of the six modules that comprise the baghouse filter unit. Compressed air is used to remove the residues from the sleeves and from the hoppers the residues are transported in enclosed conveyors to one of two residue silos (each of 210m^3 capacity). The residues are either discharged into road tankers for export to recovery at saltmines in Germany or are transferred by enclosed conveyors to the pre-treatment plant on site as outlined in **Section 4.4.4** below. Residues that undergo pre-treatment on-site are sent to a saltmine in Northern Ireland for recovery, as discussed in **Section 4.4.4** below.

4.4.3 Raw materials usage

In addition to lime, activated carbon/clay and water for flue gas cleaning, water is also used on site for boiler water, general site cleaning, and firefighting activities. Fuel oil is consumed in the burners primarily for start-up and shutdown activities. Aqueous ammonia is used in the SNCR process for the reduction of nitrogen oxides. **Table 4.3** below summarises the annual raw materials usage for 2019.

Table 4.3 Raw materials consumed for 2019.

Raw Material	Total Consumption 2019 Usage (tonnes)	Usage per hour (kg/h)
Quicklime (CaO)	3,543	441
Dry Hydrated Lime ($Ca(OH)_2$)	1,352	168
Activated Clay+Carbon	318	40
Aqueous Ammonia	381	47
Water	71,398	8,878
Fuel Oil	228	28

4.4.4 Pre-treatment plant for boiler ash and flue gas cleaning residues

Since October 2018, a new pre-treatment plant for treating boiler ash and flue gas cleaning residues has been operational on site. Boiler ash, flue gas cleaning residues and water are mixed together and discharged into 1m^3 flexible intermediate bulk container (FIBC) bags.

The FIBC bags are then loaded onto curtain-sided trailers and sent to a saltmine in Northern Ireland for recovery. This process avoids the need to export these residues in bulk powder form to saltmines in Germany where a similar pre-treatment process is applied prior to recovery in the mine. For operational reasons, the ability to use both routes for export is maintained. Further details on the export of boiler ash and flue gas cleaning residues are provided in Section 16.5.3.11 of **Chapter 16 *Material Assets.***

4.4.5 Emissions monitoring and control

As shown in **Figure 4.1** above, continuous sampling and monitoring of the flue gases is performed to give real time information to the operators of the plant on the performance of the flue gas cleaning systems relative to the strict emission limit values specified in the EPA Industrial Emissions (IE) licence. The dosing of rate of the re-agents is controlled automatically by the plants computerised control system. The facility has a very good compliance record and submits annual environmental reports to the EPA each year outlining the overall environmental performance of the facility. Further details on the IE licence are provided in **Section 4.10.1** below.

4.5 Main features of the proposed development

4.5.1 Overview

The main drivers for embarking on this project have already been outlined in **Chapter 3 *Alternatives*** of this EIAR but can be summarised as follows:

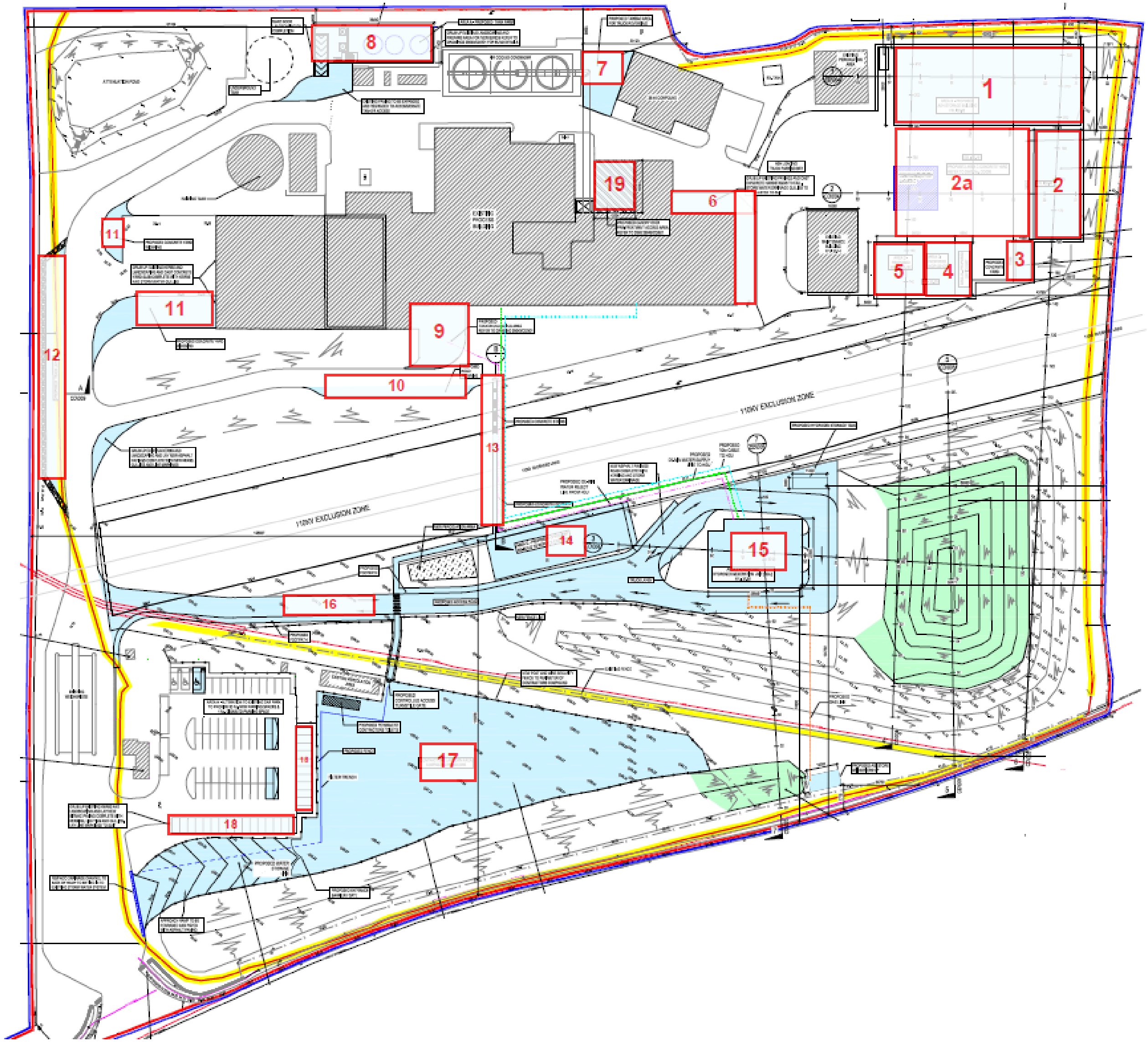
- To provide a sustainable level of treatment capacity to meet the needs of an evolving waste market.
- To improve the energy efficiency and sustainability of the facility in a new and evolving energy market.
- To provide additional buildings and infrastructure on site to adapt to changes in the residue treatment market and to provide for further employment growth on site.

The proposed development will consist of the following main elements:

1. Increase in the amount of hazardous waste accepted at the facility for treatment in the waste to energy plant from the current permitted 10,000 tonnes per annum (tpa) up to a maximum of 25,000 tonnes per annum;
2. It is also proposed to increase the annual total waste accepted at the site for treatment in the waste to energy facility from the currently permitted 235,000 tonnes per annum to 250,000 tonnes per annum;
3. Development of an aqueous waste tank farm and unloading area for the storage and processing of aqueous liquid wastes currently accepted at the facility;

4. Development of a 10MW_e hydrogen generation unit for connection to the natural gas distribution network, for mobile hydrogen transport applications and other potential uses;
5. Development of a bottom ash storage building for the storage of up to 5,000 tonnes of bottom ash which is currently produced on site;
6. Additional waste acceptance capacity and infrastructure to receive up to 30,000 tpa (bringing the site total to 280,000 tpa) of third-party boiler ash, flue gas cleaning residues and other similar residues for treatment in the existing ash pre-treatment facility on site;
7. Development of a warehouse, workshop and emergency response team (ERT)/office building to support existing maintenance activities on the site.
8. Development of a new concrete yard and parking area for up to 10 trucks, tankers or containers on the site;
9. Demolition and re-building of an existing single storey modular office building on site with a slightly increased footprint; and
10. Other miscellaneous site upgrades.

Drawings **29043-CD-002** and **003** present the existing and proposed site plans reflecting the scope of works involved, refer to **Appendix 5.2** of **Volume 3**. **Figure 4.4** below shows the proposed elements of the development in the different areas of the site.



Legend:

1. Bottom Ash Storage Building (Area B)
2. Concrete Area for Tanker Truck/Container Parking (Area C)

2a. New Concrete Yard Area (Area C)

3. Canopy Maintenance Bay
4. Workshop & Office (Area D)
5. Warehouse (Area D)
6. Cast Concrete Hardstand
7. Tarmac Area for Truck Reversing
8. Tank Farm (Area A)
9. Tanker Unloading Area
10. Road Widening
11. Concrete Yard Widening
12. Truck Layby
13. Concrete Footpath & Stairs
14. Office Re-build (Area G)
15. Hydrogen Generation Unit (Area F)
16. Access Road
17. Contractors Laydown Area
18. Alterations to Car Park (Area H)
19. Canopy over Pre-Treatment Access Area

Figure 4.4 Proposed Development on the site. Not to scale.

4.5.2 Increase in overall annual total waste accepted at the site for treatment, including increase in hazardous waste

It is proposed to increase the amount of hazardous waste accepted at the facility for treatment in the waste to energy plant from the current permitted 10,000 tonnes per annum to 25,000 tonnes per annum. This will result in an increase in the annual total waste accepted at the site for treatment in the waste to energy facility from the currently permitted 235,000 tonnes per annum to 250,000 tonnes per annum.

The proposed increase to 250,000 tpa from 235,000 tpa is to allow for the acceptance of additional (15,000 tpa) hazardous wastes (including hazardous aqueous wastes in particular) but is also intended to reflect the changing nature of the average calorific value of the solid industrial and municipal non-hazardous wastes accepted at the plant. When the average calorific value (CV) of the overall blend of solid wastes decreases, then more waste can be processed per annum and when the CV increases, then less waste can be processed. Based on the experience of the past 8 years of operation, the average CV changes from year to year. As Indaver cannot control or influence these changes, the plant must be flexible to absorb these fluctuations. Based on the amount of suitable hazardous waste available in any given year and the average CV of the non-hazardous waste, the additional 15,000 tonnes of capacity requested could also be utilised for non-hazardous waste. An example of this is given as Scenario 2 in **Table 4.4** below.

A conservative approach has been taken when estimating the associated increase in raw materials required and residues produced and assumes that all of the additional proposed tonnage would be from solid waste. This is detailed further in **Chapter 16 *Material Assets***.

It is proposed to construct a tank farm and tanker unloading area for the acceptance of aqueous wastes. Since 2017, an average of over 7,200 tonnes per annum of aqueous hazardous waste were accepted and treated at the facility. By the development of this infrastructure, the annual treatment capacity of hazardous aqueous waste can be increased from 8,000 to a maximum of 20,000 tonnes per annum. The waste will predominately be delivered in bulk tankers (22 to 24 tonnes per load), as it is currently the practice.

The provision of this infrastructure will ensure that up to 20,000 tonnes of hazardous aqueous wastes can be diverted from the current export to Europe route and instead be directed to Indaver's WtE plant in Ireland. The proposed increase in hazardous waste tonnage accepted from 10,000 tpa to 25,000 tpa will also allow for further growth of the hazardous solid waste accepted on site. From past experience, it is not easy to predict what volumes of particular hazardous wastes will be suitable and available for treatment, but an outline of both the existing and proposed split between solid and aqueous hazardous waste (based on a theoretical maximum for aqueous hazardous waste) is shown as Scenario 1 in **Table 4.4** below.

As outlined in **Chapter 2 *Policy & Planning Framework and Need for the Scheme*** of this EIAR, this in turn increases Ireland's self-sufficiency for the treatment of waste on the island.

The proposed development also supports the proximity principle and is also more sustainable as it reduces the distance travelled by these waste streams dramatically.

Table 4.4 Example of two typical scenarios based on the existing and proposed waste to be accepted.

Waste	Existing Example (tpa)	Scenario 1 Proposed (tpa)	Scenario 1 Increase (tpa)	Scenario 2 Proposed (tpa)	Scenario 2 Increase (tpa)
Hazardous aqueous waste	8,000	20,000	+ 12,000	15,000	+ 7,000
Other hazardous waste (solid)	2,000	5,000	+ 3,000	3,000	+ 1,000
Non-hazardous waste	225,000	225,000	0	232,000	+ 7,000
Total waste accepted	235,000	250,000	+ 15,000	250,000	+15,000

4.5.3 Aqueous Waste Tank Farm & Unloading Area

It is proposed to develop a tank farm for the storage and processing of aqueous liquid wastes currently accepted at the facility.

Drawing **29043–CD-201** in **Appendix 5.2** shows the layout of the tank farm. There will be a total of three tanks, each with an operational capacity of 300m^3 which are up to 25.5m in height (+56m OD) and 4.5m in diameter. Only two of these tanks will be dedicated to the acceptance and storage of aqueous hazardous waste.

The third tank will be utilised for the storage of water during maintenance activities. There will be a further tank of 20m^3 operational capacity which will be used to ensure that any fine solids are constantly kept in suspension before being pumped to the furnace. All tanks will be single walled but with an additional jetting prevention shield where necessary and will be fabricated from mild steel and contained within a concrete bund. The bund will be approximately 29m by 11m in plan and with a 1.2m high bund wall (north facing bund wall 2.2m). It will be designed to the required standards for water-tightness and retention capacity. **Figure 4.5** below outlines the layout of this area and the tanks within the bund.

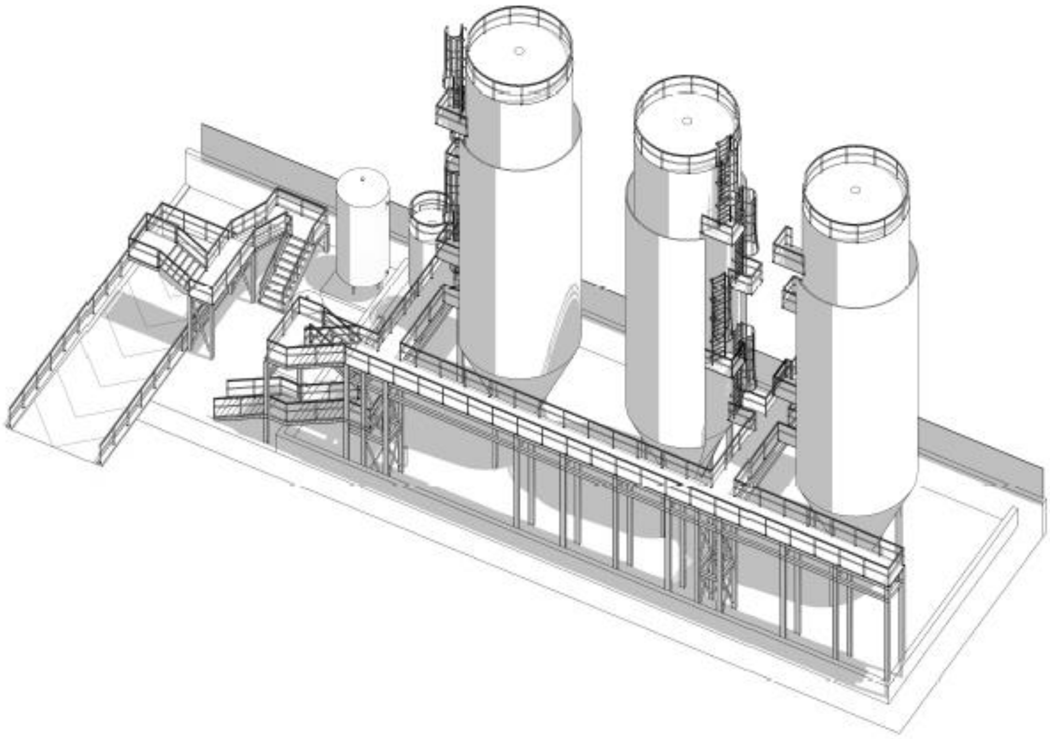


Figure 4.5 Tank Farm and Bund

To cater for the possibility of any solvents being present in the aqueous wastes, the tanks will be equipped with a nitrogen blanketing facility to ensure an inert atmosphere in the head space of the tanks. Any possible off-gases and overpressure in the tanks will be vented to the furnace for incineration. A small activated carbon unit will also be installed for times when the WtE plant is in shutdown to prevent any emissions to atmosphere. A piperack will be provided to link to the existing piperack servicing the aqueous ammonia and fuel oil area to the proposed tank farm. Walkways and staircases will provide access in and out of the bund and for access to the tanks and loading area.

An upgrade to the existing tanker unloading area, located south of the main process building is also proposed. Details are included on drawings **29043-CD-003** and **29043-CD-301** in **Appendix 5.2** of **Volume 3**. The upgrade will provide space for three tankers at a time for sampling and offloading operations. Containment for the full contents of a tanker (25m^3) will be provided in the event of a spillage. See the layout of this area in **Figure 4.6** below.

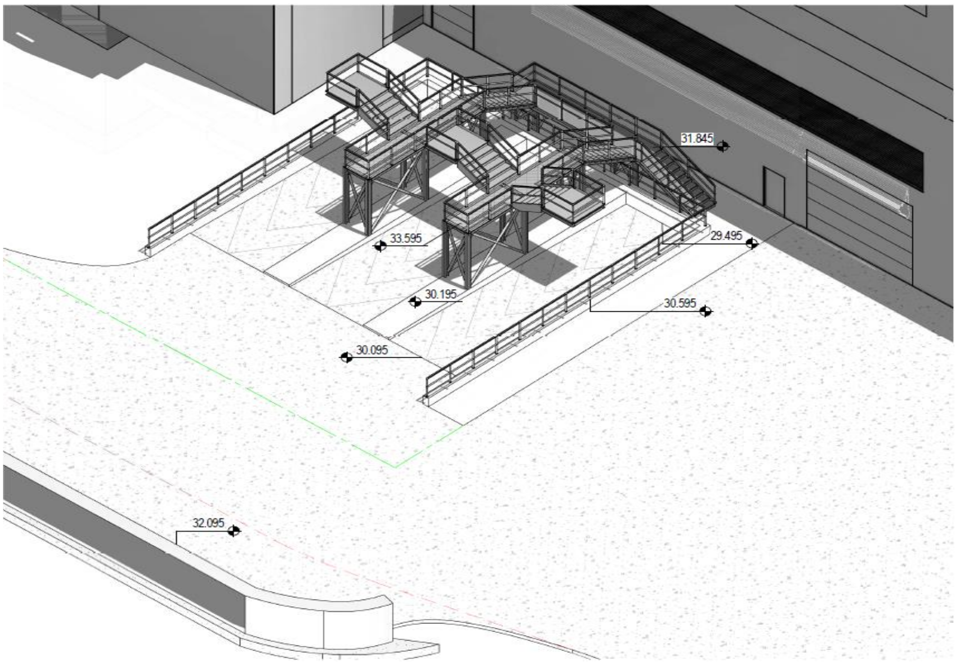


Figure 4.6 Proposed Upgrade to Existing Tanker Unloading area

The area will be approximately 15m by 14m in plan and the height to the top of the gantry platforms will be 3.5m (34m OD).

An additional gantry for accessing the top of tankers (the existing area accommodates access to two tankers) will also be provided so that any of the three tanker parking spaces can be safely accessed from above. A wider turning circle for tankers reversing into place will be provided by widening a section of the road to the south of unloading area.

Tankers containing aqueous waste will be directed to the unloading area after waste acceptance and initial weighing operation at the weighbridge. Operators in the tank farm will direct the driver to one of the three unloading bays. The tanker unloading area is located south of the main process building. Details are included on drawings **29043-CD-003** and **29043-CD-301** in **Appendix 5.2** of **Volume 3**.

Once in place, the operator will access the top of the tanker to take a sample, when required. The sample is then analysed for conformity with certain key parameters such as calorific value, pH and chlorine content. This conformity check analysis ensures that the load is within specification. Compatibility testing will also be performed where required to ensure that there will be no adverse reaction with the contents of the tanks.

If the contents are not within specification, then arrangements will be made to send it off-site to an appropriately licensed facility in Ireland or abroad. In this event, the tanker may remain in the unloading area until collected or shunted to the new contained parking area proposed for the northern corner of the site.

Based on the available volume in each of the two 300m^3 tanks and by radio communication with the control room, the operator will decide which tank to offload the waste to.

Once the connections are made to the tanker, the operator controls the pumping operation locally until the tanker is empty. This takes approximately one hour.

Circulation loops in both 300m^3 tanks will ensure that the contents of the tank are well mixed prior to transfer to the 20m^3 feeding tank. From the feeding tank the control panel operator in the control room will feed the waste to the furnace at an average rate of approximately 2 tonnes per hour (tph) and up to a maximum of 2.5 tph via two lances in the furnace. The pump will be located in a pump bund local to the tank farm and the line from the pump to the furnace will be carried on an existing overhead pipe rack from the tank farm to the main process building and from there to the furnace. The line will be supported from the structural steel frame of the main process building and on the inside of the building. The line to the furnace will be fully welded with no flanged connections. The same route will also be followed by the line connecting the head spaces of the three tanks which will carry nitrogen/vapours from the tank farm for treatment in the furnace.

This transfer of nitrogen/vapours from the two 300m^3 tanks will occur when overpressure is experienced in the headspace of the tanks, either from temperature increases during the normal course of the day or when one or other of the tanks is being filled. When aqueous waste is being pumped out of the tanks, this will generate a slight under-pressure in the tanks and the nitrogen storage vessel adjacent to the tank farm will fill the head space to maintain a constant nitrogen blanket pressure of approximately 10 – 15 mbar.

A facility for direct injection from the tanker off-loading area to the furnace will also be provided for certain dedicated waste streams or in the event that the tank farm is out of commission for inspection/maintenance. The direct injection process from a tanker will take approximately 12 hours to complete.

As is currently the case under EPA licence requirements, the tanker unloading area design will provide a contained drainage system and stormwater collected in these areas will only be released into the main drainage network after local assessment confirms that there is no contamination present. The new tank farm will be contained within a bund to comply with standard EPA licence requirements and in line with BS 8007.

The feed rate from the tank farm to the furnace will be controlled in the central control room for the plant. The offloading from road tankers to the tank farm will be controlled locally by the operators in the unloading area. The level on each tank will be controlled using level transmitters and overfill protection will be provided via level switches and interlocks. Overpressure in the tanks is managed by forced ventilation to the secondary air system in the furnace. Pressure transmitters and over/underpressure venting devices will also be installed on each tank.

In the event of a build-up of a solvent top-layer in either of the tanks (which can be verified by samples taken from the tanks), both tanks will have the facility to drain off this solvent layer into a tanker which can park in the area adjacent to the nitrogen storage vessel. This tanker can then be sent off site for treatment when full. This loading area can be seen on the left-hand side of **Figure 4.5** above.

The inputs to the tank farm will be hazardous aqueous waste and nitrogen for the blanketing system. The outputs will be hazardous aqueous waste and a nitrogen/vapour mix to the furnace for thermal treatment.

The acceptance, handling and storage systems described above are considered BAT under the BREF reference documents for Waste Treatment and Emissions from Storage.

4.5.4 Hydrogen Generation Unit (HGU)

It is proposed to develop a $10MW_e$ hydrogen generation unit (HGU) for connection to the natural gas distribution network for mobile hydrogen transport and other potential applications.

The proposed HGU has been designed as an alternative means of generating energy during times of curtailment for export to the national electricity grid. On average, the existing facility is curtailed or prevented from exporting power generated from the steam turbine on site for approximately one thousand hours per year (or 12.5% of the operational time of the plant) due to lack of demand or excess wind generation capacity. As is currently the case, instead of "dumping" or destroying the steam generated from the combustion of waste over the steam turbine by-pass station and air-cooled condensers, it is proposed to generate electricity in the turbine and divert it to a hydrogen generation unit on site. The hydrogen generated can then be either fed into the natural gas grid or stored on site for fuelling trucks, buses and other vehicles that have been either designed or retrofitted to run on hydrogen fuel cells. Hydrogen can also be tankered off-site for industrial use or to fuel distribution centres. When used as a fuel, hydrogen combusts to produce water vapour and hence is a clean fuel.

As already outlined above, the development of the HGU on site will ensure that energy recovered from the combustion of waste is not destroyed when restrictions on the export of electricity are experienced. The location and layout of this unit can be seen on drawing **29043-CD-601** in **Appendix 5.2**. The building housing the equipment will be approximately 33m by 25m in plan and 11m high (49m OD) at the roof ridge. A rendered view of the building can be seen in **Figure 4.7** below.

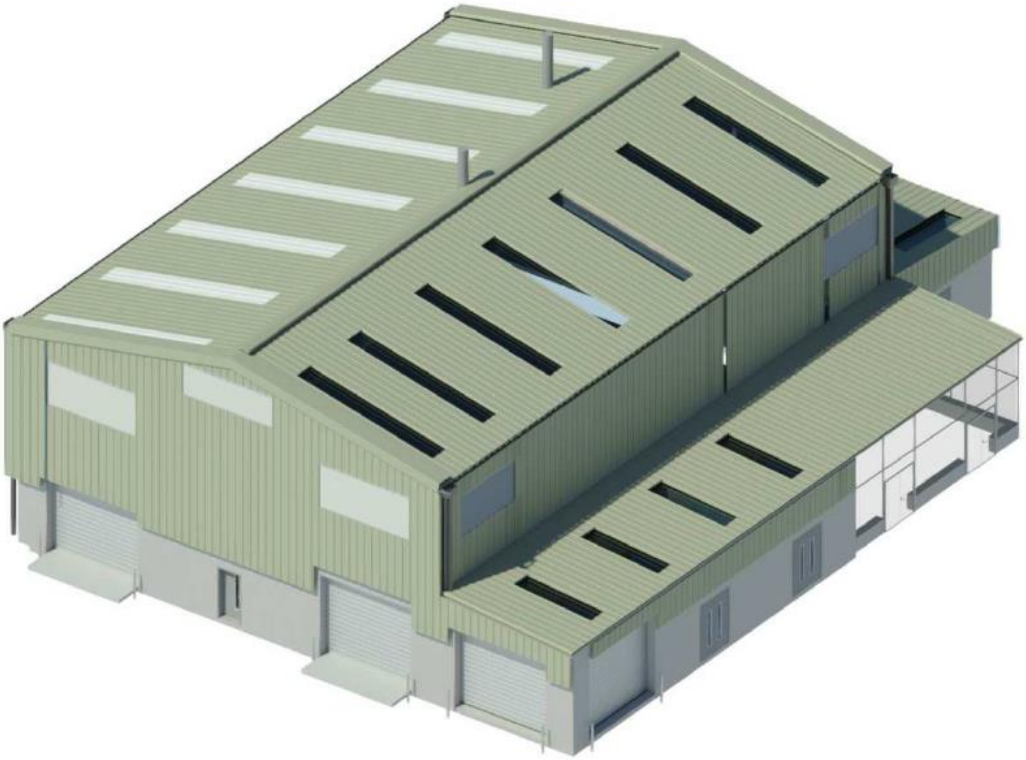


Figure 4.7 Hydrogen Generation Unit

The process employed is alkaline water electrolysis which uses water as the feedstock in the presence of an alkaline solution (Potassium Hydroxide or KOH) to generate hydrogen and oxygen. A schematic of the process is shown in **Figure 4.8**. In short, electrical current is supplied to two electrodes which are submerged in an alkaline – water solution producing Hydrogen at the cathode and Oxygen at the anode. The oxygen and hydrogen sides of the cell are separated by a diaphragm. The layout of the equipment within the building can also be seen below in **Figures 4.9** and **4.10**.

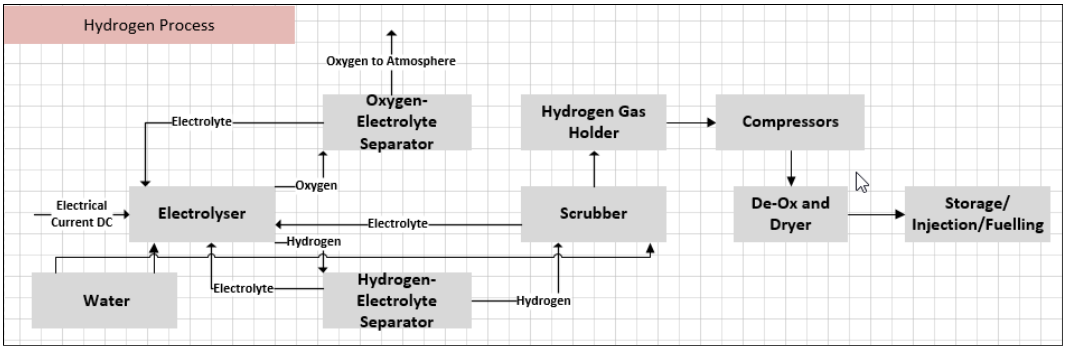


Figure 4.8 Schematic of the alkaline water electrolysis process

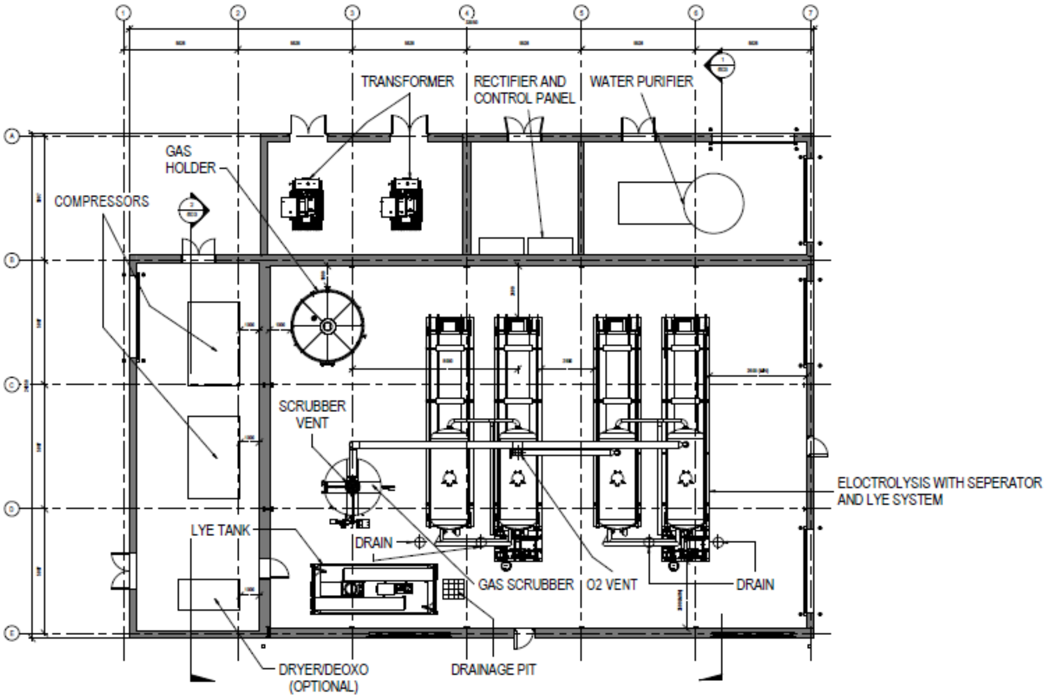


Figure 4.9 Schematic of the layout of the Hydrogen Generation Unit building.

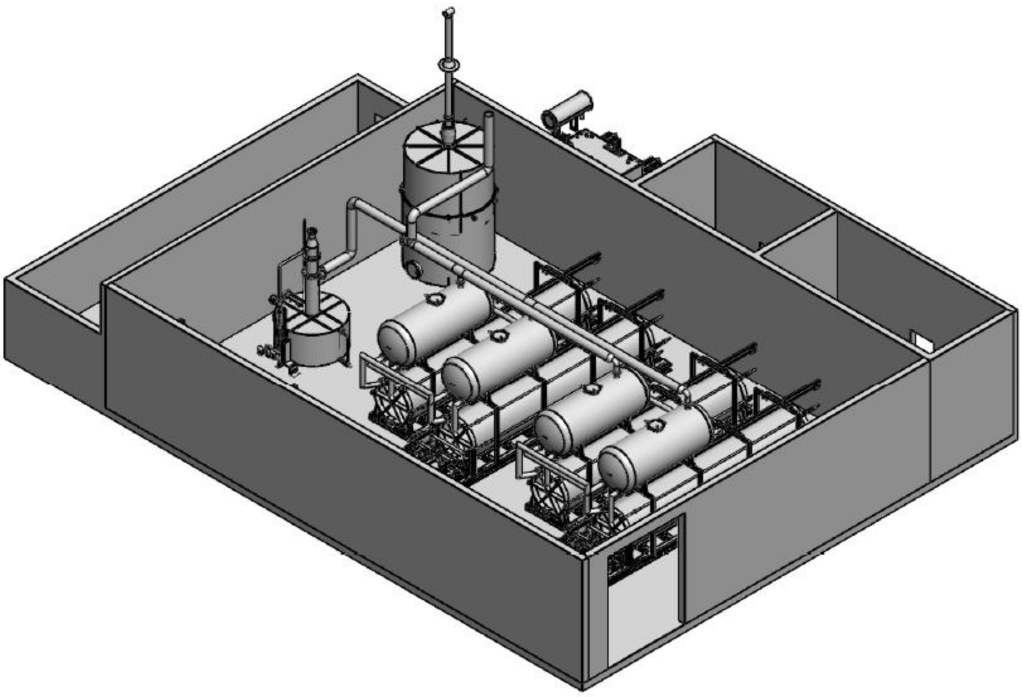


Figure 4.10 Layout (3D view) of equipment inside the HGU.

4.5.4.1 Electrolysis Unit

DC voltage is applied between the first and last electrode, thereby producing a current flow through the cells and gas is produced. The incoming AC supply from the main incomer is converted to DC via the rectifier unit. The gas from each cell is collected in the hydrogen and oxygen flow ducts which run in parallel along the top of each unit and are fed into the gas/electrolyte separators at the front of the electrolyser. The oxygen separator discharges the oxygen to atmosphere through a small vent stack (approximately 2.1m high) in the roof at a rate of 1,934 Nm^3/hr and the hydrogen separator sends the hydrogen to the water scrubber. The electrolyte from both separators is then recycled back into the distribution channels in the bottom of the electrolyser unit. The electrolyte is fed to this system from a 50m^3 storage tank located in the main plant area. This tank will either be a double skinned tank or contained within a bund and the building. The separators are placed directly on top of the electrolyser units.

A series of 4 No. electrolyser units are proposed, all of which are located in the main plant area of the building. Each electrolyser has an electrical consumption of 2.5 MW_e and can produce a total of 1,930 Nm^3/hr of hydrogen or just under 500 Nm^3/hr of hydrogen per electrolyser unit. This equates to 1,930,000 Nm^3 or approximately 160 tonnes of hydrogen per annum, assuming that the unit runs for 1,000 hours per year.

Based on a calorific value of 130 MJ/kg for the produced Hydrogen fuel, the overall efficiency of the process for the conversion of electrical energy into hydrogen is approximately 60%.

The system uses purified water as a feedstock with a consumption rate of 2.2 m^3/hr.

Purified water will be supplied from the existing de-mineralised water system on site. In the event that the quality or supply is not suitable from the existing plant on site, a dedicated water purifier will be fed with process water from the existing plant. The water purifier unit, if required will be located in the northernmost corner of the building.

4.5.4.2 Scrubber Unit

Water is also used in the scrubber unit after the hydrogen/electrolyte separator. The scrubber design provides efficient removal of residual KOH droplets from the hydrogen gas to protect downstream equipment from alkali deposits and corrosion. The scrubber is a conventional, packed column type with counter flow scrubbing of the gas. The unit has a water reservoir at the bottom, the packed bed in the middle and a demister at the top. The gas enters under the packed bed and leaves through the demister located at the top of the packing column. The scrubbing water is sprayed evenly on to the top of the packed bed, collected in the bottom reservoir, and circulated back to the top by the scrubber water circulation pump. A heat exchanger is integrated in the circulation loop to cool the gas. Make-up water intake is directly into the bottom water basin.

The scrubber is made from carbon steel and provided with connections for make-up water inlet; drain; flowmeter; level switches and a differential pressure gauge.

The scrubber basin also acts as the feed water reservoir for the electrolyser and since the electrolyser is topped up with feed water from the scrubber basin, recovery of KOH from the gas is ensured.

There is one level transmitter on the scrubber basin to maintain the level in the basin and to provide alarms if the level goes below normal operating range.

4.5.4.3 Gas Holder

The hydrogen from the scrubber passes next into the gas holder which is a 50m^3 wet, floating-bell type with a central coaxial sliding guide equipped with low friction material. A water seal is fitted immediately downstream of the gas holder and acts as a condensate drain.

The volume of the gas holder is designed to accommodate the approximate equivalent of the maximum volume of hydrogen produced by the electrolyser in 2-3 minutes. If the gas holder should overfill, the hydrogen will automatically be safely vented to atmosphere.

There is one level transmitter and one level switch which monitor how full the gas holder is. The signal from the level transmitter will be used to steer the rectifier current to increase/decrease hydrogen production to maintain the gas holder level at the chosen set point. In addition, the level transmitter is used to provide service alarms (high & low level) and trip alarms (such as HH=rectifier to zero (min)) when the gas holder level reaches various alarm set-points.

4.5.4.4 Compressor

Finally, a compressor is used to compress the hydrogen gas from the gas holder pressure of 0.02 bar up to the pressure required in the on-site storage tank for mobile hydrogen of 350 bar or to supply the above ground installation (AGI) feeding into the natural gas distribution pipeline which is located between the south-eastern site boundary and the R152 regional road. The storage tank is located on the north side of the hydrogen building and will be a horizontal, cylindrical tank of approximately 100m^3 capacity. This tank will be capable of storing up to 2 tonnes of hydrogen at a pressure of 350 bar. The AGI for feeding into the natural gas pipeline will be located to the south of the hydrogen building near the south-eastern site boundary. The AGI will be fenced off with restricted access for authorised personnel only.

The compressor will be fitted with a gas recycle loop which returns some of the hydrogen from the compressor outlet back to the inlet side of the compressor (through the inlet side of the scrubber and gas holder). The hydrogen gas recycle volume is automatically adjusted by a control valve in the gas recycle loop and based on a signal from the level instrument installed on the gas holder.

When the hydrogen gas production rate increases, the gas holder bell will tend to rise and the recycle control valve will close. When the hydrogen volume in the gas holder decreases, the recycle control valve increases the recycle flow, returning some of the hydrogen back to the gas holder.

4.5.4.5 De-Oxidiser & Dryer

Depending on the quality of Hydrogen required, a final polishing step may be installed where any residual oxygen or water is reduced to an absolute minimum. Without the polishing step the purity of Hydrogen produced is 99% and when installed qualities of 99.99% can be achieved.

If the polishing step is required, this is achieved by the use of a deoxidiser combined with a dryer unit. Residual oxygen is removed from the hydrogen product gas by the deoxidizer, which is a small catalytic reactor. The catalyst chemically combines all the oxygen present with the hydrogen to form water vapour. This chemical reaction is exothermic and will cause a temperature rise of approximately 16°C for each 0.1% of oxygen removed.

The inlet gas to the deoxidizer is saturated and as moisture inhibits the functioning of the catalyst, the gas is electrically pre-heated to a temperature well above dew point. When the deoxidizer reaches the operating temperature, the heater is switched off.

Temperature rise across the deoxidizer gives an accurate measurement of the oxygen content in the hydrogen gas and in case of a high temperature on the outlet of the deoxidizer, which indicates high oxygen content in the hydrogen; the whole plant is automatically shut down.

There are two temperature transmitters on the deoxidizer pre-heater; one to control the temperature, and one to provide high (H) and high-high (HH) temperature alarm functions.

The pre-heated hydrogen then enters the catalytic deoxidizer column. This contains a palladium catalyst which promotes the reaction of hydrogen with residual oxygen in the gas stream. The reaction is exothermic, producing a temperature rise in the gas. There is also a temperature transmitter on the deoxidizer outlet. The increase in temperature from the pre-heater inlet to the deoxidizer outlet is used to calculate the initial oxygen content of the gas. If it is found to be higher than 1% the plant is brought to a stop by an interlock.

The gas is then dried in a twin tower gas dryer where the gas is passed over a bed of water vapour adsorbent. The adsorbent has a limited water adsorption capacity and consequently a twin tower dryer is used. Whilst one tower is drying the gas, the other tower is regenerated.

Drying of the adsorbent is carried out by a small flow of dried gas which is heated by an electric heater. On completion of the regeneration period, the adsorbent is allowed to cool before the regenerated tower is switched back to gas drying mode. The regeneration sequencing and the valve operation of the dryer unit is automatically controlled, and a complete cycle takes approximately 6 hours giving very little wear on valves etc. There is no loss of product gas during the regeneration cycle as the gas used for regeneration is re-circulated internally in the dryer.

4.5.4.6 Inputs & Outputs

The inputs to the hydrogen generation unit are electricity (10MW$_e$), de-mineralised water (2.2 m^3/h) mixed with a fixed amount of electrolyte (Potassium Hydroxide) for the production of hydrogen, cooling water for cooling the scrubber and electrolyte streams and cooling of the oxygen prior to discharge to air.

Outputs from the hydrogen generation unit will be oxygen (1,934 Nm^3/h) to atmosphere, hydrogen (1,930 Nm^3/h) for storage or injection into the gas grid, warmer air from cooling circuits and condensed water vapour to drain from the polishing stages (deoxidiser and dryers) if installed.

The efficiency factor that describes the ratio of energy input to thermal output of the produced hydrogen is approximately 60%.

Drainage from the roof of this building will be via the existing rainwater system on the site. Any spills or leaks from the process will be contained within the building and discharged to the existing spill water tank on site.

4.5.4.7 Mobile Hydrogen Storage & Transfer

Hydrogen will be stored for re-fuelling of buses, and HGV's or for bulk transport off-site to fuelling stations. As discussed in **Section 4.4.3.4**, the storage tank will be 100m^3 in capacity and will be horizontal, cylindrical and with dished ends. Normal operating pressure in the tank will be 350 bar and this tank will be capable of storing up to a maximum of 2 tonnes of hydrogen. The tank will be located to the north of the hydrogen building.

A concrete-surfaced re-fuelling area at the western end of the hydrogen unit will be provided to facilitate fuelling of truck, buses and bulk hydrogen transport tankers. This area will be equipped with a pressure reducing station, hoses and connections for fuelling of trucks and buses and with a separate set of hoses and connections for filling high pressure bulk hydrogen transport tankers.

Drainage from paved areas serving this area will be drained via a forecourt interceptor and silt trap prior to being discharged to the existing stormwater system on the site.

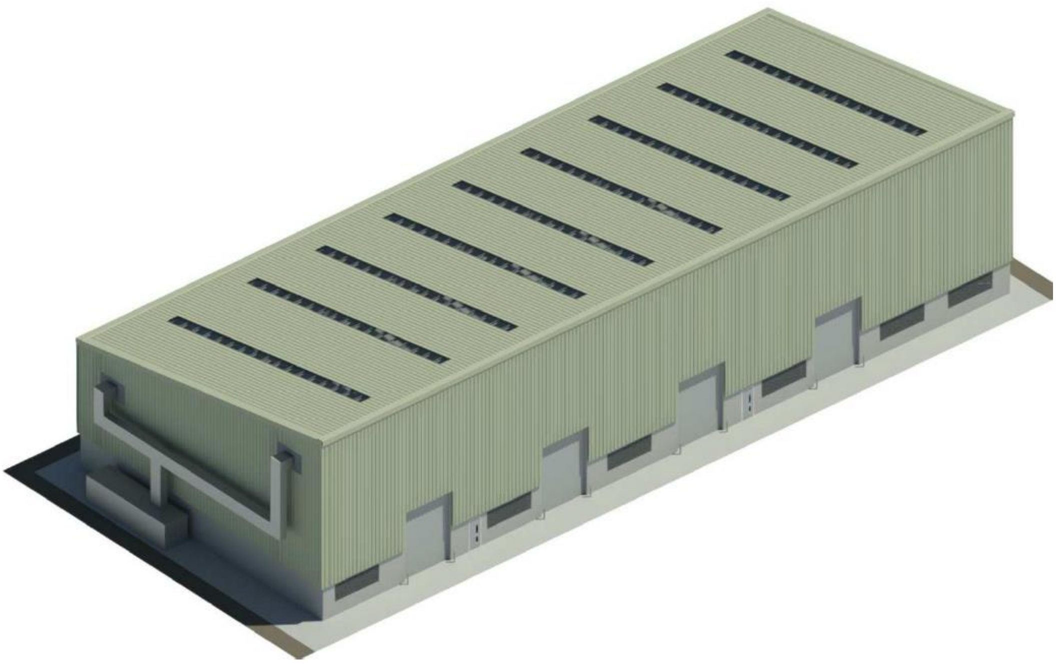
4.5.5 Bottom Ash Storage Building

It is proposed to develop a bottom ash storage building for the storage of up to 5,000 tonnes of bottom ash which is produced on site. This facility will provide the flexibility to export bottom ash to continental Europe for recovery in the event that there are no bottom ash recycling plants developed in the next five to ten years. The need for such a facility has been outlined in **Chapter 2 *Policy & Planning Framework and Need for the Scheme***. It will have the capacity to store up to 5,000 tonnes of bottom ash at a time and can facilitate the export of all of the ash produced in approximately 12 shipments per year out of the Port of Drogheda.

The bottom ash storage building will be located in the north-western corner of the site.

The location and layout of this building is shown on drawings **29043-CD-003** and **29043-CD-501** in **Appendix 5.2**. The building is for bottom ash produced by the plant which will be transported by truck from the bottom ash hall on site on a daily basis. The storage on site is to facilitate export of the bottom ash for recovery to mainland Europe in the event that there are no bottom ash recovery plants developed within the state. Bottom ash would be exported via ship out of Drogheda Port approximately 12 times per year, each with a capacity of 3,000 tonnes. Covered trucks would bring the bottom ash from the site to Drogheda Port for loading into a vessel, typically over a two or three-day period for each shipment. Further details on the uses and destinations of bottom ash offsite are provided in **Section 16.5.3.10** of **Chapter 16** ***Material Assets.***

The building will be approximately 61m by 25m in plan with a single sloped roof of 14.5m high to accommodate tipping trucks at the highest point (45m OD) to 10m in height at the back of the building. A large concrete yard area to the south-east of the building is also proposed (approximately 55m by 35m in plan) which will allow for circulation of trucks transporting ash to and from the building, access for trucks to the contained parking area (see **Section 4.5.8** below) and for deliveries to the new warehouse located to the south-east. There are four entrances provided for truck access to the building from the concrete yard area along the length of the front of the building. Inside, on three sides, a re-enforced concrete wall to a height of 6m will provide strength and containment for the bottom ash stored. The maximum storage capacity of the building for bottom ash will be approximately 5,000 tonnes. **Figure 4.11** below shows the orientation and



appearance of the building.

Figure 4.11: Bottom Ash Storage Building

Trucks carrying the bottom ash from the ash hall on site will reverse into one of the four doorways and tip the ash onto the concrete floor of the storage building.

A front loader will then move the ash into the ash pile and clear the tipping area for the next truck to arrive. This process will be repeated until the area is full.

When an export shipment is planned, trucks will be loaded by the loading shovel and sent off site to Drogheda Port where a vessel will be loaded with approximately 3,000 tonnes of bottom ash over a two or three day period. All trucks leaving the site for the port will be weighed on the weighbridge. When there are no truck movements in or out of the building, the four access doors will remain shut.

Although the bottom ash is wet when extracted from the furnace, storage of this material for periods of weeks or months will result in the remaining water to evaporate, i.e. drying. Therefore, the entire building will be ventilated by air extraction through a particle filtration system at the southern end and outside the building. Fresh air will enter through vents at the northern end of the building and will be extracted via ducting on the southern end as shown in **Figure 4.11** above. Any residual water from the storage of the wet bottom ash will remain on the concrete floor of the storage building where it will be contained until evaporated.

As the export of this material would involve movement to another EU country, the requirements of Regulation (EC) No 1013/2006 of 2006 on shipments of waste would also need to be adhered to. Refer to **Section 4.10.4** for further details.

Inputs to the building will be bottom ash. Outputs will be air from the filtered air extraction system and bottom ash for export. The design this storage and handling building is considered BAT under the BREF for Emissions from Storage.

Rainwater collected from the roof area will be drained directly to the existing stormwater system on site.

Paved areas outside the building will be drained via a forecourt interceptor and silt trap prior to being discharged to the existing stormwater system on the site.

This building may also be used for annual waste surveys and detailed waste audits and inspections on incoming deliveries. Waste surveys involve the sampling and sorting of municipal waste and are carried out over a 3 – 5 day period. Detailed inspections may be carried out during an intensified period (1 – 2 weeks) of audits for conformity with incoming municipal waste deliveries. This activity involves tipping a waste load onto the ground and checking for oversized material or non-conforming waste prior to re-loading the truck with a loading shovel or telescopic forklift.

4.5.6 Residue Acceptance & Storage for Pre-Treatment

It is proposed to increase the capacity of the existing ash pre-treatment facility (for the acceptance of third-party boiler ash and flue gas cleaning residues) by 30,000 tonnes per annum. Acceptance of such residues would be conditional on an analysis to check that the licence or permit requirements at the saltmine in Northern Ireland can be complied with. Further, the requirements of Regulation (EC) No 1013/2006 of 2006 on shipment of waste would also need to be adhered to (as is currently the case for the existing scenario) Refer to **Section 4.10.4** for further details.

The additional infrastructure proposed for the acceptance of this material and other similar residues from other thermal treatment plants on the island of Ireland will comprise three silos housed within the main process building and an unloading area for tankers delivering this material outside the main process building. The residues will then be processed in the existing pre-treatment plant on site (as described in **Section 4.4.4** above) for export for recovery to a saltmine in Northern Ireland.

Currently, 25,000 tpa of third-party residues similar to those produced at the Meath facility are exported to Germany and Norway. This proposal would reduce the transport distances for the sustainable treatment of these residues.

Boiler ash, flue gas cleaning residues (FGCR) and similar residues from thermal treatment processes (e.g. kiln dust if available in the market) will be accepted and unloaded to one of three new silos located within the process building (refer to area 11 in **Figure 4.1** "Existing Site Layout"). Two silos will be dedicated for FGCR acceptance (approx. 200m^3 each) and one for boiler ash (BA) and other residues (approx. 100m^3). The ash will be delivered in enclosed tankers and are offloaded to the silos pneumatically. The same method is currently used for unloading consumables. Filtration systems on the silos will mitigate against dust emissions during the unloading operation. A new concrete area (300m^2 approx) will be provided for these unloading operations at the north-eastern end of the main process building as shown in drawing **29043-CD-003**, refer to **Appendix 5.2** in **Volume 3**. Rainwater from this area will be contained and, if deemed clean, will be released into the internal water collection system within the main process building, which drains to the spilled water tank on site for re-use in the process.

From the silos, the residues will be transported in enclosed conveyors to the pre-treatment plant and mixed with water in specific proportions in the pre-treatment plant (as described in **Section 4.4.4** above), which has been permitted previously under ABP planning (Ref. PL17.PM0007).

Once mixed, the cement-like product is discharged into 1m^3 flexible intermediate bulk container (FIBC) bags. The bags are then sent to a saltmine in Carrickfergus, Northern Ireland for recovery (Permit No. P0547/16A).

It is anticipated that a maximum of 30,000 tonnes per annum of residues will be accepted on site for treatment in the pre-treatment plant.

Inputs to the storage silos will be residues and compressed air. Outputs will be clean air from the dust filtrations unit on each silo and residues to the pre-treatment plant on site. The design of these silos is considered BAT under the BREF for Emissions from Storage.

4.5.7 Warehouse, Workshop & Office/ERT Building

It is proposed that the existing warehouse and workshop building on site will be re-purposed and the warehousing and workshop functions will be re-located to a new two storey building which will also include additional office accommodation for staff on site, Emergency Response Team (ERT) equipment and staff facilities including changing area, toilets and showers.

The building will be split into three separate areas to accommodate the warehouse, workshop and office/ERT functions. The location and layout of this building is shown on drawings **29043-CD-003** and **29043-CD-401** in **Appendix 5.2** of **Volume 3**.

The warehouse will comprise a goods-in and -out area, a small office for the warehouse technician and racking/storage spaces for spare parts associated with the operation and maintenance of the entire facility. This area is approximately 15m by 17m in plan and 10m high (41m OD).

The workshop is dedicated to the mechanical maintenance team and will house welding equipment, grinders, cutting equipment for use on work benches or in a welding booth all located on the ground floor. A mezzanine office area will be provided for the mechanical maintenance team leader and staff. This part of the building will be approximately 10m by 17m in plan and 10m high (41m OD).

The existing warehouse and workshop building will be re-purposed to store FIBC bags ready for shipment from the existing residues pre-treatment plant on site, in advance of shipment off site. The existing office area within this building will be re-purposed as a small laboratory area for sample collection, preparation and testing associated with the pre-treatment plant for residues and the incoming aqueous hazardous waste streams.

The proposed office and ERT area will accommodate up to ten additional Indaver staff with a locker room, showers, offices and meeting room for both the Indaver staff and permanent contractors on site.

This two-storey section of the building will be approximately 6.5m by 17m in plan and 10m high (41m OD). A plant room will also be provided for the building services and utilities required.

The ERT area, showers/locker area and the plant room will be on the ground floor. A corridor with staircase will provide access to both the mezzanine office area above the mechanical workshop and the meeting room and general office area. Details of the layout of these areas can be seen on drawing **29043-CD-401** in **Appendix 5.2** of **Volume 3** of this EIAR.

Foul effluent will be drained to the existing on-site treatment and percolation system existing on site. Refer to drawing **29043-CD-015** in **Appendix 5.2** for location of same.

As is currently the case under EPA licence requirements, drainage from the roof of this building will be to the main stormwater network on site. Any spills or leaks from the warehouse or workshop will be contained by the concrete floor areas within the building.

4.5.8 New concrete yard area and container/trailer/tanker parking area

This proposed area (approximately 70m x 36m) is to facilitate access and vehicular movements in and out of the bottom ash storage building and for deliveries to the warehouse. The yard area will be of a re-enforced concrete construction.

Part of this concrete area (approximately 15m x 35m) will be a dedicated spill control zone for the parking of containers, trailers and tankers associated with aqueous waste deliveries and the transport of residues in containers and pre-treated residues in trailers off-site. The design of the concrete will facilitate double-stacking of shipping containers if required.

As is currently the case under EPA licence requirements, this parking area will be constructed so as to control any spillages that may occur. Subject to testing, any liquid falling in this area will be retained until deemed clean. If there is contamination, the water can be transferred to the aqueous waste tank farm on site for recovery or removed for disposal off-site via a collection sump. Clean water will be discharged to the stormwater system on site.

4.5.9 Modular Office Re-construction & Car Park Extension

It is proposed to demolish and re-build an existing single storey modular office building (see **Figure 4.12**) on site with a new permanent single storey office and staff welfare building. This new building will have a slightly increased footprint in place of the old building. The location and layout (approximately 48m x 13m x 4.7m high) of this building is shown on drawings **29043-CD-003** and **29043-CD-701**, refer to **Appendix 5.2** of **Volume 3**.

The existing modular building (33m x 12m x 4.7m) was erected for the purpose of housing staff during the construction, commissioning and warranty period of the plant and was made a permanent feature on the site by planning permission in 2014 by the parent strategic infrastructure development (SID) permission for the site 17.PA0026. This included provision for 22 visiting staff to be accommodated in the building.

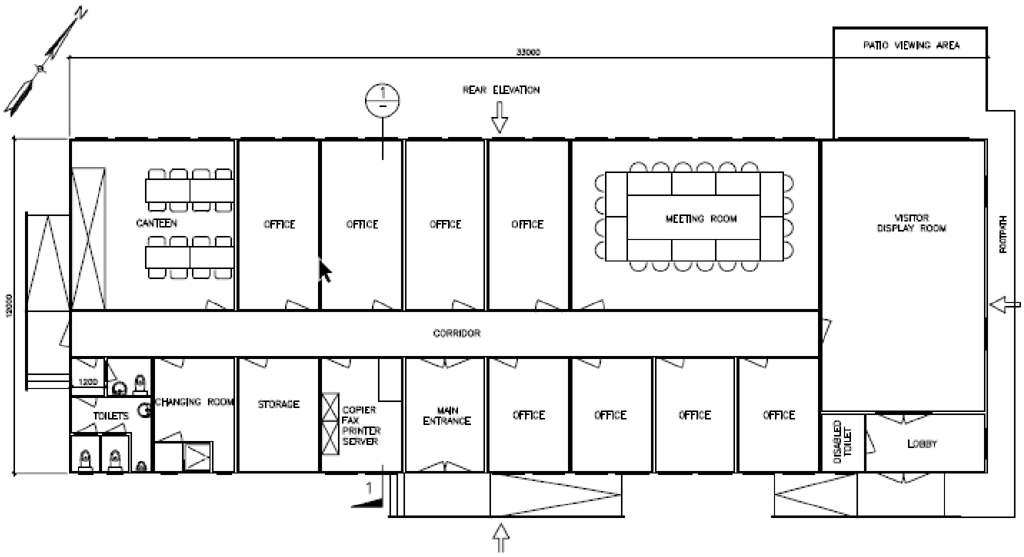


Figure 4.12: Existing office layout

The re-built office will accommodate a total of 23 staff (one additional to that already permitted) and provide a wellness centre, locker room, canteen and meeting facilities for the Indaver staff and permanent contractors on site, refer to **Figure 4.13** below.

An additional 32 car parking spaces are also proposed to accommodate the additional staff and also to facilitate visitors and contractors to the site. Details of the car park extension are presented on drawing **29043-CD-003** (**Appendix 5.2** of **Volume 3**) and is marked as area 18 on **Figure 4.4** above.

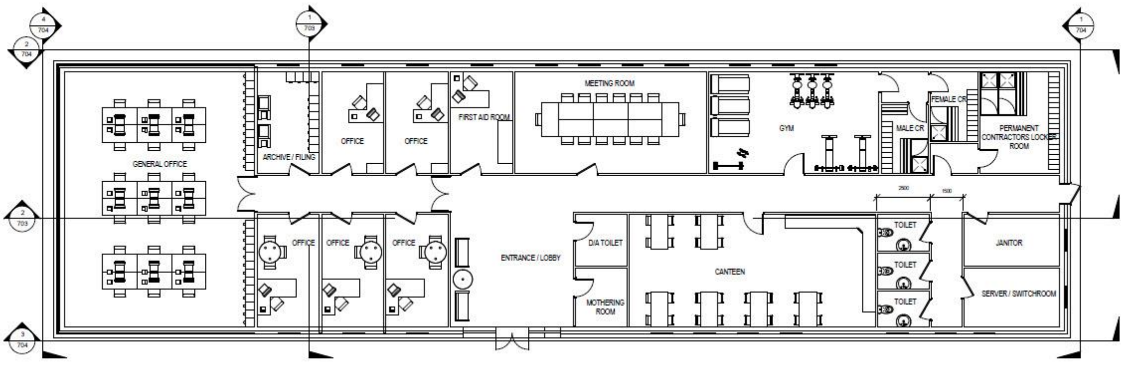


Figure 4.13: Proposed office layout showing 18 people in open plan plus five individual offices

As is currently the case under EPA licence requirements, roof drainage from the office building and paved areas will drain to the existing stormwater drainage system on site. Foul effluent will be drained to a new on-site treatment and percolation system similar to the system already existing on site. Refer to drawing **29043-CD-016** (**Appendix 5.2** of **Volume 3**) for location of same.

As is currently the case under EPA licence requirements, drainage from the extension to the car park will be installed as an extension to the existing car park drainage.

4.5.10 Miscellaneous site upgrades

As part of the project there will be a series of miscellaneous site upgrades to improve the workings of the site in general. The locations of these upgrades are shown on drawing **29043-CD-003** and will consist of the following:

- Provision of a weather canopy to the pre-treatment and residue loading area located on the south-western side of this area. This canopy will consist of a steel and roofing structure approximately 13m x 16m at a height of 12m (43m OD). A separate drawing **29043-CD-801** (**Appendix 5.2** of **Volume 3**) shows this detail. This area will be open sided and used as a weather shield for operatives handling bags of pre-treated residue prior to loading onto curtain-sided vehicles for transport off site.
- Provision of a weather canopy over a portion of the proposed concrete yard area (to the East) approximately 13m x 5m and 6m high for the maintenance of vehicles (e.g. front loader, forklift or shunter) on site.

- Alterations to the hardstands and approach roads to the waste delivery reception hall at the west side of the process building totalling 1,100m^2 in area. These changes will improve the circulation of the vehicles and reduce the likelihood of traffic conflicts.
- Provision of a concrete hardstand between the aero condenser structure and the electricity import/export substation. This area (250m^2 approx.) will provide for empty trailer parking and loading with pre-treated residues in addition to space for reversing manoeuvres.
- Reconfiguration of the landscaping and berming adjacent to the proposed hydrogen generation building is proposed. This reconfiguration (including an increase in height of up to 7m in places) will serve to improve the visual screening characteristics of the landscaping and also serve to reduce the amount of material to be removed from the site during the construction phase.
- Extension of the existing berm at the south-eastern site boundary adjacent to the R152 regional road. The extension will cover an additional 25m and will match the height of the existing berm. This will provide additional screening of the site from the R152. Landscaping will be completed to match that which is already in place.
- Repurposing of the existing temporary trailer park at the southern end of the site (adjacent to the R152) to a dedicated permanent contractors compound is proposed. On completion, this compound (with a footprint of up to 5,350m^2) will provide welfare facilities and space for contractor facilities during maintenance and construction works in the future. The toilet block (12m x 3m approx. and 3.5 m high) will be a permanent feature with a new dedicated treatment plant which will tie into the existing percolation area servicing the gatehouse. The details of the toilet block are shown on drawing **29043-CD-1002** in the main planning drawing set.

  The compound will be fenced (2.5m high) which will also secure it from the main Indaver site. Vehicle access to the compound will be via a paved approach road from the main site entrance. Vehicle access to the Indaver site will be via the existing site security system whilst personnel access will be via a new personnel route through a security turnstile serving the compound.
- Provision will be made for a personnel access route from the process building to the proposed office building, HGU and the contractors compound. This will include the construction of a concrete stairs (75m^2 approx.) between the process building level and the office building level, laying of footpaths and the installation of a security turnstile to control access on the site from the contractors compound.

4.6 Stormwater & Firewater Management for the proposed development

4.6.1 Stormwater Management

Runoff during the construction phases will be directed towards temporary soak pits lined with geotextile for filtration purposes prior to its discharge to the stormwater drainage network. This is described in more detail in **Chapter 5 *Construction Activities*** of this EIAR. Details for the operational phase of the proposed development are outlined below.

4.6.1.1 Site Drainage

The stormwater drainage system for the proposed development will collect rainwater from all roofs, hardstands, roads and grassed areas which fall naturally towards hardstand areas. These areas (in addition to the existing developed areas of the site) will amount to approximately 4.9Ha. Approximately 5.1Ha of the site will continue to drain naturally and have not been catered for under the proposed stormwater drainage system.

The stormwater runoff from the new areas will discharge into the existing stormwater system on site. The current system is attenuated at the point of discharge to the watercourse located at the north west corner of the site as described in **Section 4.3.1** above.

Any spills or wash waters generated within the HGU building will be contained and directed to the existing spilled water tank on site.

The proposed stormwater drainage system is outlined in **Figure 4.14** below with the new elements highlighted in green. Full details of the proposed drainage network are included in drawing **29043-CD-015** in **Appendix 5.2** of **Volume 3**.

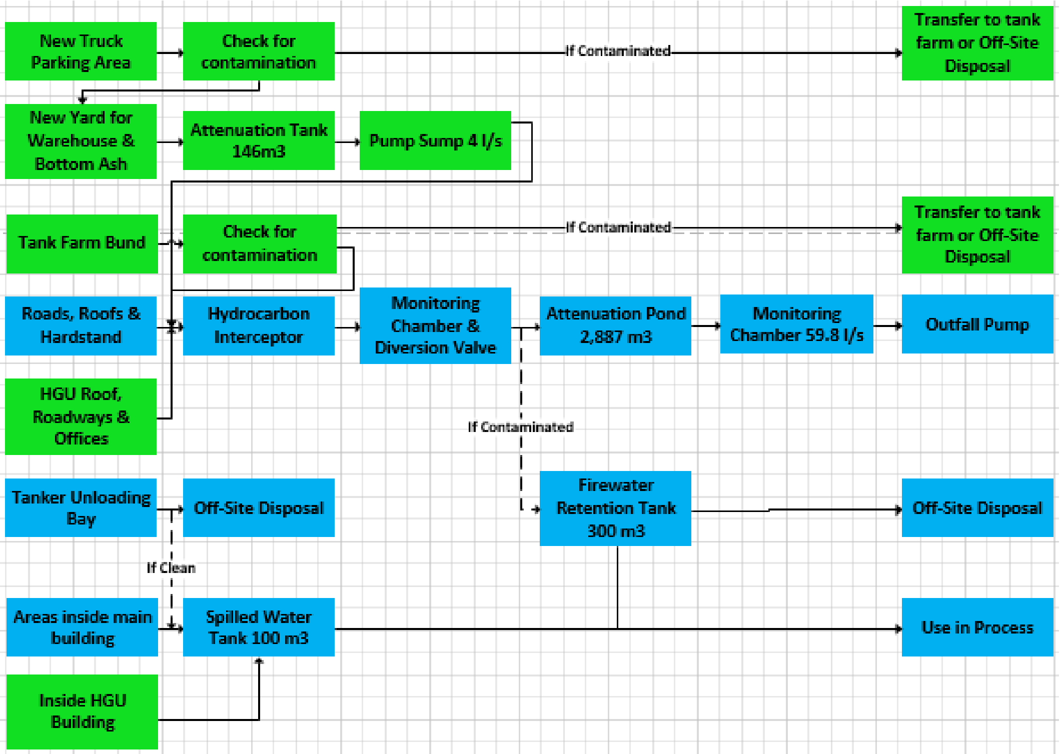


Figure 4.14 Proposed Stormwater Drainage System Flow Diagram.

4.6.1.2 New Concrete Yard Area

The existing stormwater drainage network was evaluated with a view to extend the network to the new concrete yard area. It was determined that due to the existing levels and the need to control the rate of discharge from this area that this was not possible. The design solution is to attenuate the stormwater run-off to a tank with a pumping chamber located under the slab area from where it will be pumped to the nearest existing manhole chamber.

The proposed attenuation tank is a Microstrain stormtech MC4500 type designed for a 30-year return period with a volume of 146m^3. In addition, the proposed system will offer the site additional attenuation volume and the ability to manage any potential for contaminated run-off from the bottom ash storage building and truck parking area.

Two submersible pumps will be utilised in the pumping chamber, a duty pump and a standby pump to ensure continuous operation. The pump will operate at a maximum rate of 4 litres per second. Level control devices fitted in the tank will switch on and off the pump as required.

Design characteristics

The design of the existing network been validated using a Standard Average Annual Rainfall (SAAR) for the region Rainfall = 802mm.

Using this figure combined with a factor for climate change and calculating the impermeable developed area of the site along with landscaped areas that would contribute to run-off, a required attenuation volume is calculated using a site-specific model of maximum rainfall and allowable run-off over a given period of time. The retention capacity required for a 1 in 100-year storm for both the existing and proposed development is calculated in **Tables 4.5** and **4.6** below.

Table 4.5 Current design for stormwater attenuation on-site.

Stormwater Attenuation - Existing	
Current developed Area	2.67 Ha
Contributing Current Landscaped Area	0.84 Ha
Total Current Area:	3.51 Ha
Attenuation storage requirements (including allowance for Climate change)	**1,649 m^3**
Capacity of the existing attenuation pond	**2,887m^3**

The above table demonstrates the spare capacity that exists in the current facility design.

Table 4.6 Design post development for stormwater attenuation on-site.

Stormwater Attenuation – Proposed	
Proposed and current developed Area	3.8 Ha
Proposed and current contributing Landscaped Area	1.02 Ha
Total proposed and current Area	4.82 Ha
Attenuation storage requirements (incl. allowance for climate change)	**2,370 m^3**
Capacity of the existing attenuation pond	2,887 m^3
Capacity of the proposed attenuation tank under concrete yard	146 m^3
Total proposed attenuation capacity	**3,033 m^3**

Based on the above calculations, the existing infrastructure has the capacity to attenuate the additional stormwater run-off.

4.6.2 Fire water management

The greatest potential for fire for the proposed development arises within the tank farm bund.

This bund has been sized to cater for a number of scenarios as follows:

- Tank rupture – the bund volume has been sized to meet the EPA requirements of 110% of the largest tank volume or 25% of the total storage volumes.
- Fire in the bund – the bund volume has been sized to cater for the rupture of the largest tank plus a 150m^3 fire water volume. Excess fire water run-off will be directed to the 300m^3 retention tank as outlined below.

Whilst the risk of fire occurring elsewhere in the process building or other buildings on site is low, contaminated run-off resulting from all other firefighting operations will be contained by collection in the stormwater drainage system and draining to both the contaminated water tank (approx. 300m^3) and by overflow when full to the attenuation pond (approx. 2,887m^3).

This is achieved by the provision of an actuated valve which automatically diverts contaminated firewater to the 300m^3 tank. This water will be stored for removal from site for disposal or for transfer to the tank farm for treatment in the furnace. The volume provided will provide adequate capacity to store both the firefighting water and rainfall that may occur during a fire.

4.6.3 Sanitary Services

Current foul effluent management systems on site consist of effluent discharge via the foul drainage system to the on-site effluent treatment systems which will then pass through percolation areas to ground. It is proposed to extend this system to deal with the proposed development.

Domestic effluent from new toilets, showers, sinks and coffee stations etc. will be dealt with as follows:

- New ERT/office area – to be drained to the existing treatment system and percolation area located on the northern boundary of the site (refer to drawing **29043-CD-003** in **Appendix 5.2** of **Volume 3** for location);
- New Office Re-build - to be drained to the new treatment system and percolation area located to the south west of the proposed office building (refer to drawings **29043-CD-003** & **29043-CD-016** in **Appendix 5.2** of **Volume 3** for details);
- New Contractors toilet facilities - to be drained to the new treatment system and existing percolation area located to the west and the north of the new toilet block respectively (refer to drawing **29043-CD-018** in **Appendix 5.2** of **Volume 3** for details);
- New Tank Farm – not applicable;
- New Bottom Ash storage building – not applicable;
- New Warehouse – not applicable;
- New Workshop – not applicable.

4.6.4 Process Effluent

There is no process effluent generated by the proposed development. Any wash waters or spills generated by materials handling inside buildings of the proposed development will be retained and either collected for treatment in the waste to energy plant or sent off-site.

4.7 Additional site services requirements

The additional utility requirements to support the proposed developments on site are outlined under the individual headings detailed below.

4.7.1 Water

A new supply from the existing de-mineralised water system or process water system on site will be brought to the Hydrogen Generation Unit (HGU) to feed the electrolysis units. An hourly flowrate of 2.2 m^3/hour is required to feed the unit when running at full capacity. The current abstraction rate for the site is approximately 9m^3 per hour. This is not a significant demand based on the groundwater well production volumes that are available which can provide in excess of 300m^3 per day.

Water for domestic use in the warehouse/workshop/office building and in the rebuilt offices on site will be provided from the existing networks that are already in place. The increase in demand will be of the order of 200 litres per hour and is solely related to domestic usage by staff in these areas.

Water requirements are discussed in more detail in **Chapter 16 *Material Assets***.

4.7.2 Electricity

A new cable supplying 10MW_e to the HGU will be provided in underground ducts from the 10kV side of the main transformer compound on site to the HGU. Switchgear and protections will be installed in the electrical room at the HGU on the main incomer. As discussed in Section 4.4.3 the HGU will be powered from electricity generated on-site from the WtE plant process.

Domestic power, lighting and any plant requirements (extraction fans, arc welders etc.) to the other buildings and areas on the site will be provided from the main plant switchrooms at 400V.

All of the electricity requirements for the proposed development will be met by the existing generation capacity on site and are further detailed in **Chapter 16 *Material Assets***.

4.7.3 Gas

A connection to the natural gas grid via the AGI proposed and the existing distribution gas main in the R152 adjacent to the site will be required for feeding the hydrogen produced by the HGU into the natural gas network.

An application has been made to GNI and discussions are underway in relation to the technical details and requirements for such a connection (refer to **Section 16.5.2.7** of **Chapter 16 *Material Assets***).

4.7.4 Telecoms

Telecoms will be provided from the existing fibre ring network that exists on site to the new buildings and areas that require such connections. There will be no additional connectivity required for the operational phase but there will be some temporary wireless services sought and provided for the construction phase.

4.8 Commissioning

Following completion of construction and installation of equipment, and before operation of the facility commences, there will be a testing and commissioning phase. This phase will comprise:

- Installation compliance checks;
- Commissioning tests;
- Performance demonstration tests.

4.8.1 Installation Compliance Checks

This will be a process of systematically checking that all systems and equipment have been constructed, assembled, aligned and installed correctly, in accordance with the design specifications and drawings, and that all interconnecting pipe work, cabling and wiring has been installed in compliance with the design specifications and drawings. This phase will also include the Statutory Compliance certification required under the BCMS System.

4.8.2 Commissioning Tests

The function of each item of equipment and each system will be tested and verified, in a systematic manner, as being in accordance with the design and specifications. All the alarm and control systems and instrumentation will be tested to demonstrate that they are functioning correctly. Following these tests, each system will be checked to ensure that it is ready to be commissioned under operating conditions including using real materials, temperatures, pressures and voltages.

4.8.3 Performance Demonstration Tests

The facility’s safety and fire prevention systems and the emission monitoring systems will be subject to the same rigorous testing protocols as the other systems in the plant.

In this commissioning phase, the individual items of equipment and systems will be tested under operating conditions using the materials, pressures and voltages to which they will be subjected when in operation.

Once the operation of all equipment and systems have been tested and verified individually, they will be integrated, and the operation of complete systems will be tested.

4.9 Health, Safety and Environmental Aspects

4.9.1 Operational Safety and Environmental Management

Indaver have an integrated Quality, Environmental and Safety & Health (QESH) management system. The Quality, Environmental or the Health & Safety

Management Systems for the facility were certified by NSAI to the Quality Standard, ISO 9001:2015, the Environmental Standard ISO 14001:2015 and Occupational Health and Safety Standards OHSAS 1801:2007 in August 2017. All three Standards remain valid until August 2020.Indaver undergoes an annual audit and re-certification process to maintain these ISO certifications.

The objectives and targets for the facility are set out in the Indaver Goals and Plan Book Action (part of Indaver's Environmental Management Programme agreed with the EPA in 2012). Actions are added and closed on an ongoing basis and further details of these are included in the AER for the facility, published by the EPA under licence number W0162-03.

The proposed development, once constructed, will be incorporated into this management system.

4.9.2 Fire Prevention and Emergency Response

During the detailed design phase of the existing plant, hazard and operability (HAZOP) studies were carried out to assess hazards that could arise during both steady and non-steady state operations and identified the necessary mitigation measures required. Based on these studies, a comprehensive set of operating procedures have been drawn up for all aspects of the operation of the plant, to minimise the risk of accident or emergency situations arising.

The same procedure will apply during the detailed design phase of the hydrogen generation unit and tank farm. A HAZOP will be carried out that will determine all required safety measures.

A Hazard Identification exercise has also been carried out for the entire site, covering the risks presented by the existing activities and the new risk presented by the proposed development, specifically the new bulk storage facility at the site. This exercise is included as **Appendix 17.1** to **Chapter 17** ***Major Accidents & Disasters***. The risk reduction and mitigation measures resulting from this exercise are summarised in **Section 17.6.2**.

A comprehensive Site Emergency Plan has been developed for the existing facility (see **Appendix B** of the **Appendix 5.1** ***Construction Environmental Management Plan*** (CEMP) in **Volume 3** of this EIAR). The plan sets out the response measures to be taken by personnel in the event of an emergency.

Measures have been designed to ensure maximum protection for site employees, visitors and people in other premises near the site to limit damage to property and minimise the impact of site operations on the environment. A dedicated Emergency Response Team have been appointed to respond to any emergency which may arise.

The new elements of the proposed development will be incorporated into a revision of the Site Emergency Plan once operational.

4.9.3 Prevention of Accidental Emission or Spillage

All waters produced from wash down etc., and any leaks/spills within the process building are directed to the spill water tank with a capacity of $100m^3$. Water from this tank will be used to supplement process water requirements or will be transported off-site for treatment or disposal to an appropriately permitted or licensed facility. There is no process effluent discharged from the facility.

Bulk tanks containing hazardous materials (ammonia, diesel fuel oil) are double skinned and equipped with interstitial leak detection. The tanks are also fitted with level monitoring and overfill protection. Pipe work from the bulk tanks is located over-ground, over paved areas and undergoes regular visual inspection.

There is a designated bulk tanker unloading area for diesel and ammonia which is graded towards an ACO channel. Prior to unloading a diversion valve on the stormwater drainage system is activated which diverts the drainage from the ACO channel to an underground Retention Forecourt Separator. This ensures that during tanker unloading any spills/leaks are contained within the unloading area and underground separator. Any contained spills of hazardous materials will be treated appropriately.

All other hazardous materials on site are stored in smaller quantities (e.g. 200L drums, IBCs etc.) in individual bunded areas (e.g. spill pallets, trays, chemical storage cabinets) to contain any spills/leaks.

4.9.4 Indaver Environmental Policy

Indaver is committed to its QESH policy that demonstrate concern for people, safety and the environment.

Hazards are managed and risks are mitigated by identifying the major accident scenarios and where applicable, maintaining a major accident prevention policy in accordance with the current European Seveso Directive, (as transposed into Irish and UK legislation). It should be noted that the subject site including the proposed development do not fall within the scope of this Directive.

In addition, the environmental aspects and health and safety hazards associated with our activities are to be identified, action on the identified hazards using the hierarchy of controls to be taken, and a commitment to the protection of the environment and the prevention of pollution from our activities to be ensured.

Before committing capital expenditure or entering into any new business ventures, the impact on the environment is to be considered fully.

4.9.5 Environmental Management Programme

As required by its Industrial Emissions (IE) licence, Indaver prepares an Annual Environmental Report (AER) for submission to the EPA. The AER brings together, in one document, all the individual reports required under the IE licence.

Indaver prepares an annual Environmental Management Programme (EMP), which is formally reviewed at senior management level during the management review. This programme is included in the AER. The programme addresses the requirements of Indaver's IE licence. Targets are set, for between one and five years, for the programme objectives.

At the end of each year the progress against the targets is formally reviewed at senior management level. The programmes are adjusted as required in the light of ongoing experience and advances in knowledge and technology.

Targets and goals in the programmes are set to ensure that resources and systems are put in place to achieve the targets. The success of the programme is measured by the effectiveness of the systems installed, as well as results in meeting targets.

A copy of the AER (which includes the EMP) for 2019 is available on the EPA website[1].

4.10 Regulatory Control of the Facility

4.10.1 Industrial Emissions Licence

The Indaver site is subject to Industrial Emissions (IE) licensing under licence number W0167-03.

The IE licence requires Indaver to take various actions to meet its environmental obligations, particularly by monitoring emissions and reporting the results to the EPA, the maintenance of the site environmental management programme and the continuation of efforts at waste minimisation and utilisation of clean technology. The existing facility is a highly regulated operation and the EPA licence contains over 200 individual conditions governing all aspects of the operation and control of the facility including opening hours, waste acceptance procedures, acceptable waste types, emissions monitoring and limits on such emissions, emergency response procedures, the keeping of records and reporting requirements. The facility has a very good compliance record and submits annual environmental reports to the EPA each year outlining the overall environmental performance of the facility. The facility has maintained the status of a Recovery Facility (R1) as defined in Annex II of the Waste Framework Directive.

The facility is licensed to carry out the following activities:

Disposal or recovery of waste in waste incineration plants or in waste co-incineration plants
(a) for non-hazardous waste with a capacity exceeding 3 tonnes per hour, and

(b) for hazardous waste with a capacity exceeding 10 tonnes per day.

Full details of the conditions of this licence are available on the EPA website, www.epa.ie. The proposed Site Sustainability Project falls within the same category of licensable activity under IE licensing. Indaver has consulted with the EPA regarding the proposed development. An IE licence review application will

[1] Environmental Protection Agency http://www.epa.ie/licensing/

be submitted to the Agency if and when planning permission for the proposed development is obtained.

4.10.2 Other existing Licences/consents

The facility also has a number of other existing consents in place, namely:

- Licence to generate electricity from the Commission for Regulation of Utilities (CRU).
- Licence L2890-04 from the EPA for the use of ionising radiation sources on site.

4.10.3 Future Licences/consents

There are several aspects that were considered for any additional licences or consents associated with the proposed development. These are:

- Consents for the HGU unit for generation of hydrogen gas and injection to the natural gas grid from the CRU.
- EPA Licensing requirements for new activities and increased capacity by means of a review application to the EPA of the existing IE Licence W0163-03. Under Schedule 1 of the EPA Act 1992 (as amended) the appropriate activity for H_2 generation is "*5.13 Production of inorganic chemicals, such as (a) gases such as ammonia, chlorine, […], hydrogen, sulphur dioxide […]*". This is mirrored in the IED as Class 4.2 (a).
- Inventory calculations assessment for applicability of the COMAH Regulations.
- SI No. 631 of 2019, Dangerous Substances (Flammable Liquids and Fuels Distribution and Commercial Supply Stores) Regulations 2019 which came into force on April 1st 2020 will apply to the storage of hydrogen on site.

Consultation with the CRU on the consents/licences required for the HGU element of the project is underway. It is clear from this consultation that specific provisions will have to be made to adopt hydrogen into the existing regulatory framework.

The following consents/licences have been discussed in this context and are likely to be applicable once planning permission is received:

- Section 39A to construct a Gas Pipeline;
- Gas Shipping Licence;
- Gas Supply Licence.

All relevant applications will be made at the appropriate time after planning permission is received and the CRU has confirmed the applicable regulatory framework for this element of the project.

An application for a review of the existing IE licence for the facility will also be made to the EPA once planning permission is received.

From initial consultations with the EPA, an additional activity under the IED will be required for the operation of the HGU. This activity is 4.2(a) from Annex I of the IED:

"4.2 Production of inorganic chemicals, such as:
(a) gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur compounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride;"

Following a detailed assessment of the existing and proposed inventory of substances stored on site under the COMAH Regulations, the proposed development will not require a Notification to the HSA as the site will be sub-threshold for the lower tier requirements of the Regulations. This inventory assessment has been prepared and presented in Appendix 5 of the HAZID Report in **Appendix 17.1** of **EIAR Volume 3** for **Chapter 17** ***Major Accidents & Disasters*** of this EIAR.

The storage of up to two tonnes of Hydrogen on site will require a licence from Meath County Council as the licensing authority under SI No. 631 of 2019. The application for a licence must be accompanied by a risk assessment and these Regulations also require that such a storage facility meets certain standards, codes of practice and guidance documents as set out in Schedule 1 of the Regulations. The first steps of such a risk assessment have been set out in **Appendix 17.1** ***Hazard Identification & Risk Assessment*** of this EIAR.

4.10.4 Transfrontier Shipment of Waste (TFS)

The transfrontier shipment (TFS) of waste deals with the movement of waste between countries. Transfrontier shipments of waste within, into and out of the EU, for recovery or disposal operations, are governed by Regulation (EC) No. 1013/2006 on shipments of waste which came into effect on the 12 July 2007. Proposals for the export of waste from, and the import of waste into the Republic of Ireland are subject to the provisions of the Waste Management (Shipments of Waste) Regulations 2007, S.I. No. 419, introduced on the 5 July 2007, which give effect to Regulation (EC) No. 1013/2006 under Irish Law. The overall objective of the TFS Regulation is to implement measures for the supervision and control of shipments of waste in order to ensure that the movement, recovery, or disposal of waste, is managed in an environmentally sound manner, for the protection of the environment and human health. Under the Waste Management (Shipments of Waste) Regulations 2007, Dublin City Council is nominated as the competent authority of dispatch in respect of the export of waste, the competent authority of destination in respect of the import of waste, and the competent authority of transit in respect of any waste shipments transiting through the Irish State. Dublin City Council carries out its National TFS functions at the National Transfrontier Shipment Office (NTFSO) in Dublin.

A TFS is already in place for the export of treated boiler ash and flue gas cleaning residues between the existing Indaver facility in Meath and the existing salt mine facility in Carrickfergus, Northern Ireland. A new TFS or modification to the existing TFS will be sought to accommodate the increase in boiler ash and flue gas cleaning residues proposed as part of the proposed development.

A TFS is also in currently place for the export of untreated boiler ash and flue gas cleaning residues between the existing Indaver facility in Meath and the Hattorf and Wintershall Reutilisation Facility, salt mine in Germany. Similarly, a new TFS or modification to the existing TFS will be sought to accommodate the increase in boiler ash and flue gas cleaning residues proposed as part of the Site Sustainability Project.

As noted previously, bottom ash may be exported to outlets in Europe if there is no landfill capacity in Ireland. A TFS will be sought to facilitate the shipment of this waste to Europe if this arises.

4.11 Best Available Techniques (BAT)

BAT is applicable to the proposed development in the context of the BREF's for Waste Treatment (2018) and the Emissions from Storage (2006). There is no BREF document on the production of Hydrogen from electrolysis. The BREF for Waste Incineration is also relevant but only in the context of the existing operations on site to which no changes are proposed in the context of the proposed development. The revised BREF for waste incineration has been formally adopted at EU level in December 2019 and the existing facility will have 4 years from that date to implement any additional requirements. This will be formalised in this period as part of a licence review process by the EPA for the existing waste to energy activity on site.

BAT techniques for waste treatment and emissions from storage are applicable to the aqueous waste tank farm, bottom ash storage building and the silos for acceptance of third party residues.

These include set-up and implementation of waste characterisation and pre-acceptance as well as waste acceptance procedures. These are already in place for the aqueous waste treatment as the facility is already accepting aqueous wastes.

Safe and optimised storage will be ensured for an adequate storage capacity. The tank farm is designed to have the capacity to deal with fluctuations in the waste delivery market. Overfill protection will also be provided and the potential for fugitive emissions minimised by venting of over-pressure in the tanks to the secondary air system in the furnace for treatment.

There will be several levels of redundancy installed that will ensure safe operation even if technical issues occur.

The silos for acceptance of third party residues will match all safety measures of the existing silos, including interlocks, overfill protection, dust filters and over-pressure protection.

The bottom ash storage building is designed to avoid any pedestrian and vehicle interference by separating entry doors for pedestrians and vehicles. The building will be able to hold 5,000t of bottom ash which will allow for the storage of approximately 45 days production. The building will also be ventilated to atmosphere via dust filters to avoid any fugitive dust emissions to atmosphere and to ensure a fresh air supply for staff working in the area.

4.12 Provisions for Site Decommissioning

This section discusses the decommissioning of the facility as per the definition given the EPA draft EIAR guidelines (August, 2017) whereby decommissioning is "[t]*he final closing down, and putting into a state of safety of a development, project or process when it has come to the end of its useful life*".

In the event of decommissioning, measures will be undertaken by Indaver to ensure that there will be no environmental effects from the closed facility. A closure, remediation and aftercare management plan (CRAMP) and an associated financial provision is currently in place as part of a licensing requirement under W0167-03 to provide for decommissioning activities at the site should this arise. As part of the licence review process this closure plan will be updated and submitted for approval to the EPA.

The CRAMP will be expanded to cover the additional activities associated with the proposed development and the financial provision will also be updated to reflect this. Such a plan contains a range of measures to ensure that there will be no environmental effects from the decommissioning activity. The measures will include:

- Cancellation of all waste deliveries to the site,
- All wastes at the facility at time of closure will be incinerated,
- All raw materials, oils, fuels, ash and residues etc. on site at the time of closure will be returned to the supplier, or collected and recycled or disposed of by an authorised waste contractor, as appropriate,
- All process equipment will be decontaminated and decommissioned,
- All equipment from the spare parts warehouse, offices and other facilities will be removed and reused or recycled,
- Cleaning of all underground drainage lines, tanks and stormwater attenuation pond,
- Removal of equipment and facilities from offices, collection of remaining waste materials and decommissioning of wastewater treatment system.

Circa 11,317 tonnes of materials and wash waters will be removed from site during the de-stocking and decontamination phase. This represents 566 No. truckloads of material to be removed from the site over a three month period of the decontamination phase, which is an average of approximately 9 trucks a day.

All of these de-stocking, decontamination and cleaning operations will be carried out in areas that were designed for the unloading, storage and handling of the raw materials and wastes that they contained. Hence the potential for any environmental effects during these operations will be minimised. It will take approximately six months to complete all of the above activities.

The decommissioning measures will have to be implemented to the satisfaction of the EPA and in line with the approved CRAMP submitted to the EPA.

If, after the decommissioning activities described above, no further use can be identified for the site, then Planning Condition No. 27 of PL17.219721 from 2007 must be adhered to. This condition relates to the restoration of the site and would involve the demolition of the main buildings on the site, leaving only the following infrastructure in place for another potential future industrial use:

- Site fencing and entrance gate
- Weighbridges, gatehouse and car park
- 38kV import/export compound (de-energised)
- Firewater storage tank, pumphouse and fire ring main
- Attenuation pond and stormwater monitoring stations
- Roads and stormwater drainage network.

Site restoration activities will include:

- Electrical isolation of all power systems
- Removal of power and signal cables
- Recovery of any remaining internal plant and equipment
- Main process building and equipment demolition
- Ancillary building demolitions
- Recovery and disposal of residual materials from the site.

The same mitigation measures as outlined for the construction phase designed to control noise, dust, traffic and stormwater run-off will be implemented for the decommissioning phase to ensure that the impact on the local community is kept to a minimum during this phase.

Circa 50,000 tonnes of concrete, blockwork, paving, cladding and other building materials will be removed from site during the demolition phase. This represents 2,364 No. truckloads of material to be removed from the site over a five month period. At the peak of activity during this 5 month phase, approximately 29 trucks a day will be used to transport these materials off site. Environmental monitoring will be undertaken for the entire duration of the decommissioning period to ensure that any potential environmental effects from decommissioning activities are minimised.

Key Indaver staff will also be retained on site during this period including site security staff, until all of the decommissioning activities and environmental reporting have been completed.

There will be up to 30 staff and contractors' personnel on site during the complete 11 month period but the average number on site will be less than this. The decommissioning activities will be undertaken within the hours of 08.00 to 18.00 from Monday to Friday.

The decommissioning activities will involve substantially fewer site activities, a substantially smaller workforce and consequently, substantially less truck and car traffic than the construction phase. Consequently, it is expected that the decommissioning will not have a significant impact on the environment or the nearest residential receptors.

4.13 References

COMAH Regulations SI No. 209 of 2015

Indaver Industrial Emissions (IE) Licence No. W0167-03

NSAI Quality Standard, ISO 9001:2015

Environmental Standard ISO 14001:2015

Occupational Health and Safety Standards OHSAS 1801:2007

BREF Reference Document on the Emissions from Storage (2006)

BREF Reference Document on Waste Treatment (2018)