ARUP

INDAVER

Meath Waste-to-Energy

Site **Sustainability** Project 2020

Environmental Impact Assessment Report

Vol 1: Non-Technical Summary

Indaver, leading the field in sustainable waste management

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Contents

		Page
1	**Introduction**	**1**
1.1	Existing Facility	2
1.2	Environmental Impact Assessment Report	2
1.3	Consultation	4
2	**Policy and Planning and Need for the Scheme**	**5**
2.1	Waste Policy	5
2.2	Energy and Climate Change Policy	6
2.3	Planning Policy	6
3	**Alternatives**	**7**
3.1	Alternative Sites	7
3.2	Alternative Processes	7
3.3	Alternative Designs	9
3.4	'Do-Nothing' Scenario	9
4	**Description of the Proposed Development**	**10**
4.1	Overview	10
4.2	Liquid (Aqueous) Waste Tank Farm & Unloading Area	12
4.3	Hydrogen Generation Unit (HGU)	13
4.4	Bottom Ash Storage Building	13
4.5	Residue Acceptance & Storage for Pre-Treatment	14
4.6	Warehouse, Workshop & ERT/Office Building	14
4.7	New concrete yard area and container/trailer/tanker parking area	15
4.8	Modular Office Re-construction & Car Park Extension	15
4.9	Miscellaneous site upgrades	15
5	**Construction Activities**	**16**
5.1	Construction Methods	16
5.2	Material Imports, Exports and Transportation	16
5.3	Employment, Welfare and Safety	17
5.4	Construction Environmental Management Plan	18
6	**Population and Human Health**	**18**
7	**Traffic and Transportation**	**19**
8	**Air Quality**	**20**
9	**Climate**	**22**

10 Noise and Vibration 23

11 Biodiversity 24

12 Archaeological, Architectural and Cultural Heritage 26

13 Landscape and Visual 27

14 Land and Soils 29

15 Water 30

16 Material Assets 31

17 Major Accidents and Disasters 32

18 Cumulative Effects, Other Effects and Interactions 33

18.1 Cumulative Effects 33
18.2 Transboundary Effects 34
18.3 Interactive Effects 35

1 Introduction

Indaver Ireland Limited (Indaver) proposes to carry out a new development at its existing waste-to-energy (WtE) facility in Carranstown. The proposed development is collectively referred to as a *Site Sustainability Project* in this Environmental Impact Assessment Report (EIAR) and in the planning application.

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).

This document is a Non-Technical Summary of Indaver's Environmental Impact Assessment Report (EIAR). The EIAR is structured as follows:

- Volume 1 Non-Technical Summary
- Volume 2 Main Text
- Volume 3 Appendices

For ease of reference, the Site Sustainability Project is referred to as "*proposed development*" in this non-technical summary and throughout the EIAR.

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 tpa.
2. It is also proposed to increase the annual total waste accepted at the site for treatment in the WtE facility from the currently permitted 235,000 to 250,000 tonnes per annum (tpa) to include up to 15,000 tpa of additional hazardous waste;
3. Development of a tank farm and unloading area for the storage and processing of aqueous liquid wastes currently accepted at the facility;
4. Development of a hydrogen generation unit (HGU) for connection to the natural gas network and for use as a fuel in vehicles;
5. Development of an ash storage building for the storage of up to 5,000 tonnes of bottom ash which is currently produced from the WtE process on site;
6. Additional waste acceptance capacity and infrastructure to accept up to 30,000 tpa (bringing the site total to 280,000 tpa) of third party boiler ash and 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 office building on site with a slightly increased footprint.; and

10. Other miscellaneous site upgrades.

1.1 Existing Facility

This facility has successfully operated since 2011 and currently accepts 235,000 tonnes per annum (tpa) (up to 10,000 tpa of which is hazardous waste) of household, commercial and industrial hazardous & non-hazardous solid and liquid waste. Each year since 2011, this facility has diverted over 200,000 tonnes of waste annually away from landfills and export, recovering over 6,000 tonnes of ferrous metals, and generated enough electricity to power the equivalent of 30,000 homes per annum, or a town the size of Drogheda and Navan combined.

Combustion of the solid and liquid waste in the furnace of the WtE facility produces flue gases, boiler ash (fly ash) and bottom ash. Metals are recovered from the bottom ash on site prior to sending off-site for recovery to landfill sites in Ireland. The energy produced in the combustion process is harnessed in a steam boiler and the steam is then used to generate electricity in a steam turbine for export to the national grid and for use by the facility itself.

The flue gases produced must be cleaned before discharging through the stack to atmosphere. To do so, ammonia, lime and an activated carbon/clay mixture are injected into the flue gases. The solid materials injected are then removed as flue gas cleaning residues using a filter. These residues are then either pre-treated with the addition of water in the ash pre-treatment facility on site prior to export for recovery or exported directly off-site in tankers for recovery. A full illustration of the existing WtE process on site is shown in **Figure 1** below.

Like any large-scale industrial facility, the facility in Meath is subject to an extremely rigorous environmental and compliance regime and is licensed by the EPA under register number W0167-03 pursuant to the Industrial Emissions Directive (IED) and relevant national regulations. This stringent licensing regime will also apply in the context of the proposed development.

1.2 Environmental Impact Assessment Report

Environmental Impact Assessment (EIA) is a process for anticipating the effects on the environment caused by a development. The EIA process includes the preparation of an environmental impact assessment report (EIAR) by the developer, the carrying out of consultations, the examination by the competent authority (in this case An Bord Pleanála (ABP)) of the information presented in the EIAR and any other relevant information received during the consultations, the reasoned conclusion by ABP on the significant effects of the development on the environment and the integration of its reasoned conclusion into the decision making process.

The EIAR is a "*statement of the effects, if any, which the proposed development, if carried out, would have on the environment*". The EIAR is prepared by the developer (in this case Indaver) and ABP will use the information provided to assess the environmental effects of the project and, in the context of other considerations, to help determine if consent should be granted.

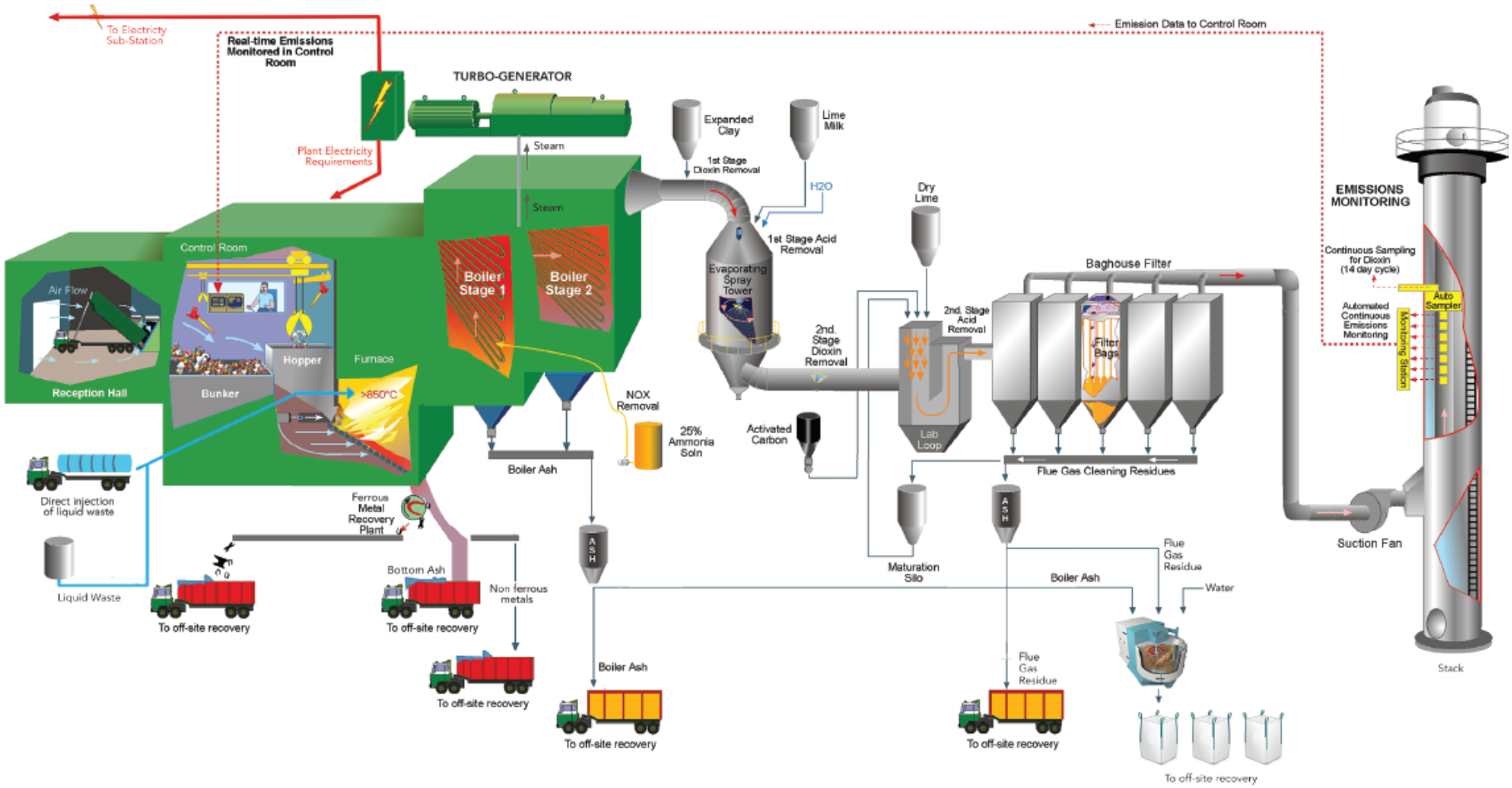


Figure 1 Overview of the existing Waste to Energy Process on site

Broadly speaking, the EIAR consists of a systematic analysis and assessment of the potential effects of a proposed project on the receiving environment.

The following information must be included in the EIAR:

1. A description of the proposed development comprising information on the site, design, size and other relevant features of the proposed development;
2. A description of the likely significant effects on the environment of the proposed development;
3. A description of the features, if any, of the proposed development and the measures, if any, envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment of the development;
4. A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment;
5. A non-technical summary of the information referred to in the above four points;
6. Any additional information relevant to the specific characteristics of the development and to the environmental factors likely to be affected.

The significant effects (both direct and indirect) on a range of environmental factors, which are used to organise descriptions of the environment must be addressed in the EIAR. These include:

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

The effects referred to above on the factors must also include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned.

This EIAR has been prepared on behalf of Indaver by a multi-disciplinary consultancy team of competent experts led by Arup with input from specialist sub-consultants. The format used in the EIAR is the grouped format, in which each topic is addressed in a separate section. This is designed to allow readers to access the issues of interest to them as easily as possible. However, there is overlap of some topics.

1.3 Consultation

During the preparation of this EIAR, a pre-application consultation meeting was held with An Bord Pleanála (ABP). ABP has confirmed that the proposed development may be regarded as strategic infrastructure for the purposes of the

Planning and Development Act and the relevant application for permission for the proposed development be made to An Bord Pleanála.

Additional pre-application consultations were also undertaken including the Health and Safety Authority, Meath County Council, Environmental Protection Agency, Commission for Regulation of Utilities and the Eastern-Midlands Waste Regional Office.

Indaver has also consulted the public and interested parties regarding its plans for the proposed development. This has been carried out through the Indaver Community Liaison Committee (ICLC, which includes representatives from the local community, Meath Co. Co. and two local councillors) during various stages of the development of this project.

Indaver also met with representatives from the neighbouring site, Irish Cement, Platin. In addition, an application was made to Gas Networks Ireland (GNI) for connection of the hydrogen generation unit (HGU) to the natural gas grid.

2 Policy and Planning and Need for the Scheme

The proposed development has been demonstrated to be fully in compliance with a suite of plans, policies and objectives at European, national, regional and local level and include those relating to waste, energy and climate change and planning policy.

2.1 Waste Policy

EU and national waste policy require waste to be managed in an economic, sustainable and environmentally sound manner. Implementing the EU waste hierarchy, waste should be managed as a resource and disposal should be the last resort. EU and national policies support the recovery of energy from residual waste.

As regards self-sufficiency in the management of hazardous waste, the National Hazardous Waste Plan 2014-2020, the Progress Report on its implementation and the Eastern Midlands Regional Waste Management 2015-2021 Plan underline the need for hazardous waste treatment capacity and for enhanced self-sufficiency in the State.

The proposed development may be regarded as being in alignment with both the National Hazardous Waste Management Plan 2014-2020 and the Progress Report on its implementation as the same will contribute to the achievement of self-sufficiency in the treatment of hazardous waste within the State and will minimise hazardous waste export as prioritised and underlined in both national policy documents. It is also compatible with stated policy positions regarding climate mitigation through an associated reduction in transport emissions.

2.2 Energy and Climate Change Policy

The development of a hydrogen generation unit for connection to the gas distribution network and for mobile transport applications as an integral part of the proposed development will improve the energy efficiency and sustainability of the facility by making use of energy that would otherwise be wasted. In the national context, and considering the scale of the decarbonisation challenge, it has the potential to provide low-carbon solutions for both heat and transport.

The existing policy framework at national and regional level underlines the pressing need to facilitate the development of enhanced electricity and gas supplies in order to support the State's transition to a low carbon economy as set out in the Climate Action Plan and the Meath Climate Action Strategy. It will also contribute towards objectives of energy and resource efficiency and the circular economy as laid down in European policy positions.

Moreover, the use of this versatile technology in mobile transport applications further accords with the developing policy landscape on sustainability mobility. These include the Climate Action Plan, the National Policy Framework on Alternatives Fuels Infrastructure for Ireland, the Transport Strategy for the Greater Dublin Area and the European Commission's 2050 Long Term Strategy, all of which indicate significant roles for hydrogen in the future energy mix and seek to enhance synergies with the circular economy transition through the use of sustainable alternative transport fuels.

2.3 Planning Policy

From a national planning policy perspective, the National Planning Framework, specifically provides that planning for waste treatment requirements to 2040 will require waste to energy facilities which treat residual waste that cannot be recycled in a sustainable manner. It also provides for the development of necessary and appropriate hazardous waste management facilities to avoid the need for treatment elsewhere.

From a local and regional planning perspective, the policies and objectives as set out in the Eastern Midlands Regional Spatial and Economic Strategy and the Meath County Development Plan, are similarly supportive of the proposed development.

The proposed development is furthermore in alignment with the Meath County Development Plan as the development comprises of an infrastructural and industrial extension of activities at the existing Carranstown site and whilst this is in an unzoned area, it has been developed as a de facto land use industrial area characterised by existing heavy industrial activities as evidenced by an established land use pattern of development.

It is therefore compatible with good land use planning practice and policy, and is furthermore supported by strong planning precedent having regard to the pattern of development in the area and may be regarded as a plan-led development, consistent with regional, spatial and national planning policy including the statutory National Planning Framework.

3 Alternatives

The reasonable alternatives studied which are relevant to the proposed development include those relating to alternative locations within the existent site, alternative layouts and processes and a 'do-nothing' alternative. Environmental effects were compared for each of the reasonable alternatives. This assessment has been prepared in accordance with a suite of guidance documents at national and European level.

3.1 Alternative Sites

This assessment demonstrated that the carrying out of the proposed development at the existing Carranstown facility may be regarded as the only reasonable site when the existing and established use, the planning history and overarching policy and planning framework relating to the site are taken into account.

A further assessment considered if the proposed development should be carried out at alternative locations on the existent Carranstown site in the context of the tank farm, hydrogen generation unit and bottom ash storage building elements of the proposed development.

This screening exercise and relevant environmental factors identified for consideration sets out the most optimal locations for the tank farm, hydrogen generation unit and bottom ash storage building on the existent site. This exercise indicated the main reasons for selecting the chosen locations for the relevant aspects of the proposed developments and also included a comparison of environmental effects.

3.2 Alternative Processes

The assessment of alternatives undertaken also examined alternative processes, including:

- Hazardous waste treatment (Waste to Energy);
- Hazardous waste treatment (Pre-treatment of boiler ash and flue gas cleaning (FGC) residues);
- Tank Farm - Aqueous waste storage;
- Hydrogen generation unit; and
- Bottom ash storage for off-site treatment.

3.2.1 Hazardous Waste Treatment (Waste to Energy)

This aspect of the assessment found that no changes are required to the existing waste to energy treatment process itself to facilitate the treatment of an additional 15,000 tonnes per annum. Therefore, it is considered that there is no reasonable alternative for hazardous waste treatment in this context given that the current process is working successfully.

A permanent storage facility is however required for aqueous waste prior to treatment and this is discussed further below.

3.2.2 Hazardous Waste Treatment (Pre-treatment of boiler ash and FGC residues)

In terms of the assessment of alternative processes relating to the pre-treatment of boiler ash and flue gas cleaning (FGC) residues, the only changes required to the existing hazardous ash pre-treatment process to facilitate the acceptance of an additional 30,000 tonnes per annum is the addition of two storage silos within the main process building and a small unloading area. The current process is working successfully with regard to the treatment of boiler ash and flue gas cleaning residues generated on site. Other available processes were found to be unworkable at the present time and as such, no reasonable alternative for the recovery of these hazardous wastes exist on the island of Ireland.

3.2.3 Tank Farm - Aqueous waste storage

The accepted and proven way of storage of aqueous waste is using a tank farm designed to the required standards. No other process was considered but alternative aqueous waste storage designs considered are outlined below.

3.2.4 Alternative Processes relating to the Hydrogen Generation Unit

Alternative processes were also explored for the utilisation of waste steam or the resultant waste electricity when power is not required by the grid. Several options were investigated including:

- Fly-wheel technology for energy storage
- Electric battery storage
- Users for steam off-take
- Use of the electricity for hydrogen generation.

With the exception of hydrogen generation, none of the other options assessed provided a viable, technical or economic case meriting further investigation and thus it was concluded that there was no reasonable alternative to the use of electricity for hydrogen generation for this particular project.

3.2.5 Bottom ash storage for off-site treatment

The only alternative process that could be considered on site for the storage of bottom ash prior to off-site treatment is the full treatment of bottom ash to recover remaining residual metals and to produce an aggregate material for onward sale to the construction industry. With only 40,000 tonnes per annum of bottom ash currently produced on site, the scale of investment would not be economical and in addition, the amount of space required would be significant and could not be accommodated on the existing site. Thus, no reasonable alternative exists.

3.3 Alternative Designs

The assessment of alternatives undertaken also examined alternative designs, including those for:

- Aqueous waste storage;
- Hydrogen generation unit; and
- Bottom ash storage.

3.3.1 Aqueous Waste Storage

Some alternatives were considered with regards to the type and size of tanks to be utilised for the unloading, storage, mixing of aqueous waste prior to transfer to the furnace for treatment. These alternatives would be considered standard in process engineering terms and would also be in accordance with the applicable BAT guidelines.

3.3.2 Hydrogen Generation Unit

As the layout of the equipment is standard for such a plant and the visual impact is not significant as referred to in Section 13 (Landscape & Visual) below. no alternative designs were considered. Colour finishes for the exterior cladding were chosen to match the existing.

3.3.3 Bottom Ash Storage

Apart from the pitch of the roof (based on the orientation of ash trucks within the building when tipping) no other alternative designs were considered. Colour finishes for the exterior cladding were chosen to match the existing on site.

3.4 'Do-Nothing' Scenario

In terms of this scenario, the overarching planning, waste and climate change law and policy framework applicable to the proposed development as comprehensively detailed in Chapter 2 of this EIAR was referred to in this regard.

The assessment undertaken in Chapter 2 demonstrates in clear terms that the proposed development may be regarded as being in alignment with this overarching framework at both national and EU level and is capable of giving effect to the policy positions underlined therein.

Given this significant policy alignment of the proposed development with all relevant plans, policies and objectives at European, national, regional and local level, it would not be feasible in such circumstances to consider a do-nothing scenario as a reasonable alternative in the context of the proposed development in overall terms.

A do nothing scenario was also specifically considered in the context of the specific elements of the proposed development including the additional treatment

of hazardous waste, the hydrogen generation unit and the bottom ash storage building.

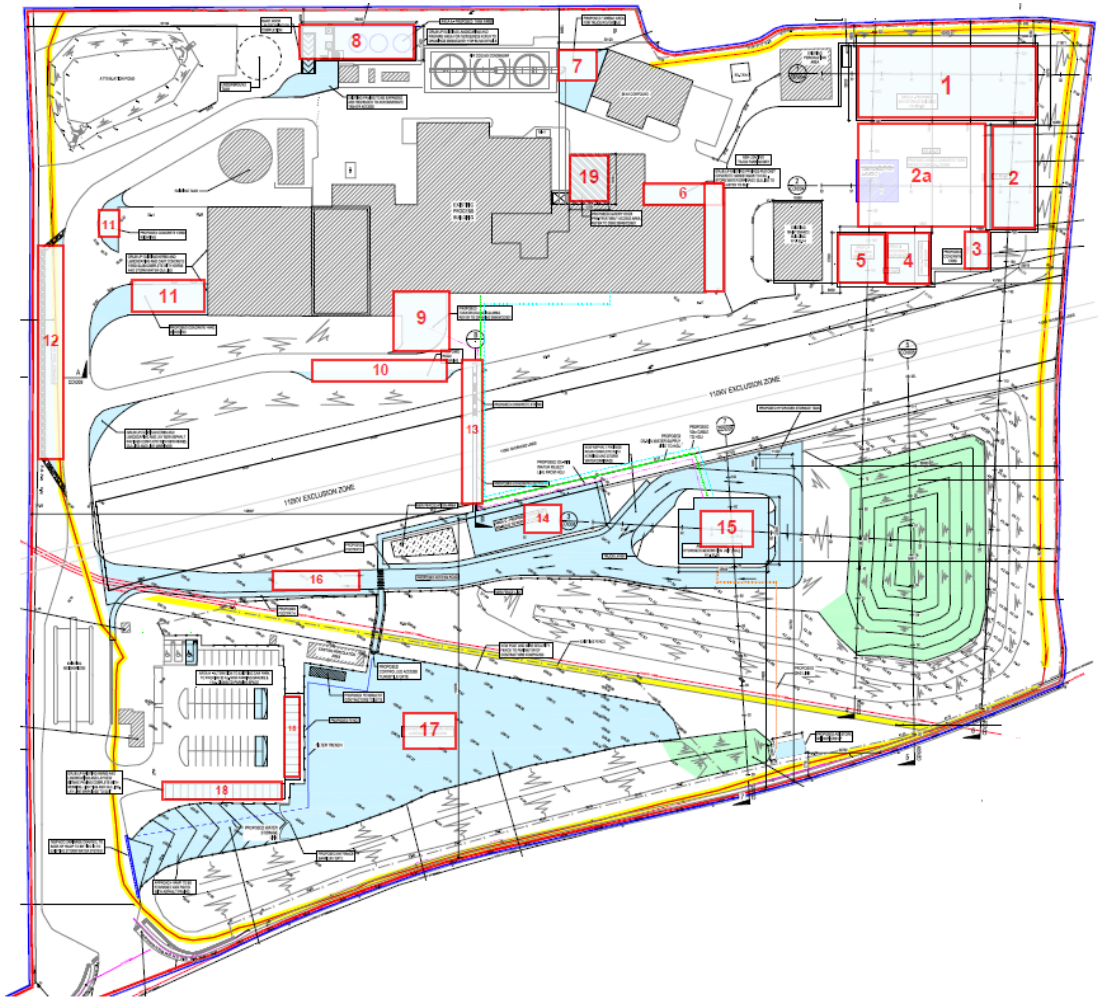
This assessment concluded that in the absence of these developments, the export of hazardous waste from the State would continue, valuable renewable energy would be lost and reliance on third parties for the storage of ash would not be feasible in the medium to long term.

4 Description of the Proposed Development

4.1 Overview

The proposed development will consist of the elements as listed in Section 1 above. The proposed increase in the annual total waste accepted at the site for treatment in the WtE facility from the currently permitted 235,000 to 250,000 tonnes per annum (tpa) to include up to 15,000 tpa of additional hazardous waste will require a review of the existing EPA licence. The existing WtE facility accepts liquid waste but is limited to 8,000 tpa of liquid hazardous waste.

The built elements of the proposed development are outlined in Sections 4.2 to 4.9 below. **Figure 2** 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 2 Proposed Development on the site

4.2 Liquid (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. Three tanks of 300m^3 capacity are proposed. Two will be dedicated to the acceptance and storage of liquid waste. The third will be utilised for the storage of boiler water during maintenance activities. Refer to **Figure 3** below.

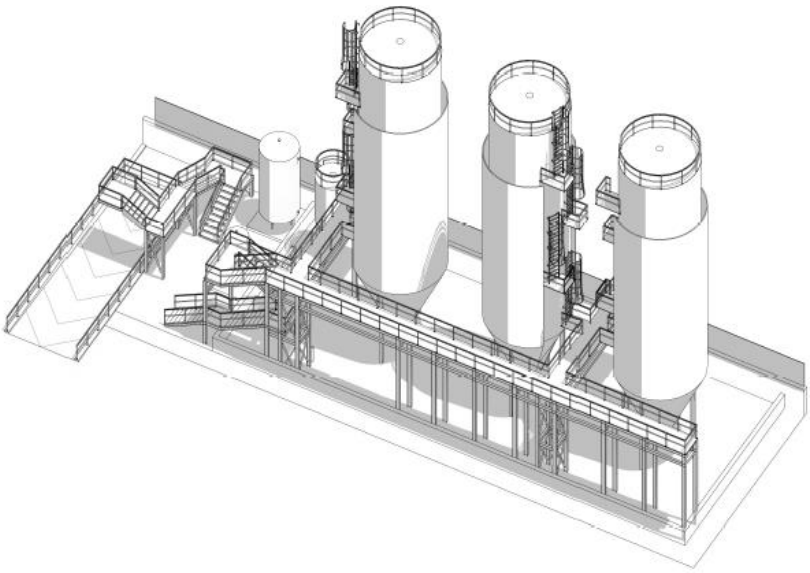


Figure 3 Tank Farm and Bund

An upgrade to the existing tanker unloading area is also proposed. The upgrade will provide space for three tankers at a time. Widening a section of the road adjacent to the unloading area will allow the tankers to reverse into the bays. Refer to **Figure 4** below.

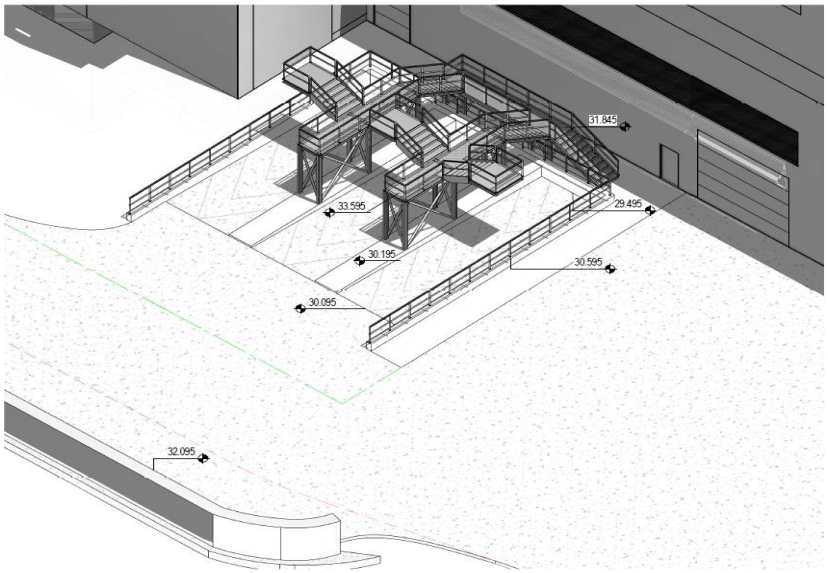


Figure 4 Proposed Upgrade to Existing Tanker Unloading area

4.3 Hydrogen Generation Unit (HGU)

It is proposed to develop a hydrogen generation unit (HGU) for connection to the natural gas network and for mobile hydrogen transport and other potential applications for use as a fuel.

The proposed HGU has been designed as an alternative means of using energy when the facility cannot export electricity to the national grid. Using a mildly alkaline water solution and electricity, water is split into hydrogen and oxygen. The hydrogen generated from this electricity could either be fed into the natural gas grid (an application to GNI has been made to explore this option) or stored on site for fuelling trucks and busses 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.

A rendered view of the building can be seen in **Figure 5** below.

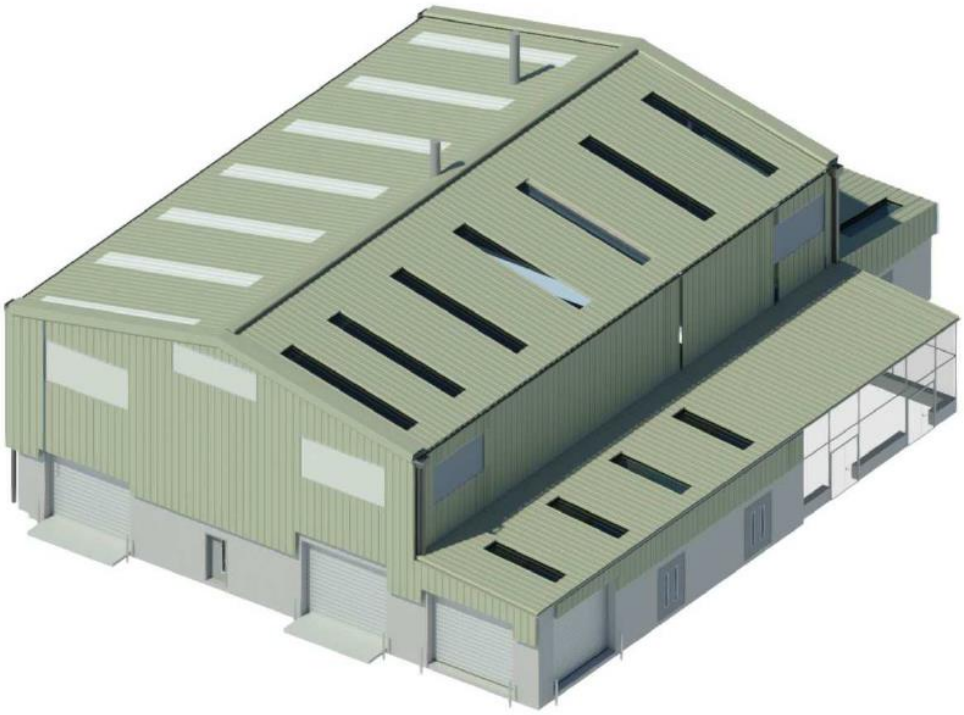


Figure 5 Hydrogen Generation Unit.

4.4 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. This will be done by exporting approximately 3,000 tonnes at a time (on average once per month) over a two or three day period by truck to Drogheda Port and directly onto a ship for export.

Figure 6 below shows the orientation and appearance of the building.

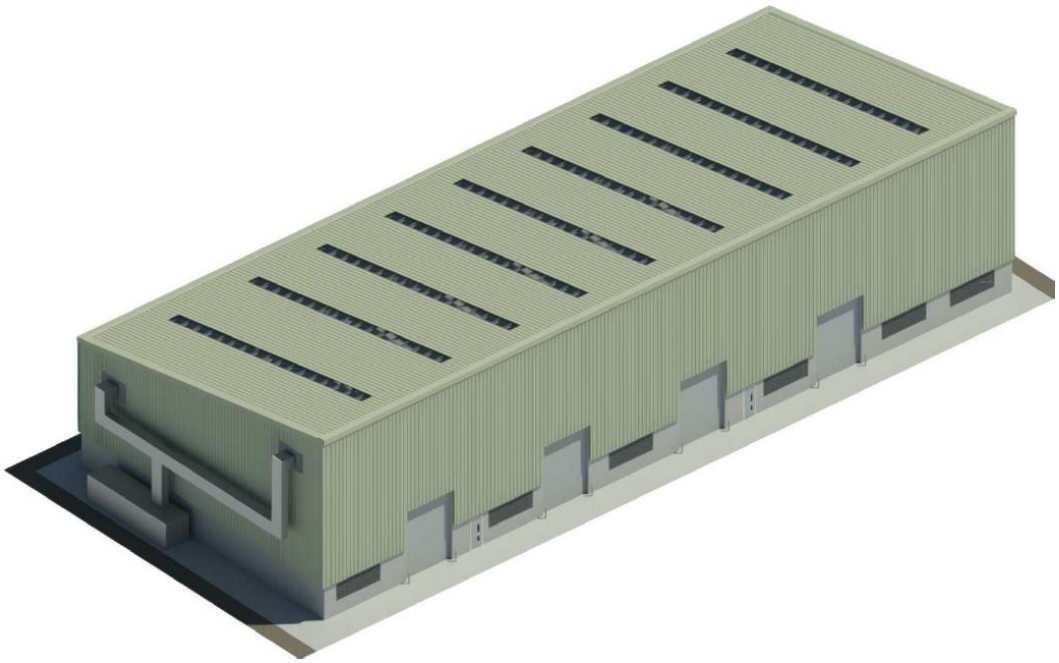


Figure 6 Bottom Ash Storage Building

4.5 Residue Acceptance & Storage for Pre-Treatment

It is proposed to increase the capacity of the existing ash pre-treatment by the acceptance of up to 30,000 tonnes per annum of similar third party residues for treatment.

The additional infrastructure proposed will comprise three silos housed within the existing WtE process building and an unloading area for tankers delivering this material outside the main process building (marked as Area 6 on Figure 2). The residues will then be processed (with the addition of just water) in the existing pre-treatment plant on site for export for recovery to a saltmine in Northern Ireland.

4.6 Warehouse, Workshop & ERT/Office 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.

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

This proposed area is to facilitate access and vehicular movements in and out of the bottom ash storage building and for deliveries to the warehouse. Part of this concrete area will be a contained area 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.

4.8 Modular Office Re-construction & Car Park Extension

It is proposed to demolish and re-build an existing single storey modular office building 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 existing modular building 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.

4.9 Miscellaneous site upgrades

As part of the project there will also be a series of miscellaneous site upgrades to improve the workings of the site in general. The locations of these upgrades are shown in Figure 2 above as areas marked 3,, 7, 11, 12, 13, 17, 18 and 19. A brief description of these areas is as follows:

- Areas 3 and 19 will be weather canopies for the area outside the pre-treatment building for handling and loading of bags and for performing maintenance activities for on-site vehicles respectively.
- Areas 7, 11, 12 will be extensions to hardstanding areas to facilitate improved HGV movements for the pre-treatment building, tipping hall and to provide a layby for trucks queueing for entry to the tipping hall respectively.
- Area 13 will provide for a personnel access route from the process building to the proposed office building, hydrogen generation building and the contractors compound.
- Area 17 will be for repurposing of the existing temporary trailer park to a dedicated permanent contractors compound, complete with welfare facilities and space for contractor cabins during maintenance and construction works in the future. Personnel access to the site will also be provided via a new security turnstile serving the compound.
- Area 18 will provide additional car parking spaces for staff and contractors on site.
- Reconfiguration of the landscaping and berming adjacent to the proposed hydrogen generation building for additional visual screening and a reduction of the amount of material that has to be removed off site.

- Extension of the existing berm at the south-eastern site boundary adjacent to the main road. The extension will cover an additional 25m, will match the height of the existing berm and provide additional screening of the site when viewed from the main road.

5 Construction Activities

Construction of the proposed development will be carried out in two distinct phases. It is anticipated that, with the proper implementation and management of the construction activities described in this chapter, the construction phase of the development will have no significant or long-term impact.

Phase 1 will consist of the construction of the following:

- Aqueous waste tank farm and tanker unloading area;
- Bottom ash storage building;
- Warehouse, workshop and emergency response team (ERT) building;
- New concrete yard and parking area;
- Development of a permanent Contractors Compound and access to same.

The schedule for the construction and commissioning of the Phase 1 elements is approximately 16 months.

Phase 2 will consist of the construction of the following:

- Hydrogen generation unit (HGU);
- Demolition of the existing single storey office building;
- Construction of the new single storey office building;
- Additional car parking.

The schedule for the construction and commissioning of the Phase 2 elements is approximately 12 months.

5.1 Construction Methods

The proposed development will be constructed employing best practice in safety and efficiency. The scale of each stage of the works are relatively small and such that all of the construction can be executed using common building methods and materials.

5.2 Material Imports, Exports and Transportation

The construction of the proposed development will require considerable movements of materials to and from the site. Within the necessary constraints of performance, durability and cost, construction materials will be sourced from local suppliers and manufacturers, where possible. Construction materials will be transported from the suppliers via the local road network. Approximately 2,300m^3

of engineering fill and crushed stone will be imported onto the site for the construction works.

In order to minimise the environmental effects, materials required from quarries will be sourced from quarries which are located in close proximity to the site where possible.

It is also estimated that up to 31,000m^3 of surplus material will be removed from the site. This will consist mainly of soil and materials from the excavation works.

The Contractor will endeavour to re-use as much of the surplus materials and wastes generated during demolition, excavation and construction as feasible within the proposed development boundary subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use.

5.3 Employment, Welfare and Safety

Through the construction phase there will be some variation in the numbers working on site. It is anticipated that a maximum of 120 construction workers will be employed on site at any one time during Phase 1, with the works being carried out during the daytime only (minor exceptions to this may arise due to weather, type of works etc). The Phase 2 construction works will peak at 100 people.

Temporary office accommodation and other construction facilities will be installed on site for the construction phase. All temporary units will be of a high standard in accordance with statutory regulations, as a minimum.

The co-ordination of people and materials on-site will be one of the key activities throughout the construction phases. The construction traffic management plan will designate traffic routes, timings and parking arrangements.

Typical working hours during the construction phase will be:

Start	Finish	
0700	1900	Monday – Friday
0700	1300	Saturday

Consideration of safety, weather or sub-contractor availability is likely to necessitate working outside normal hours on occasion. Heavy or noisy construction activities will be avoided outside normal hours and the amount of work outside normal hours will be strictly controlled.

The requirements of the Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare at Work (Construction) Regulations, 2013 and other relevant Irish and EU safety legislation will be complied with at all times.

A “Project Supervisor Construction Stage” will also be appointed prior to the start of construction on site of each phase.

5.4 Construction Environmental Management Plan

Every effort will be made to ensure that any detrimental environmental effects will be avoided, prevented or reduced during the construction phase of this project. Specific construction phase mitigation measures are described in the individual EIAR chapters.

A construction environmental management plan (CEMP) has been prepared prior to construction commencing which summarises the overall environmental management strategy that will be adopted and implemented during the construction phase of the proposed development. Implementation of the CEMP will ensure disruption and nuisance are kept to a minimum.

Furthermore, a Construction Traffic Management Plan, based on the principle of minimising construction-related traffic during existing peak periods will be developed by the appointed contractor.

6 Population and Human Health

This section considers the impact of the proposed development on population and human health.

The assessment considered the local population of Carranstown, Duleek and surrounding areas and how the proposed development may potentially affect human health as well as socio-economic aspects of the community including employment, amenities and heritage.

An assessment was also undertaken of the potential effects of emissions from the proposed development (during construction and operation) on human health. In addition, a literature review was carried out to identify potential significant impacts on human health with regards to the waste to energy process.

During operation, the waste to energy process (WtE) would be expected to be the dominant source of air emissions, and to a lesser extent, noise emissions, associated with the facility during operation. However, the emissions and total flue gas flowrate will not increase as a result of the proposed development and the facility will still be obligated to comply with its licensed emission limit values set by the Environmental Protection Agency. Hence the increase in waste tonnage proposed for treatment will not cause a significant impact to the ambient air quality and thereby human health.

The proposed mitigation measures for air, noise and water (as described below) will either avoid, prevent or reduce effects to human beings during the construction and operation phases of the proposed development.

The assessment on human health concluded that no significant effects on human health are predicted from the proposed development. The evidence is now very strong that well-run, modern incinerators have no adverse effect on the health of the communities around them.

In the wider socio-economic context, the proposed development will provide a positive effect on hazardous waste management options in Ireland by providing

additional solutions for other operators in terms of waste disposal and facilitate socio-economic development.

7 Traffic and Transportation

This section considers the effects of the traffic generated by the proposed development during both construction and operational phases.

The assessment was carried out in accordance with standard practice for traffic impact analysis and was developed in consultation with Meath County Council. The assessment comprised a review of the existing situation; determination of the potential traffic generation characteristics of the proposed development and an assessment of its impact on the local road network.

The effect of traffic generated on the local road network was assessed by comparing the projected future traffic volumes with and without the construction-related traffic for the proposed development. In addition, the effect of the generated traffic on the key junctions in the immediate vicinity of the proposed development was examined.

The phasing of construction of the proposed development has been taken into consideration in the traffic model in addition to the overlap with the operational phase to provide a robust analysis.

As part of the design process for the proposed development, a number of mitigation measures were included to control the effect of the generated traffic on the local road network. These include scheduling the construction start/finish hours on site to avoid the morning and evening peak periods on the local road network, and also the scheduling of operational staff working hours to avoid these morning and evening peak periods. These are described further below.

It is also an objective for Indaver that no HGV traffic associated with construction shall route through Duleek Village, and during the operational stage a similar restriction shall apply to HGV traffic unless absolutely necessary.

Furthermore, a Construction Traffic Management Plan, based on the principle of minimising construction-related traffic during existing peak periods will be developed by the appointed contractor.

In order to minimise the potential effect of traffic flows during the construction stage, construction working hours will be scheduled from 07:00-19:00. By scheduling the starting and ending construction peak hours to coincide with the lower traffic flows on the local road network at these times, the higher traffic flows which occur later will be avoided, and there will therefore be no resultant effect on the local road network during the morning and evening peak periods.

The traffic assessment concluded that the construction of the proposed development will have little or no effect on the local road network. There is sufficient residual capacity at the key junctions in the vicinity of the site to accommodate the construction phases of the proposed development..

Once both phases of the proposed development are constructed, only operational traffic associated with the proposed development will be present on the local road network.

During operation, traffic will be generated by the operation of the proposed development by workers commuting to the site and by additional HGVs using the development. Operational staff working shifts will commence before 08:00 and will finish at 16:30, thereby not coinciding with the morning and evening peak periods on the local road network.

The traffic assessment concluded that the operation of the proposed development will have little or no effect on the local road network in the 2027 and 2037 assessment years.

Whilst the Indaver site entrance junction will continue to retain significant capacity in the coming years, the junction of the R150/R152 at New Lanes Cross to the south will begin to experience capacity issues by 2027 in the evening peak period, and by 2037 certain arms of this junction will be over capacity in the morning and evening peak periods; however, the additional traffic associated with the proposed development will have a very minor impact on this junction.

The effect of the proposed development on local junctions is therefore considered to have minimal to no effect during operation.

A further sensitivity analysis was undertaken to evaluate the potential impact of a scenario whereby bottom ash generated by the development would be exported for recovery elsewhere in Europe, via Drogheda Port. Periodically throughout the year, for a two-day period there would be additional HGV traffic transporting the bottom ash to the port throughout the day.

An analysis of the junction of the R132/Shop Street in Drogheda determined that the junction has sufficient capacity to accommodate the additional HGV traffic associated with the transfer of bottom ash for export, which would have a very minor impact on the operation of the junction.

In summary, with the adoption of the mitigation measures, the traffic generated by the proposed development will have no significant effect.

8 Air Quality

An assessment of the potential effects of the proposed development on air quality has been conducted.

In terms of the existing air quality environment, baseline data and data available from similar environments indicates that levels of nitrogen dioxide, particulate matter less than 10 microns and less than 2.5 microns, carbon monoxide, benzene sulphur dioxide and heavy metals are well below the National and European Union (EU) ambient air quality standards and environmental assessment levels. Impacts to air quality associated with the proposed development are assessed respective to these environmental assessment levels.

The greatest potential impact on air quality during the construction phase is predicted to be from construction dust emissions and the potential for nuisance dust. In order to minimise dust emissions during construction, a series of mitigation measures were prepared which will be incorporated into the overall Construction Environmental Management Plan for the project. When the dust mitigation measures are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

Construction stage traffic emissions were also reviewed in line with Transport Infrastructure Ireland and UK Highways Agency DMRB guidance and assessment criteria. It was found that the change in traffic associated with the construction of the proposed development was not of the magnitude requiring a detailed air dispersion modelling assessment and the impact to the local air quality during construction is assessed to be short-term, negative but imperceptible.

During the operational phase the impact to air quality occurs from the operational Waste to Energy process at the facility and due to an increase in vehicles associated with the proposed development. In terms of the Waste to Energy process, this is considered the dominant source of air emissions from the facility. As part of the proposed development it is proposed to increase the annual tonnage of waste accepted from 235,000 to 250,000 tonnes per annum, comprising of up to 15,000 tonnes of additional hazardous wastes. However, the facility will still be obligated to comply with its licenced emission limit values and maximum flue gas flowrate and thus the increase in waste tonnage proposed will not cause a significant impact to the ambient air quality.

A detailed air dispersion modelling assessment was undertaken as part of the earlier applications for a Waste to Energy facility at the site in the air quality chapter of the 2009 and 2012 Environmental Impact Statements (EISs), which were based on the maximum licensed flow rate and maximum emission concentrations and continuous operation of the facility. This found that the impact on air quality would not be significant.

These modelling studies were updated as part of this assessment in order to account for an updated model version and recent meteorological data, as well as the addition of the structures associated with the proposed development. The revised assessment shows very minor variations in results from the original 2009 and 2012 assessments and indicates that the facility will continue to be in compliance with its licence requirements and no significant impacts to ambient air quality are predicted.

The increase in operational phase traffic associated with the proposed development was reviewed and was screened out of a detailed modelling assessment based on the UK Highways Agency DMRB assessment criteria. It was therefore determined that the impact to local air quality during the operational phase would be long-term, negative but imperceptible.

As the National and EU standards and environmental assessment levels for air quality are based on the protection of human health, and concentrations of pollutants for both the construction and operational stages of the proposed development are predicted to be significantly below these standards, the impact to human health is predicted to be imperceptible in both the short and long term.

In conclusion, there will not be significant effects on air quality arising from the proposed development during either the construction or operational phase.

9 Climate

An assessment of the potential effects of the proposed development on climate has been conducted.

The assessment has considered the effects of the proposed development on climate change and the vulnerability of the proposed development to climate change. With regard to effects on climate, Indaver considered how the proposed development will impact on both the emission of greenhouse gases and the consumption of renewable energy.

With regard to the vulnerability of the proposed development to climate change, climate adaptation measures have also been considered. The results of the flood risk assessment conclude that the site is not at risk of flooding. Refer to Section 15 below for further details.

The existing climate baseline can be determined by reference to data from the EPA on Ireland's total greenhouse gas (GHG) emissions and compliance with the European Union's climate related targets for GHG emissions, specifically, Effort Sharing Decision "EU 2020 Strategy" (Decision 406/2009/EC). This strategy has set annual GHG targets that Ireland needs to comply with to reduce future impacts on climate.

At present, finalised emissions are available for 2017 and Ireland's GHG emissions are exceeding the target set out by the EU. Emissions are predicted to continue to exceed the targets in future years, therefore, reduction measures are required in all sectors in order to reduce impacts to climate and prevent climate change. Impacts to climate associated with the proposed development are assessed respective to Ireland's EU 2020 target. As part of the proposed development it is planned to construct a hydrogen generation unit on site, the impact of this aspect of the development has been assessed relative to Ireland's EU 2020 target in comparison to natural gas providing the equivalent energy.

During the construction phase emissions from plant and machinery may release some emissions of CO_2 and N_2O. However, the Institute of Air Quality Management guidance states that emissions from site plant and vehicles is unlikely to be a significant source of pollutants and does not require a qualitative assessment. There is also the potential for construction stage traffic emissions to impact climate through increased CO_2 emissions. Construction stage traffic emissions were reviewed in line with Transport Infrastructure Ireland and UK Highways Agency DMRB guidance and assessment criteria. It was found that the change in traffic associated with the construction of the proposed development was not of the magnitude requiring a detailed dispersion modelling assessment. Greenhouse gas emissions during the construction phase will not be significant in the context of Ireland's total GHG emissions and therefore and the impact to climate during construction is assessed to be short-term, negative but imperceptible.

During the operational phase GHG emissions will be released from the incineration of the waste. Due to the proposed increase in the tonnage of material accepted to the facility there is the potential for the composition of the waste to change. The waste throughput information was used to estimate the GHG emissions from the facility. The proposed development will increase GHG emissions from the existing scenario by 0.04% of Ireland's EU 2020 target. This is considered a long-term, negative but imperceptible impact on climate.

The increase in operational phase traffic associated with the proposed development was reviewed and was screened out of a detailed modelling assessment based on the UK Highways Agency DMRB assessment criteria. It was therefore determined that the impact to climate from traffic emissions during the operational phase would be long-term, negative but imperceptible.

The future operation of the proposed hydrogen generation unit (HGU) will have a positive impact on climate by off-setting some GHG emissions. The steam from the facility can be converted to electricity and used to generate hydrogen to replace natural gas in the local network or to be used as a clean transport fuel.

According to the EPA's emission projections for 2018-2040, a range of measures will be required to tackle transport emissions. In the absence of biofuels such as hydrogen or an increase in the uptake of battery electric vehicles, transport emissions will continue to grow.

While this is considered a small scale impact, it is nevertheless a positive impact to climate as a result of the HGU development and will contribute to reduction measures to enable Ireland to meet its future climate targets.

10 Noise and Vibration

An assessment of the potential effects of the proposed development on noise and vibration has been conducted.

The existing WtE facility is located off the R152 road within the townland of Carranstown, Co. Meath. Lands surrounding the facility are a mix of agricultural farmland, industrial and residential. The closest noise sensitive property is approximately 20m to the south east of the site boundary.

The current noise environment is surveyed on an annual basis to comply with the facilities existing Industrial Emissions (IE) Licence. The results of the annual compliance noise monitoring surveys in addition to supplementary noise surveys indicate that road traffic dominates the prevailing noise environment at noise sensitive locations surrounding the facility. Activities from the Indaver facility are audible at low level during quieter night-time and evening periods during lulls in surrounding noise sources, predominately road traffic. The range of noise levels measured confirms the facility is operating within its licence limits at present for all periods at all survey locations.

The proposed development will introduce additional noise sources from a small number of external plant items and on-site vehicle manoeuvring activities.

Calculated operational noise levels associated with the existing facility combined with the proposed development, are below the licence noise limits during all periods assessed at the nearest noise sensitive locations.

There will be some additional traffic along the surrounding road network once the proposed development becomes operational. The assessment has concluded that the addition of operational traffic to the existing road network will be of negligible noise impact.

For other possible or planned projects relating to new and extended industrial facilities in the surrounding area, the distance to the nearest noise sensitive locations assessed for the proposed development is sufficiently large or of negligible noise impact such that cumulative noise levels will be not significant.

There are no sources of vibration associated with the proposed development which will give rise to any significant levels of vibration within or outside of the site boundary.

During the temporary construction phase, there is potential for noise levels to be increased outside the site boundary, depending on the activities involved and the location of works on the site. The predicted construction noise levels associated with the key construction stages are in compliance with the recommended noise limits due to the nature of the proposed works, the distances to the nearest sensitive buildings and the screening afforded by site buildings and boundary treatments.

Vibration impacts during the construction phase will be negligible given the absence of any significant intrusive ground works and the distances to the nearest properties.

In summary, the proposed development at the WtE facility is predicted to be in full compliance with all applicable noise and vibration limit values during both the construction and the operational phases of the development during the day, evening and night-time periods.

In conclusion, there will not be significant noise and vibration effects arising from the proposed development during either the construction or operational phase.

11 Biodiversity

An assessment of the potential effects of the proposed development on biodiversity has been conducted.

The assessment is based on information gathered from a desktop review of available local ecological information as well as surveys of the Indaver site carried out during 2019 and 2020 by an ecologist. Surveys of the site included habitat mapping and classification, invasive species, rare floral species, birds, mammals and aquatic habitats.

The surveys of the site found that the habitats within the proposed works site are generally of low ecological value at a local level i.e. amenity grassland, buildings and artificial surfaces, ornamental/non-native shrub, spoil and bare ground and

recolonising bare ground. A narrow band of planted immature woodland/ mixed broadleaved woodland will also be impacted by the proposed development.

The construction of the proposed development will require the partial removal of a number of habitats identified on site however these habitats are not rare, threatened nor do they require any special protection under existing or pending legislation. No significant loss of habitat for mammal species is predicted. No rare species were recorded during the site survey, nor are they expected to occur given that the habitats within the works areas are relatively common. No high-risk invasive species were recorded during the recent site survey.

During construction, there is a risk that accidental spillages or leaks hydrocarbons (e.g. fuel) and/or other chemical substances during construction could introduce toxic chemicals into the aquatic environment via direct means, surface water run-off or groundwater contamination. This could potentially affect aquatic habitats however this is only likely to occur where works take place in proximity to seasonal drainage ditches within the site boundary. The risk of potential impacts on water quality during construction is low as the drainage ditches within the site boundary are seasonal and will not have running water during dry periods. The closest watercourse is the Cruicerath Stream which is located approximately 130m from the Indaver site boundary and ultimately discharges to the River Nanny.

There will not be significant effects on biodiversity from increased noise and disturbance and dust during the construction.

Mitigation measures are proposed for the protection of habitats, water quality and general ecological protection during construction. Monitoring measures during the construction phase are proposed to ensure the protection of water quality. Such measures will be included in the Construction Environmental Management Plan (CEMP).

During operation, the existing site surface water drainage network effectively prevents any significant impacts on water quality. As described in **Section 15** Water below, the existing monitoring measures under the IE Licence are sufficient to ensure water quality will be protected. Surface water collected from areas of hardstanding on site is currently monitored entering and as outfall from the site attenuation pond. There are no significant negative effects on biodiversity predicted.

During operation, based upon the air quality assessment carried out, it has been concluded that in the absences of any significant impacts on air quality the effect on fauna via direct toxicological impacts or via bioaccumulation will be imperceptible.

The proposed development will have effects on habitats that are primarily low value. No adverse effect on designated sites or their conservation objectives will occur. No particular difficulties in the effective implementation of the prescribed environmental mitigation measures have been identified.

In conclusion, there will not be significant effects on biodiversity arising from the proposed development during either the construction or operational phase.

An Appropriate Assessment Screening Report (AA) and Natura Impact Statement (NIS) have been prepared by Dixon-Brosnan on behalf of Indaver and submitted as part of this planning application to An Bord Pleanála. The conclusion of the NIS, in summary, is that the proposed development (with the implementation of mitigation measures) does not pose a risk of adversely affecting (either directly or indirectly) the integrity any European site, either alone or in combination with other plans or projects.

12 Archaeological, Architectural and Cultural Heritage

An assessment of the potential effects of the proposed development on archaeological, architectural and cultural heritage has been conducted.

There are 17 recorded archaeological sites listed in the Record of Monuments and Places for Co. Meath and the Sites and Monuments Record Database of the National Monuments Service within 1.5km of the proposed development site. These sites reflect human activity in the landscape extending back to the Bronze Age (circa 2,400-500BC). Previous archaeological assessments have been undertaken at the existing Indaver site in 2006, 2009 and 2012.

The majority of the proposed development lies within the footprint of ground which has already been archaeologically resolved. Therefore, there will be no impact on these areas and no archaeological mitigation measures are required for these development areas.

Two areas of the proposed development; under the overhead power line in roughly the centre of the site and under the berm at the northeast of the site may impact on previously unknown archaeological finds or features. The potential impact of construction works in these areas has been assessed as slight.

During construction, archaeological monitoring will be carried out on areas of ground disturbance under the berm and under the overhead powerline. In the event of archaeological material being uncovered such material will be preserved in situ, where possible or preserved by record. Preservation in situ will require the relocation of the element of the development beyond the area of archaeological sensitivity.

Preservation by record will require the excavation of the archaeological material and such material will be fully resolved to professional standards of archaeological practice (Policy Guidelines on Archaeological Excavation – Department of Arts, Heritage, Gaeltacht and the Islands). This work will be funded by the developer.

No likely significant effects on the architectural environment are predicted. The proposed development will have no visual impact on the World Heritage Site of Brú Na Boinne, located c. 5km to the northwest.

In conclusion, there will not be significant effects on archaeological, architectural and cultural heritage arising from the proposed development during either the construction or operational phase.

13 Landscape and Visual

An assessment of the potential effects of the proposed development on landscape and visual has been conducted.

The proposed development is located within the existing Indaver waste-to-energy facility at Carranstown, Duleek, Co. Meath. In that context, it is relatively small in scale and of a similar character. Whilst the surrounding landscape is generally agricultural (pastoral) in nature, the immediate locale has an industrial feel, with the nearby Platin cement works dominating. The gently rolling topography and hedgerows bounding the fields around the site, effectively limit visibility of the site (and the smaller scale proposed development within), from the surrounding area. Importantly, the protected views and prospects from the very sensitive Brú na Bóinne World Heritage Site, located more than 4.5km to the north-west, will not be affected by the proposed development on this site. Consequently, the principal views potentially yielding visual impacts are from a limited number of locations along or close to the R152 road, from the south and north-east.

The proposed development is largely located in the north-east corner of the existing waste-to-energy site, away from the R152 and beyond the existing buildings and their existing effective screen planting and berms. The proposed development is of relatively small scale and the design of the main built elements incorporates mitigating features relating to materials, colour and tone which will assist in the integration of the proposed development into the existing facility and a reduced potential visual impact if /when seen from without the site. The existing landscape character of the site and surrounding areas is unaffected by the insertion of the proposed development. The photomontages prepared for views from the selected viewpoints (two examples are shown in **Figures 7 & 8** below), illustrate how the visual impacts created by the proposed development are imperceptible/not significant.

In conclusion, there will not be significant landscape and visual effects arising from the proposed development during either the construction or operational phase.

Figure 7 Showing View 1 of the site with the proposed development outlined in red

Figure 8 Showing View 5 of the site with the proposed development outlined in red

14 Land and Soils

An assessment of the potential effects of the proposed development on land and soils (including hydrogeology) has been conducted.

Desktop information as well as a site walkover was used to complete the assessment. A conceptual site model of the site was developed based upon available site investigation information to aid understanding the current geological and hydrogeological environment at the Indaver site. The site is underlain by Carboniferous limestone. Groundwater is classified as a Regionally Importance karstified (limestone) aquifer from which the site abstracts from. Groundwater monitoring is carried out on site under the EPA Industrial Emissions Licence (W0167-03). The ground conditions for the site are well understood as a result of previous site investigation works carried out in advance of the existing facility.

Construction activities relevant to the assessment of land and soils pertain to the stripping of topsoil and vegetation, bulk excavation and general site regrading of ground levels and the construction of earth retaining structures.

During construction, these ground works can potentially cause minor local permanent change in aquifer (groundwater) vulnerability due to the loss of overburden (material over the aquifer). Soil and groundwater may also potentially be impacted where there is accidental localised contamination, for example spillages or leaks.

These potential effects are considered to be moderate to significant however, mitigation measures implemented during the construction phase will ensure that the risk to the groundwater is minimised by careful management of the excavation works, surface water run-off and ensuring the careful storage of all tanks/drums of fuel, oil, chemicals and all other materials that pose a risk to waters if spilled. These measures will be adhered to by the construction contractor and included in the Construction Environmental Management Plan (CEMP).

As the significance of the ‘likely significant environmental impact’ on the site during operation of the proposed development is ‘imperceptible’ no mitigation measures have been proposed with respect to effects from operation of the proposed development. All site activities already take place on areas of hardstanding and therefore the risk of any spills or leaks affecting the underlying soils and groundwater is minimised. In addition, the existing surface water management system ensures all surface water runoff from hardstanding areas is captured in the site drainage system.

Regular on-going monitoring of groundwater quality is already carried out at the existing Indaver facility as part of the EPA licence (W0167-03) requirement and this monitoring will continue.

In conclusion, there will not be significant effects on land and soils (including hydrogeology) arising from the proposed development during either the construction or operational phase.

15 Water

An assessment of the potential effects of the proposed development on hydrology (incorporating water quality, drainage and flooding) has been conducted.

The existing site is located within the River Nanny and River Devlin river basin catchment. 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. The nearest rivers and streams are the Cruicerath Stream that flows approximately 200m to the west of the site, and the Platin Stream that flows approximately 500m to the east of the site.

A site-specific flood risk assessment (FRA) was prepared for the assessment. There is no record of pluvial flooding (due to rainfall) on the site. The existing stormwater attenuation system is designed for a 1 in 100 rainfall event and factors in predicted increased rainfall due to climate change. Therefore, it was concluded that pluvial flooding risk is minimal.

The site is outside the fluvial flooding (due to rivers) risk boundary of the River Nanny. Flood risk from the Cruicerath stream is unlikely too, following the preliminary flood risk assessment outcome and the difference in ground levels between the stream and the site (1.5 – 2.0m as noted in the FRA). Therefore. it is concluded that the fluvial flood risk at the site is unlikely. It was concluded there is no tidal flooding risk given the distance of the site from the coast (10km east).

There is no record of groundwater flooding. Groundwater levels at the site have been observed in excess of 30m below existing ground levels from the monitoring boreholes installed in the site. Therefore. it is considered that groundwater flooding risk is minimal.

The proposed development will have no impact on floodplain storage and conveyance. The proposed development will also not increase flood risk off site during construction.

During construction, surface water can potentially become polluted by spillages such as hydrocarbon leaks (fuel/oil/lubricants) from construction machinery or by siltation as a result of runoff, during construction. However, surface water in the construction areas during the construction period will be infiltrated to ground via silt traps and managed soakaways. The laydown areas will be suitably drained and any areas which will involve the storage of fuel and refuelling will be paved and bunded and hydrocarbon interceptors will be installed to ensure that no spillages will get into the surface water or groundwater. These measures are sufficient to limit the discharge of any contaminants to surface water and groundwater during the construction phase. As with measures in place to protect groundwater in Section 14 Land and Soils above, these measures will be adhered to by the construction contractor and included in the Construction Environmental Management Plan (CEMP).

During operation, the proposed development will be constructed to utilise the existing site drainage infrastructure. The existing attenuation tank on the site has sufficient capacity to deal with the increase in surface water runoff from the

proposed development however due to specific constraints (regarding site levels and discharge rates) that prohibit the expansion of the existing stormwater drainage network, it was not possible to extend the stormwater network to the concrete yard. The design solution is to attenuate the surface 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.

In conclusion, there will not be significant effects on water arising from the proposed development during either the construction or operational phase.

16 Material Assets

Material assets are now defined by the EPA Advice notes on current practice in the preparation of Environmental Impact Assessment Reports (EPA 2017) as 'built services and infrastructure'. According to the EPA guidelines, the three main areas to focus on under the heading of material assets are:

- Built Services and infrastructure (including electricity, telecommunications, gas, water supply infrastructure and sewerage);
- Roads and Traffic;
- Waste Management.

The construction phase will have a slight negative effect on the lands required for the proposed development. This will be true also for the operational phase but given the current use of the site and that the land required is fully within Indaver ownership, it is not considered that this will result in a significant negative effect. There will also be no significant negative effects on adjacent land uses as a result of the proposed development.

Approximately 31,000 m^3 of surplus material will be removed from the site to facilitate the proposed development. The effect of this will depend on the disposal option or combination of options available to the contractor at the time. The reuse of surplus material on other sites will likely have a slight, positive effect on material assets. Recovery and disposal of surplus material will likely have a slight negative effect on waste resources.

The additional raw materials required, and associated residues produced from the treatment of an additional 15,000 tpa in the waste-to-energy plant are not significant. The raw material required for the hydrogen generation unit and pre-treatment plant is water. The increased demand of approximately 3.5m^3 per hour will be supplied from the existing groundwater abstraction wells on site. This will increase demand on the existing wells from 36% to 50% of their current capacity and is not deemed to be significant.

The electrical power demand for the proposed development will be supplied on site and no additional connections or diversions are required and existing wayleaves on site will be respected when running power supplies to the various elements of the proposed development. When running, the HGU will use electricity generated on site that would otherwise be wasted to produce 160 tonnes per annum of carbon-free fuel.

A connection to the natural gas distribution grid for the injection of hydrogen for use will be required and the wayleave for the existing gas transmission main traversing the site will be observed.

The treatment of an additional 30,000 tpa of residues in the ash pre-treatment facility diverts this hazardous waste from export to mainland Europe (and further afield) to a recovery solution in a saltmine Carrickfergus. The provision of up to 15,000 tpa of additional hazardous waste thermal treatment capacity will also divert this waste from export.

Recovery routes for the existing residues from the waste to energy plant will be maintained (to include the residues from the 15,000 tpa increased treatment capacity) and with the addition of the bottom ash storage building on site, an additional recovery option via bulk export to Europe through the Port of Drogheda will be opened.

In conclusion, there will not be significant effects on material assets arising from the proposed development during either the construction or operational phase.

17 Major Accidents and Disasters

An assessment was undertaken of the likely significant adverse effects on the environment arising from the vulnerability of the proposed development to risks of major accidents and/or disasters.

Indaver carried out a formal hazard identification and risk assessment (HAZID&RA) for the site, covering the risks presented by the existing activities and the new risk presented by the proposed development, specifically the new bulk storage facility (aqueous waste tank farm) at the site. In accordance with the European Commission's EIA guidance, there are two key considerations to consider in the risk assessment:

- The proposed development's potential to cause accidents and/or disasters for human health, cultural heritage and/or the environment
- The vulnerability of the proposed development to potential disaster/accident.

The starting point for the scope and methodology of this assessment is that the proposed development will be designed, built and operated in line with current international best practice and, as such, major accidents will be very unlikely.

A formal HAZID&RA was carried out to identify all potential accident scenarios that could arise at each area of the site where dangerous substances are stored or handled. Each scenario was assessed using the HAZID&RA methodology to determine its likelihood of occurrence and the severity of impact to people and the environment if it did occur. This approach gives a semi-quantitative assessment of the overall level of risk associated with each accident scenario identified. When carrying out this assessment consideration was taken of any relevant prevention or mitigation measures in place when determining the risks associated with each scenario.

There are no special or unique hazards associated with the construction of the plant on this particular site that would not be encountered on any typical construction site for an industrial building. A Construction and Environmental Management Plan (CEMP) will be in place to ensure that the construction is carried out in a safe manner with regard to safeguarding the environment from potential incidents on site.

The scenarios identified during operation were for the existing scenario (existing site) and with the proposed development. The most significant scenarios identified were:

Existing scenarios

- Bunker fire.
- Loss of containment of aqueous ammonia from storage tank.

Scenarios associated with proposed new development

- Fire at aqueous waste tank farm.
- Fire / explosion at hydrogen generation unit.

In the case of all four scenarios, on-site controls will ensure there will be no off-site effects. There are no residual effects associated with the scenarios discussed above, except in the case of an accident scenario. In the event of an accident occurring during operations, Indaver will have emergency response measures in place to minimise the impacts to human health and to the environment.

In conclusion, there will not be significant effects arising from the vulnerability of the proposed development to risks of major accidents and disasters during either the construction or operational phase.

18 Cumulative Effects, Other Effects and Interactions

18.1 Cumulative Effects

Cumulative effects are those that arise as a result from the cumulation of effects with other existing or approved/planned projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.

A review was carried out of the planning and licensing files of Meath County Council, Louth County Council, An Bord Pleanála, EPA and the EIA Portal to identify projects of a scale, nature and proximity to the proposed development that could potentially have a cumulative effect on the environment.

The review identified included two projects in Irish Cement; a solar farm project and two substation projects in the wider Duleek area. All projects have planning consent.

Likely significant cumulative effects (direct and indirect) of the proposed development in-combination with those projects for each of the environmental factors were initially identified, considered and assessed. All of the EIAR experts reviewed the available materials relating to the existing/approved projects in order to conduct their assessments. An assessment was also carried out of the likely significant direct, indirect and cumulative effects assessment of all of the above five projects together as a whole in combination with the proposed development.

The conclusion of the assessment is that there are no likely significant cumulative effects (direct and indirect) arising approved/existing projects in-combination with the proposed development. No additional mitigation measures are necessary or required following this assessment.

18.2 Transboundary Effects

This EIAR has considered and assessed the potential for transboundary effects arising from the construction and operation of the proposed development. Certain environmental effects of a proposed development have the potential to cross state boundaries, for example, air or water emissions, and have a 'transboundary effect'.

The potential for transboundary effects for the proposed development arises as follows:

- Bottom ash could possibly be exported from the proposed development to continental Europe for recovery if there are no landfill or recovery options available at a given time.
- Boiler ash and flue gas cleaning residues from the proposed development will be transported to a salt mine facility in Northern Ireland (Carrickfergus, Co. Antrim) or to continental Europe (Hattorf and Wintershall Reutilisation Facility, which is an underground salt mine in Germany).
- Non-ferrous metals will be exported for treatment to mainland Europe.

In the case of bottom ash, boiler ash and flue gas cleaning residues, there are currently appropriate facilities on the Island of Ireland that can accept this material.

Bottom ash is currently sent to landfills in Ireland. Should these facilities be no longer available to Indaver, the material would be exported to outlets in Europe which are already able to recover aggregates from bottom ash if there is no landfill capacity in Ireland in the future. The potential shipment of bottom ash to continental Europe is not likely to have significant negative effects on the environment. Thus, significant transboundary effects will not arise.

Pre-treated boiler ash and flue gas cleaning residues are currently sent to a saltmine (Carrickfergus) in County Antrim, Northern Ireland. A TFS (Transfrontier Shipment of Waste) 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. 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.

Additional boiler ash and flue gas cleaning residues will be generated from the proposed development. It is intended that the additional residues will be transported primarily to the Carrickfergus salt mine facility in Northern Ireland or to continental Europe (Hattorf and Wintershall Reutilisation Facility will be used as a back-up). Both of those facilities have the capacity to accommodate the additional residue volumes.

New TFSs or modifications to the existing TFSs (for both the Northern Ireland facility and the Hattorf and Wintershall Reutilisation Facility) will be sought to accommodate the increase in boiler ash and flue gas cleaning residues proposed as part of the proposed development. A new TFS would also be sought to export bottom ash to outlets in Europe.

Given the nature of un-treated boiler ash and flue gas cleaning residues, should any of this material come in contact with water (in the unlikely event of the loss of a tanker in-transit, the residues would solidify on contact with water. The solidified boiler ash and flue gas residues could then be removed from the seabed along with the tanker. Therefore, the potential treatment of the boiler ash and flue gas cleaning residues is not likely to have significant negative effect on the environment. Thus, significant transboundary effects will not arise

Ferrous metals are currently sent for recovery in Ireland and non-ferrous metals are exported to mainland Europe for recovery. For facilities in Europe accepting non-ferrous metals, the competent authority of the country accepting the material will have already considered the effects on the environment of the facility accepting this material through the licence or permit application process.

Consequently, the recovery or recycling of the additional non-ferrous metals is not likely to have a significant negative effect on the receiving environment. Thus, significant transboundary effects will not arise.

18.3 Interactive Effects

Interactive effects are those effects that inter-relate to different aspects of the environment assessed. Interactive effects between the identified environmental factors were considered during the EIAR preparation. There were numerous discussions and communications between the environmental specialists and the design team throughout the design process which helped to identify and minimise the potential for significant interaction of impacts. Measures to minimise impacts have been incorporated into the design and are also included in all of the assessments and the residual impacts have been assessed.