INDAVER

Ringaskiddy
Resource Recovery Centre

VOL 1

Environmental Impact Assessment Report | 2019
Non-Technical Summary



Delivering Sustainable Waste Treatment Solutions For a Growing Population

ARUP

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This report takes into account the particular instructions and requirements of Indaver.
It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

1 Introduction

Indaver Ireland Limited (Indaver) proposes to develop a resource recovery centre (including waste-to-energy facility) in Ringaskiddy in County Cork. Indaver has already successfully built and currently operates a similar facility in Co. Meath. Like the Meath facility, the proposed development will consist primarily of a waste incinerator with energy recovery, that is, a waste-to-energy facility. It will bring much-needed waste management infrastructure to the Munster region. The proposed development entails significant investment in Co. Cork and will assist both the Southern Waste Management Region and Ireland in meeting regional, national, and European waste management and energy policy objectives. Refer to **Figures 1 and 2 (Site Location).**

This document is a Non-Technical Summary of Indaver's Environmental Impact Assessment Report (EIAR), prepared for Indaver as part of the Environmental Protection Agency (EPA) Industrial Emissions (IE) licence application for permission to operate a resource recovery centre.

The proposed development will consist principally of a waste-to-energy facility for the treatment of up to 240,000 tonnes per annum of residual household, commercial, industrial, non-hazardous and suitable hazardous waste. Of the 240,000 tonnes of waste, up to 24,000 tonnes per annum of suitable hazardous waste will be treated at the facility. Examples of suitable hazardous waste would include materials from industry such as contaminated personal protective equipment/clothing, filters, absorbents, redundant over-the-counter preparations, medicines, and raw materials such as sugars, starches and gelatine tablet coatings. These streams are classified as hazardous in compliance with the European Waste Catalogue due to their chemical or physical properties. However, this does not imply that they are dangerous to handle (i.e. they may be handled by householders and businesses regularly). Energy and ferrous and non-ferrous metals will be recovered at the facility.

In waste-to-energy facilities, residual waste is combusted at high temperatures in a carefully controlled environment. The heat produced by the combustion process is recovered as steam and used to generate electricity. A portion of the energy generated is considered to be renewable, as a portion of the residual waste is biodegradable. In the case of the Ringaskiddy Resource Recovery Centre, approximately 21 megawatts (MW) of electricity will be generated, of which up to 18.5MW will be exported to the national electrical grid. This will be enough to supply the power needs of approximately 30,000 households. The remaining 2.5MW will be used to run the facility itself.

In addition to a waste-to-energy facility, the proposed development will include the upgrade of a section of the L2545 road in front of the site, a connection to the national electricity grid, an increase in ground levels in part of the site, coastal protection measures above the foreshore (high tide line) on Gobby Beach, and an amenity walkway towards the Ringaskiddy Martello tower from Gobby beach.

The proposed development will involve an investment of over €160 million, and if permission is granted it is expected to be operational in 2022. Up to 320 people will be employed during the construction phase and 63 people will be employed when the facility is operational. It is proposed that the waste-to-energy facility will operate for 24 hours per day, seven days a week, and for an average of 8,000 hours per year. There will be planned shutdowns for maintenance. Waste acceptance will be limited to the hours 06.00 to 20.00 on weekdays and 09.00 to

14.00 on Saturdays.

An application for permission under section 37E of the Planning and Development Act 2000, as amended, was submitted by Indaver to An Bord Pleanála in January 2016. An Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) accompanied the planning application to An Bord Pleanála in 2016. (For ease of reference, the EIS and NIS are referred to as "2016 EIS" and "2016 NIS" in this Non-Technical Summary).

Permission was granted by An Bord Pleanála for the proposed development under section 37G of the Planning and Development Act 2000, as amended in May 2018.

Waste management in Ireland is controlled, from a licensing perspective, through Industrial Emissions (IE) Licensing legislation. Under the legislation, the Environmental Protection Agency (EPA) has the responsibility for the licensing of all significant waste recovery and disposal activities. In order to operate the proposed development, Indaver requires an IE licence from the EPA. The design of the proposed development which was submitted as part of the planning application to the Board in 2016 (and for which permission was granted by the Board in 2018) has not changed. The same design is now presented for the IE licence application. However, a new EIS (now referred to as Environmental Impact Assessment Report (EIAR)) and a new NIS have been prepared to support the IE licence application. Both the 2016 EIS and 2016 NIS required updating due to recent changes in EIA legislation, changes in environmental baseline since 2016 and also to incorporate all relevant information gathered in the intervening period between the submission of the planning application in 2016 the present date.

Environmental Impact Assessment

Environmental Impact Assessment (EIA) is a process for anticipating the effects on the environment caused by a development. The aim, through careful scoping, is to identify and predict any likely significant effects of the project on the environment, to describe the ways in which these can be mitigated or reduced, and to interpret and communicate information about the effects through a formal document known as an Environmental Impact Assessment Report (EIAR). A combination of field surveys, desktop studies, and modelling techniques were used to evaluate the potential effects of the development.

The mitigation measures and residual effects for both the construction and operational phases for the proposed development are summarised in Chapter 18 of the EIAR's main text. The individual chapters of the EIAR's main text should also be referred to for context and detail. Residual effects are the final effects which occur after the mitigation measures have taken effect. Provided the recommended mitigation measures therein are implemented, the predicted adverse effects have either been completely eliminated or reduced to a minimum for both the construction and operational phases of the project.

This Non-Technical Summary, volume one of the EIAR, summarises the contents of volumes 2-4, to which interested readers should refer should they require more information on any aspect of the development. All EIAR volumes will be available on the Ringaskiddy Resource Recovery Centre website http://www.ringaskiddyrrc.ie/.

Duration of Planning Permission

The construction of the proposed development including site development works will take circa 31 months. However, in view of the complexity of the development, licensing requirements, and the need for the advance agreement of all conditions, a 10 year planning permission was granted for the proposed development.

In addition, permission was also granted to operate the proposed development for a period of 30 years following completion of construction and commissioning.

Consultation

Consultation plays an important role in the planning application process. Indaver has undertaken statutory pre-application consultations with An Bord Pleanála, the planning authority, statutory bodies, interested parties, and the local community regarding its plans for this development. In 2015, following several months of initial discussions with representatives of the community and other individuals, Indaver held three public engagement days for all interested members of the local community. These information days were advertised in the local papers. Indaver also sent out letters to more than 300 individuals who had previously expressed an interest in the project. Indaver has sent a number of additional letters to this group of people, keeping them up to date on the project.

Indaver has engaged with the Environmental Protection Agency (EPA) in pre-application consultations pertaining to the format of the application in the new EDEN portal submission system and the compilation of the EIAR.

Indaver has also notified relevant stakeholders of their intention to submit an application to the EPA for Industrial Emissions Licence. All of the licence application documentation, EIAR and new NIS will be made available on the Ringaskiddy Resource Recovery Centre website http://www.ringaskiddyrrc.ie/ shortly after the application to the EPA has been validated. Project information is also provided in the newspaper notice published on July 5th 2019 and the site notice which was erected on site on the same date.

Information relating to the project is also available on the Department of Housing, Planning and Local Government's EIA Portal (Portal ID number 2019104). The portal can be accessed at https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal.

Indaver's Health and Safety Measures

The following measures, which are based on the experience of the operation of Indaver's plants in Co. Meath and Flanders, Belgium, will be implemented to ensure safety and minimise the risk of emergency situations.

- The plant design will be carried out by skilled people according to internationally recognised standards, design codes, legislation, good practice and experience.
- The design will be reviewed to check for safety hazards.
- Backup systems for pumps, control systems, power supply, monitoring equipment, instruments etc. will be provided for critical situations.
- Fire detection and fire-fighting systems will be installed.

- The design will comply with Irish Building Regulations Part B Fire Safety and Indaver's insurance company's requirements.
- A thorough interlock system will automatically shut down the plant in a safe manner in the event of failure of key equipment.
- The installations will be commissioned according to a schedule that will provide for the testing of safety systems.
- The installations will be inspected by safety officers before start up.
- The installations will be well-maintained and cleaned.

Indaver will apply strict rules on safety such as a Permit to Work system, training of operators and staff, and provision and use of personal protection equipment where appropriate.

Community Gain

The Ringaskiddy Resource Recovery Centre will be an important infrastructural development that reduces Ireland's reliance on the export of waste, and that produces electricity from a valuable indigenous resource. In addition to this, there will be a number of benefits for the local community.

An amenity walkway, incorporating a viewing platform, is proposed as part of the development. The walkway will provide a connection from Gobby Beach towards the Ringaskiddy Martello tower. The upgrade of the local road (L2545) adjacent to the Indaver site to alleviate local flooding issues along the road constitutes a significant planning gain for the benefit of existing and future users of the immediate area.

The proposed development will also include high-quality landscaping, which will contribute to the transition of the Ringaskiddy area from a semi-industrial area, to a more developed cluster of industry, energy and education within a corporate-campus style landscape. The proposed development will be landscaped so as to harmonise with the evolving changes of the nearby NMCI, Beaufort and Haulbowline sites.

In economic terms, the estimated overall value of the project will be in the order of €160 million. The construction workforce is expected to peak at approximately 320. In addition, the project will support a significant number of jobs off-site in construction industry suppliers and services providers. It is estimated that there will be approximately 63 full-time staff employed in the waste-to-energy facility when it is operational. Initially, senior managerial staff will be sourced from experienced Indaver personnel. All other staff will be recruited locally prior to start-up and fully trained in their duties. The employment provided will contribute to the economy of the South Cork area both directly and indirectly through the supply of goods and services.

Finally, the establishment of a community gain fund and community liaison committee is required under the planning conditions of the 2018 An Bord Pleanála Order.

The local community will benefit from the distribution of this fund annually for local projects including new facilities and upgrades to existing facilities.

The existing Indaver facility in Meath contributes to a Community Benefit Fund as part of the planning conditions of that facility. The Meath fund is administered by the Indaver Community Liaison Committee, which was established in 2009 prior

to the main construction works period. The Committee in Meath is made up of two representatives from the local resident's association, two local area councillors, two members of Indaver and two members of the local authority, who also act as administrators of the fund.

In Ringaskiddy, it is estimated that the fund will be approximately €240,000 per year for the life of the facility. So far in Meath, the fund has amounted to over €2,000,000 which has been used to build and light a safe footpath, to finance the construction of a school building, and to support local cultural, community, arts, and sports groups and clubs.

2 Site

The site for the Ringaskiddy Resource Recovery Centre is located approximately 15km to the south-east of Cork City, in the townland of Ringaskiddy on the Ringaskiddy Peninsula in the lower part of Cork Harbour. Refer to **Figures 1** and **2 (Site Location)**. The site covers an area of approximately 13.55 hectares and is situated on a north-facing slope. It is currently covered in scrub with some pockets of trees and open grass areas.

The L2545, the main road from Ringaskiddy village to Haulbowline Island forms the northern boundary of the site. The eastern boundary of the site extends to the foreshore of Cork Harbour along Gobby Beach. The lands to the immediate south and west are in agricultural use. The site surrounds the Hammond Lane Metal Recycling Co. Ltd. facility.

The Hammond Lane Metal Recycling Co Ltd facility processes waste steel. There is also an ESB Networks compound (referred to as ESB Lough Beg substation) located adjacent to the eastern boundary of the Hammond Lane facility. Other neighbouring land uses include the National Maritime College of Ireland (NMCI), the UCC ERI Beaufort Building and some warehouses that are all located across the L2545 to the north of the site. The site is located approximately 800m east of the village of Ringaskiddy. Just beyond the southern boundary, the site is further visually defined by a high voltage electricity line. Refer to **Figure 13**.

The eastern section of the M28 Cork to Ringaskiddy Motorway Scheme is proposed to cross the far western part of the Indaver site. Planning consent was granted for the motorway scheme in July 2018 (PL04.HA0053). A judicial review for the scheme is ongoing.

The Ringaskiddy peninsula is industrial in character. It is home to the Port of Cork, and a number of pharmaceutical companies have large manufacturing facilities in the area. Recent additions to the Ringaskiddy area include four 100m hub-height wind turbines, located on industrial sites. The DePuy wind turbine is located to the south of the Indaver site. A fifth turbine, on the Novartis plant received planning permission in December 2015.

The Cork Harbour area has a number of urban developments, such as Ringaskiddy, Cobh, Rushbrooke and Monkstown, and pockets of industry near the shore. Spike Island is located approximately 500m to the east of the site, with the disused Fort Mitchell prison being situated there. There is an Irish Naval Service base on Haulbowline Island and a crematorium on Rocky Island. Both Haulbowline and Rocky Islands lie to the north of the site. A remediation project on the East Tip of Haulbowline island has been recently completed.

Indaver has previously secured planning permission and an EPA licence for a waste management facility on the site. The history of this particular site suggests that the site is suitable for the treatment of residual household, commercial, industrial, non-hazardous and suitable hazardous waste.

Figure 1: Site Location



Figure 2: Site in Context



3 Main Elements of the Waste-to-Energy Facility

The waste-to-energy facility will have the following elements:

- Main process building, with a stack extending to 75mOD (70m above ground level)
- Turbine hall and aero-condenser structure
- Administration building and security gate house and weighbridges
- Firewater storage tank and pump house
- Surface water attenuation tank and firewater retention tank:
- Light fuel oil storage tank, aqueous ammonia storage tank and unloading area, nitrogen generation and storage
- Aqueous waste storage tank and tanker unloading area
- Electricity substation, compound and grid connection
- Emergency access.

Refer to **Figure 3** and **4** for a plan of the overall proposed site layout and a plan of the waste-to-energy facility.

Figure 3: Proposed Site Layout

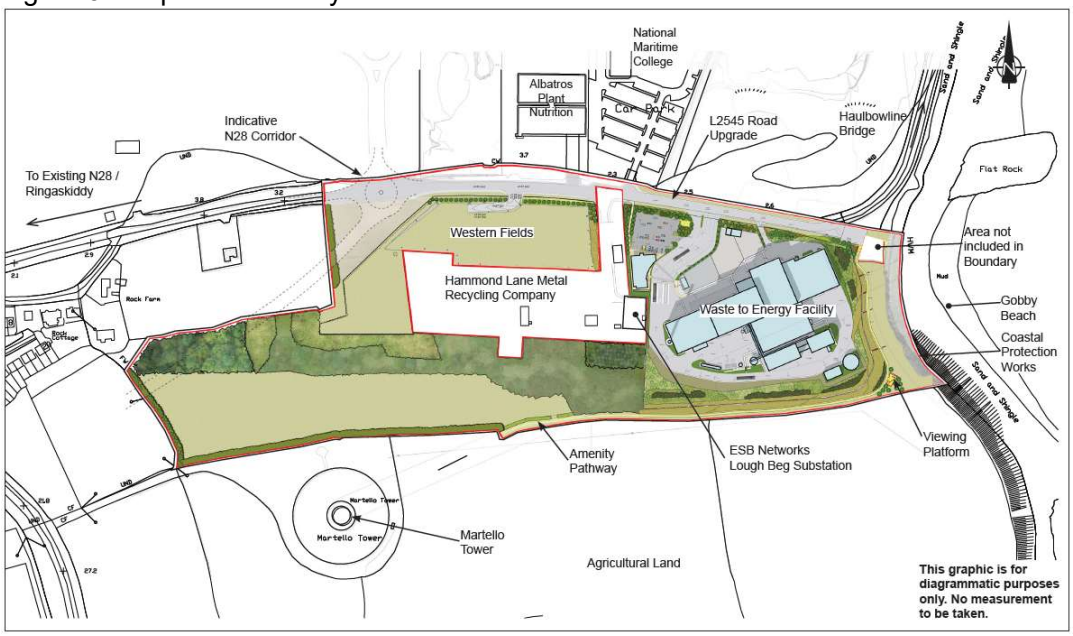


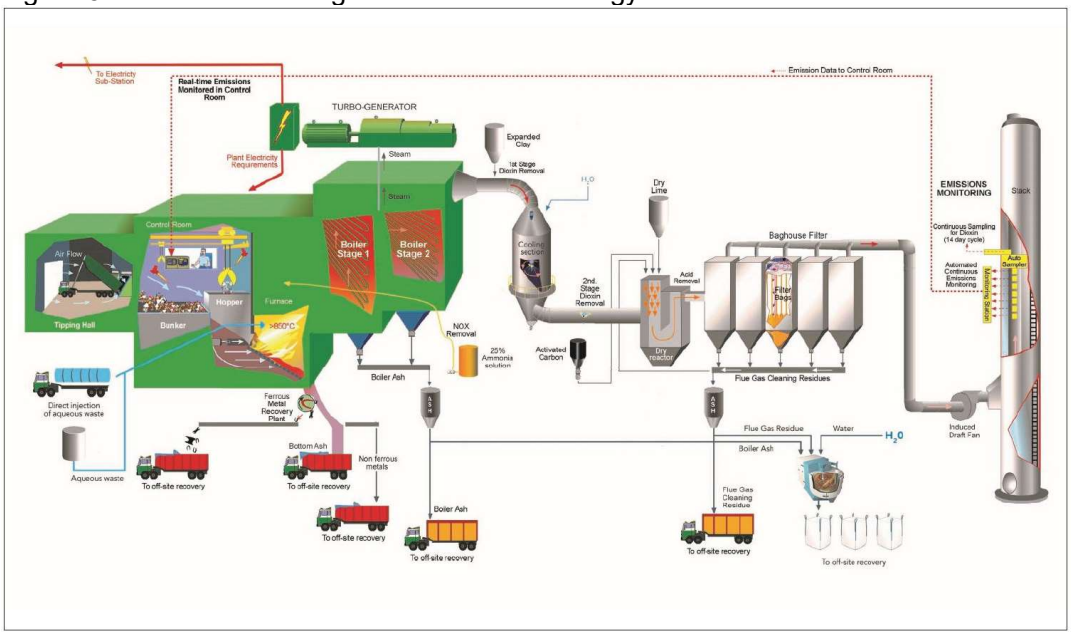
Figure 4: Proposed Site Layout – Main Site



Waste-to-Energy Process

The proposed facility includes the most up-to-date emissions control and flue gas cleaning technology. There are five main elements of the waste-to-energy process: waste acceptance, intake and storage; combustion; energy recovery; emission reduction/flue gas cleaning. Refer to **Refer to Figure 5** for a plan of the process flow for the waste-to-energy process.

Figure 5: Process Flow Diagram of Waste-to-Energy Process



Waste Acceptance, Intake, and Storage

All waste trucks will be weighed when entering and leaving the facility. Drivers will present their documentation, relating to the waste load, to the staff in the security gatehouse. Solid non-hazardous and suitable hazardous waste will arrive at the site in covered trucks.

Following completion of the waste acceptance procedures, the trucks carrying solid waste will proceed via the site road to the enclosed waste tipping hall. Refer to **Figure 6** shows the tipping hall in Indaver's Meath facility as an example. They will enter the supervised tipping hall and will be directed towards discharge chutes. The trucks will discharge the waste into the bunker through chutes in the wall of the tipping hall.

Aqueous wastes will also be accepted which include liquid wastes such as water waste streams with mixed solvents and/or inks, contaminated water from firefighting and clean-up operations, storm water and leachate from landfill sites etc. Solvents in this context are solvent streams with a high water content. Aqueous wastes will be delivered by road tanker and will be sampled and analysed prior to offloading. This sampling may be done before or after arrival on site. Key parameters will be analysed to ensure conformity with the specified waste acceptance criteria and with the parameters agreed with customers. In the event that the specification for the aqueous waste load is not met, the waste will not be accepted and arrangements will be made for the dispatch of the road tanker to the most suitable facility either in Ireland or abroad. If the aqueous waste load meets the acceptance criteria, the waste will be offloaded either into the aqueous waste storage tank or, directly, by injection to the furnace.

To prevent the emission of odours, the tipping hall will be maintained under negative pressure, i.e. air will be drawn in through any openings rather than escaping out. Air for combustion will be drawn from the tipping hall through the waste bunker. As the tipping hall will be an enclosed area, windborne litter will not be generated.

The waste bunker will be of sufficient capacity to allow the facility to accept waste during periods when the furnace is undergoing maintenance, and to continue operating over prolonged periods, such as long weekends, without deliveries.

Figure 6: Meath Tipping Hall



Combustion

A moving grate furnace is proposed for the facility. Grate furnaces are used to treat a wide variety of waste streams and are a well-recognised, robust and established technology for these purposes. The moving grate furnace is considered to be a 'Best Available Technique' for the treatment of the types of waste proposed. Refer to **Figure 5** for a plan of the process flow for the waste-to-energy process.

The moving grate furnace operates in a similar fashion to an escalator, pushing waste slowly from the top of the furnace to the bottom to ensure complete combustion. The rate at which the waste will travel through the furnace will be controlled to optimise the combustion. The waste will be in the furnace for approximately one hour. In the furnace, the organic material contained in the municipal solid waste is typically broken down into hydrogen, carbon monoxide, methane and ethane. These gases and vapours will ignite immediately, as the temperature in the furnace will be within the range of 850˚C and 1,000˚C. These temperatures ensure destruction of organics and other flue gas components.

The final section of the grate will be the burnout section where the ash, the solid residue, will be held for long enough to ensure sufficient burnout. The grate will discharge the resultant bottom ash into a water bath/wet de-slaggers, and then via a conveyor to the ash hall.

The inputs to the moving grate furnace will be mixed solid wastes, aqueous waste, combustion air, and light fuel. The outputs will be hot flue gases (combustion gases) and bottom ash.

Energy Recovery

The hot flue gases from the moving grate furnace will be directed through a steam boiler. In the boiler, heat will be transferred from the hot flue gases in the boiler to water to generate steam. The steam from the boiler will drive a turbine, which will drive an electricity generator. Approximately 21MW of electricity will be generated, of which approximately 18.5MW will be exported to the national electricity grid. The inputs into the boiler will be hot flue gases and boiler feed water. The outputs will be cooler flue gases, boiler ash and superheated steam.

Emission Reduction

The facility will be designed to minimise the formation of dioxins and furans (the term 'dioxin' is taken to include dioxins and furans) in the furnace by maintaining the flue gases at a high temperature of over 850˚C for over 2 seconds. In order to minimise the reformation of dioxins in the boiler, it has been designed to include automatic controlled cleaning and rapid cooling. Oxides of nitrogen will be controlled through combustion and through the injection of ammonia solution or urea. The flue gas cleaning equipment, described below, will further reduce dioxin concentrations in the flue gas to well below the EU emission limits.

Flue Gas Cleaning

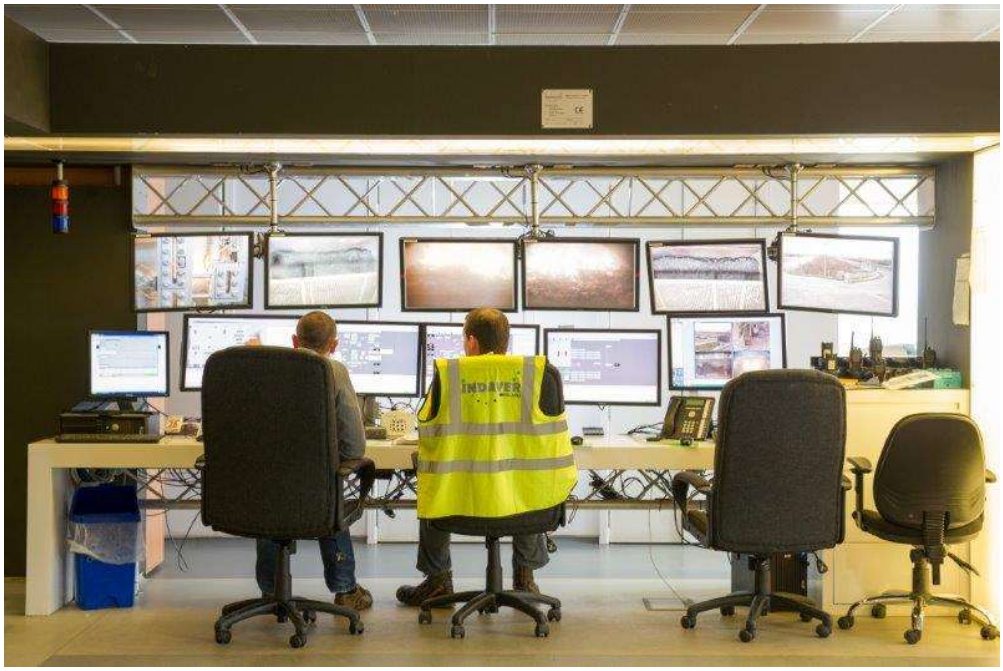
The flue gas cleaning equipment will reduce dioxin concentrations in the flue gas to levels well below the limits set in the EU Industrial Emissions Directive 2010/75/EC. Typical dioxin emissions from a facility with this equipment are one tenth of the concentration limit in the EU Industrial Emissions Directive.

A fixed amount of activated carbon or a carbon/clay mixture will be injected into the flue gases in the cooling stage and also into the flue gas either in the dry reactor or just after it. Activated carbon consists of small, porous carbon particles, which due to their porosity have a large surface area. Dioxins, furans, other trace organic compounds and heavy metals in the flue gases will be adsorbed onto the activated carbon particles. Lime will also be injected into the flue gases in the dry reactor for the removal of acid gases. The flue gases will then pass through a baghouse filter which will remove the dust, salts and the carbon particles from the gases. The dust cake forming in the baghouse filter will be removed and collected in hoppers located below it.

The flue gases will then be discharged through the stack, the top of which will be at a level of 75mOD. The stack emissions will be monitored as required by the EU Industrial Emissions Directive and in compliance with industrial emission licence. Refer to **Figure 5**.

The inputs from this stage of the process will be the activated carbon/clay/lime. The outputs will be flue gases and flue gas cleaning residues. **Figure 7** shows the control room at Indaver's Meath facility as an example from which all aspects of the waste-to-energy process are overseen.

Figure7: Meath Control Room



Process Inputs

The average consumption of water in the proposed facility will be 5.4 cubic metres per hour. Circa 400 tonnes of light fuel oil will be used per annum to raise the temperature of the furnace at start up and to maintain the temperature as required. Other materials will include sodium hydroxide, hydrogen chloride, ammonium hydroxide, sodium phosphate, lime, activated carbon and clay and urea/ammonia.

Process Outputs: Solid Residues

There will be three solid residues from the waste-to-energy facility in Ringaskiddy: bottom ash, boiler ash, and flue gas cleaning residues. The category ‘flue gas cleaning residues’ includes filter ash from the baghouse filters.

The Indaver Meath Waste-to-Energy Facility is in operation and treats wastes similar to those proposed for the Ringaskiddy facility, in other words, residual household, commercial, industrial, non-hazardous and suitable hazardous waste. It is expected that the bottom ash, boiler ash and flue gas cleaning residues from the Ringaskiddy facility will be similar in composition to the bottom ash, boiler ash and flue gas cleaning residues from the Meath facility.

Circa 52,700 tonnes per annum of bottom ash will be produced in the facility. The bottom ash will be recovered or disposed to landfill, sent to another EU member state for treatment and subsequent recovery, or if appropriate facilities are developed, will be recycled following treatment in Ireland.

Circa 2,000 tonnes per annum of boiler ash and circa 9,100 tonnes per annum of flue gas cleaning residues will be produced in the facility. The boiler ash and flue gas cleaning residues will be in the form of fine particles and will contain heavy metals. The boiler ash and flue gas cleaning residues will be suitable, after solidification, for use to backfill the void space in an underground salt mine, which

can receive a recovery code, or in a hazardous waste landfill.

There is one saltmine in Northern Ireland accepting boiler ash and flue gas cleaning residues for recovery and backfilling of the mine. The boiler ash and flue gas cleaning residues from Indaver's Meath facility are currently shipped to both this saltmine in Northern Ireland and to underground salt mines in Germany. It is proposed that, depending on the availability of outlets, the boiler ash and flue gas cleaning residues from the proposed Ringaskiddy facility will also be shipped to both facilities.

An annual average of 2,400 tonnes of ferrous metals, such as steel and 240 tonnes of non-ferrous metals will be recovered from the bottom ash for recycling.

4 Secondary Elements of the Proposed Development

L2545 Road Upgrade

In order to improve surface water drainage and alleviate local flooding issues, Indaver proposes to upgrade a section of the L2545 local road, which is the road that forms the northern boundary of the site. The proposed works will consist of raising the level of a 185m length of the road between the public car park at Gobby Beach and the eastern end of the Hammond Lane Metal Company premises. In addition, the surface water drainage beneath the L2545 along the entire northern boundary of the Indaver site will be upgraded. All of the above works will be within Indaver's ownership, apart from a small area in Hammond Lane's ownership. Consent has been given by Hammond Lane to undertake these works.

Increase in Levels on the Indaver Site

The ground levels of the Indaver site vary considerably in both the north-south and the east-west directions. There is a risk of pluvial flooding along the northern boundary with the L2545.

The levels of the low-lying parts of the site will be raised to 4.55m above Ordnance Datum in order to create a very high standard of flood protection to the site. The minimum site flood defence level was calculated at 4.28m above Ordnance Datum. This level allows for the 1 in 200 year tidal level, 1.05m for sea level rise due to climate change in accordance with the Office of Public Works Guidance, plus 0.5m freeboard (extra allowance for waves because the site is near the sea). The 4.55m flood defence level is the same as that adopted by a number of recent developments close to the site in Ringaskiddy including the Beaufort Research Laboratory.

Coastal Protection Measures

The coastline along the eastern boundary of the Indaver site consists of a glacial till face adjoining Gobby Beach. Glacial till is a mix of gravel, sand, silt and clay which has been deposited by the action of glaciers. The glacial till face is very shallow near the public carpark to the north and steepens to the south. In response to the issues raised by the Board during its consideration of the 2008 planning application, a coastal study was carried out by Arup in order to better understand the coastal processes in the vicinity of the site, the rate of erosion of the glacial till face and the specific coastal protection measures required.

As part of the study, conservative assumptions were used to predict the rate of erosion on the eastern boundary of the site in order to assess whether the proposed development could be impacted over the duration of the planning permission. The study found that after 40 years, there could be a risk of an effect on the amenity walkway and viewing platform and a small section of a diverted gas pipeline outside of the security fence line. However, even allowing for the conservative assumptions used to predict the rate of erosion, the waste-to-energy facility itself will not be impacted by coastal erosion after 40 years.

The study also found that the proposed development will not increase the current

rate of erosion of the glacial till face.

Coastal protection mitigation measures are not required for the waste-to-energy facility element of the development. However, given the concerns raised by An Bord Pleanála in 2008/2009 and given the low risk that the amenity walkway and viewing platform and a section of the diverted gas pipeline could be impacted in 40 years' time, coastal protection measures to reduce the rate of erosion were included in the planning application as a precautionary measure. The measures proposed have been included as Planning Condition 12 by the decision of An Bord Pleanála in May 2018.

The coastal protection measures will consist of the placement of 1,100m^3 of shingle (rounded pebbles) above the foreshore (high tide line) on Gobby Beach along the eastern boundary of the Indaver site. Refer to **Figure 8** which is a photomontage of Gobby Beach with the shingle in place. The shingle will slow the natural erosion rate over a number of years. Both the shingle and the glacial till face will be monitored and the shingle will be replenished as required.

The proposed coastal protection measures are a soft solution and will not have a negative effect on the coastline in the vicinity of the site. Any shingle moved by the action of the waves is likely to move towards the north in the medium and long term. This means that the shingle will not effect on the Cork Harbour Special Protection Area located 500m to the south of the beach at the Indaver site boundary.

Figure 8: View from Gobby Beach Strand towards Golden Rock



Public Amenity Footpath

A public amenity footpath and viewing platform, located outside the facility's security fence, will be provided along part of the southern and eastern site boundaries to allow public access between the Martello tower and Gobby Beach car park. Refer to **Figure 9** for an illustration of the amenity footpath and viewing platform.

Figure 9: Footpath and Viewing Platform



Grid Connection

The proposed resource recovery facility will be connected to the national grid via underground cables to the 38kV substation (Lough Beg substation), which is located on the eastern side of the Hammond Lane Metal Recycling Company Ltd., adjacent to the Indaver site. The lands over which the entire grid connection will be constructed lie within Indaver's ownership (save for a small section comprising associated works on the adjacent Loughbeg substation owned by ESB Networks). These works will be carried out by ESB Networks.

Diversion of Services

L2545 Local Road

A number of underground services are located in the L2545 road, including a water main, high voltage electricity cables, a gas transmission main, and public lighting and telecommunications cables. An overhead electricity line crosses the road. Some of these services will be diverted as part of the road upgrade works. All of the services providers have been consulted in relation to the proposed diversions.

Gas Main

An existing underground gas transmission main is located within the site. The gas main is not supplying gas to any customers currently. Due to the nature of the proposed works, the gas main will need to be diverted within the site. Gas Networks Ireland has been consulted in relation to the proposed diversion and has agreed the indicative diversion route along the eastern boundary of the site.

Overhead Power Lines

There are a number of overhead power lines traversing the site. Due to the nature of the proposed works, one overhead 10kV power line will need to be diverted underground within the site. ESB Networks has been consulted in relation to the proposed diversion and has agreed the indicative underground diversion through the centre of the site.

5 Additional Information About the Proposed Development

Provision for Decommissioning

The facility is expected to have a design life of 25 to 30 years, but this could be extended by maintenance, equipment replacement and upgrades. Planning permission would also be required to extend beyond a 30-year operational life. As part of the application for an industrial emissions licence for the facility, a closure restoration and aftercare management plan (CRAMP), including a detailed decommissioning plan, has been submitted to the EPA for their approval. It is also a requirement of the planning permission granted by An Bord Pleanála in May 2018 (Ref. 04.PA0045, Condition 23) that following the decommissioning of the facility, the restoration and re-instatement of the entire site be provided for in the form of a financial security in favour of the planning authority. The decommissioning operation will not have a significant effect on the environment.

Regulatory Control

In order to operate the proposed facility Indaver will require an Industrial Emissions (IE) licence. This is a licence, under EU Directive 2010/75/EU on industrial emissions, granted by the Environmental Protection Agency. The primary purpose of this EIAR is to support the IE licence application.

Implementation of Best Available Techniques

A requirement of the EU Directive 2010/75/EU on industrial emissions is that Best Available Techniques are used in the operation of a licensed facility, and so these have been included in the design of the proposed Ringaskiddy Resource Recovery Centre and will be applied in its ongoing operation, management and control.

6 Planning and Policy Framework and Need for the Scheme

The proposed development is both plan-led and a response to existing waste, energy, and climate-change policies and plans at all levels: European, national and regional. These policies and plans demonstrate the need for this scheme.

Waste Policy

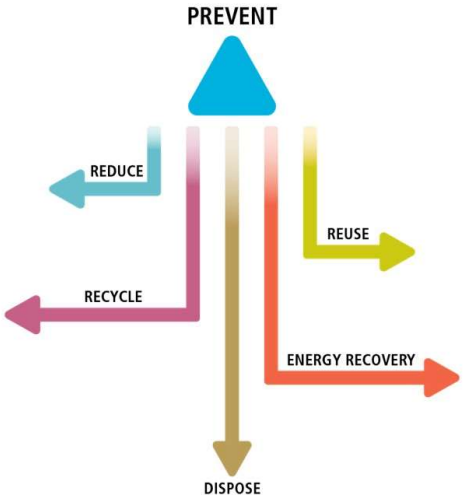
As regards waste policy, the proposed development is a response to the European, national and regional objective requiring waste to be managed in an economic, sustainable, and environmentally appropriate manner. According to the EU waste hierarchy, waste should be managed as a resource and disposal should be a last resort. Thus, EU and national waste policies support the recovery of energy from residual waste and clearly establish a need for thermal recovery capacity, such as incineration with energy recovery.

Furthermore, waste-to-energy supports high-quality recycling by treating polluted and complex waste, thereby keeping harmful substances out of the circular economy. Waste-to-energy can also contribute to recycling through the extraction of ferrous and non-ferrous metals.

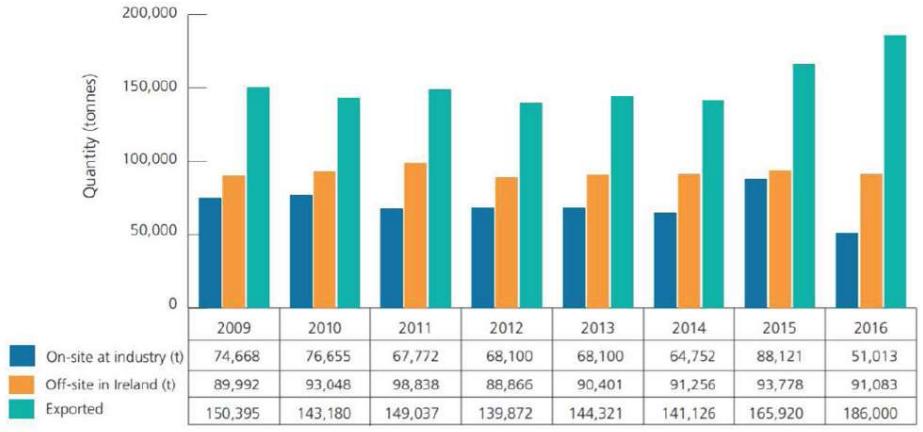
Ireland's Regional Waste Plans identify a need for 300,000 tonnes capacity for thermal recovery of residual municipal waste as well as 50,000 tonnes capacity for thermal recovery of hazardous waste and an additional but unspecified capacity for thermal recovery of industrial waste. There is currently a lack of suitable recovery capacity within the Southern Region, and as a result a large quantity of residual municipal solid waste (MSW) is being exported for recovery in similar facilities in continental Europe. The proposed development will help Ireland work towards the objective of self-sufficiency in waste management while observing the principal of proximity that underpins European and national waste policies.

The EPA's National Hazardous Waste Management Plan 2014-2020 anticipates that the private sector will develop technically and economically feasible treatment options, including thermal treatment. Similarly, the Southern Region Waste Management Plan 2015-2021 notes that the required infrastructure will not be delivered by the Local Authorities as the investment is anticipated from the private sector. Indaver's proposal for a combined approach to the management of residual MSW, industrial waste and suitable hazardous waste will contribute significantly to the attainment of national and regional objectives, and, by extension, to those at a European level. Refer to **Figure 10** for an illustration of the waste hierarchy and the amount of hazardous waste exported between 2009 and 2012.

Figure 10: Waste Hierarchy and Hazardous Waste Treatment in Ireland 2009 – 2016



Source: EPA (2016) Ireland's Environment 2016 – An Assessment



	2009	2010	2011	2012	2013	2014	2015	2016
On-site at industry (t)	74,668	76,655	67,772	68,100	68,100	64,752	88,121	51,013
Off-site in Ireland (t)	89,992	93,048	98,838	88,866	90,401	91,256	93,778	91,083
Exported	150,395	143,180	149,037	139,872	144,321	141,126	165,920	186,000

Figure 2.2a trend data for hazardous waste treated on-site, off-site within Ireland and exported outside of Ireland.

Source: EPA (2018) Progress Report on the Implementation of the National Hazardous Waste Management Plan 2014-2020.

Export for Energy Recovery

An emerging trend in Ireland at present is the export of residual municipal waste for recovery in waste-to-energy facilities in other member states of the EU. However, relying on export outlets for residual waste treatment represents a loss in revenue to the economy and a loss in the valuable energy resource in the waste.

The Ringaskiddy Resource Recovery Centre will reduce the need for this export. There are environmental advantages associated with the development of badly needed waste management infrastructure in Ireland, and the proposed development will help Ireland and the Southern Region to follow the proximity principal. The proposed development will make Ireland more self-sufficient in line with European, national, and regional policy objectives and therefore less exposed to the vagaries of the export market.

Energy and Climate Change Policy

The proposed development will contribute towards the attainment of European and national energy and climate change policy objectives. The policy objectives include the generation from renewable resources of an increasing portion of the EU's and Ireland's energy. Further, to ensure security of supply, energy should be generated from diverse and indigenous sources.

The facility will generate electricity for export to the national grid from an indigenous energy resource. It will thus contribute both to energy security and to the competitiveness of energy supply. A portion of the energy generated is considered to be renewable, as a portion of the residual waste is biodegradable. The proposed development will help to reduce greenhouse gas emissions from waste management by diverting biodegradable waste away from landfill and recovering renewable energy from it.

In addition, the provision of treatment capacity in the Munster region will reduce the export of residual waste for recovery thus reducing carbon emissions from transport of waste. Thus, the recovery of energy from residual, biodegradable waste will help Ireland to meet its renewable energy targets.

Planning

From a national and regional planning point of view, the proposed development is a strategic large-scale waste-treatment facility addressing an identified need for non-hazardous and hazardous waste-treatment capacity. However, it has been sized to ensure it does not exceed the identified capacity requirements. The proposed development is premised on the thermal treatment of waste with energy recovery, which is the preferred option for dealing with residual waste after waste prevention, recycling and recovery. Finally, the facility will provide balanced regional development and effective waste management structures.

The Ringaskiddy Resource Recovery Centre is proposed for an appropriately zoned area designated in the Cork County Development Plan 2014 – 2020 as an Industrial Area that is a Strategic Employment Area where large scale waste treatment facilities are considered. Refer to **Figure 11** for a map of the industrial zoned lands in Ringaskiddy. Although the Ballincollig Carrigaline Municipal District Local Area Plan 2017 rezoned the principal part of the proposed development site, An Bord Pleanála had regard to both plans in its decision to grant planning permission in May 2018.

In addition, the proposed facility will support both sustainable development and the transition to a low carbon economy through the treatment of waste by an accepted means, proximate to source, and will generate energy for supply to the national grid. It will also support the protection and enhancement of environmental quality, without impacting on designated sites, and will improve local road and amenity infrastructure in the vicinity of the site.

The proposed development has been designed to integrate within its landscape without significant effect on the character of views and prospects from scenic routes, and without significant effect on Cork Harbour's cultural heritage. The proposed development is compatible with other Harbour activities, as well as with the nature conservation values of the Cork Harbour Special Protection Area and the Great Island Channel Special Area of Conservation.

The proposed development will enhance the provision of tourist facilities in the

area by the amenity walkway including viewing point. The views from Martello tower to Fort Mitchell on Spike Island will not be impacted by the proposed development. The dedicated viewing point will enable tourists to appreciate the natural, built and cultural heritage of Cork Harbour.

Consistent with the policy provisions for this location in a High Value Landscape, as designated in the County Development Plan, the proposed development has been carefully designed and located such that will not be visually obtrusive either in the context of the wider Cork Harbour area or relative to adjoining developments, including the wind turbines. The layout of the proposed development has been informed by the corporate campus style character of the immediate area, while also reflecting Ringaskiddy's strategic industrial role. Refer to **Figures 8** and **12** to **17.**

Figure 11: Zoning

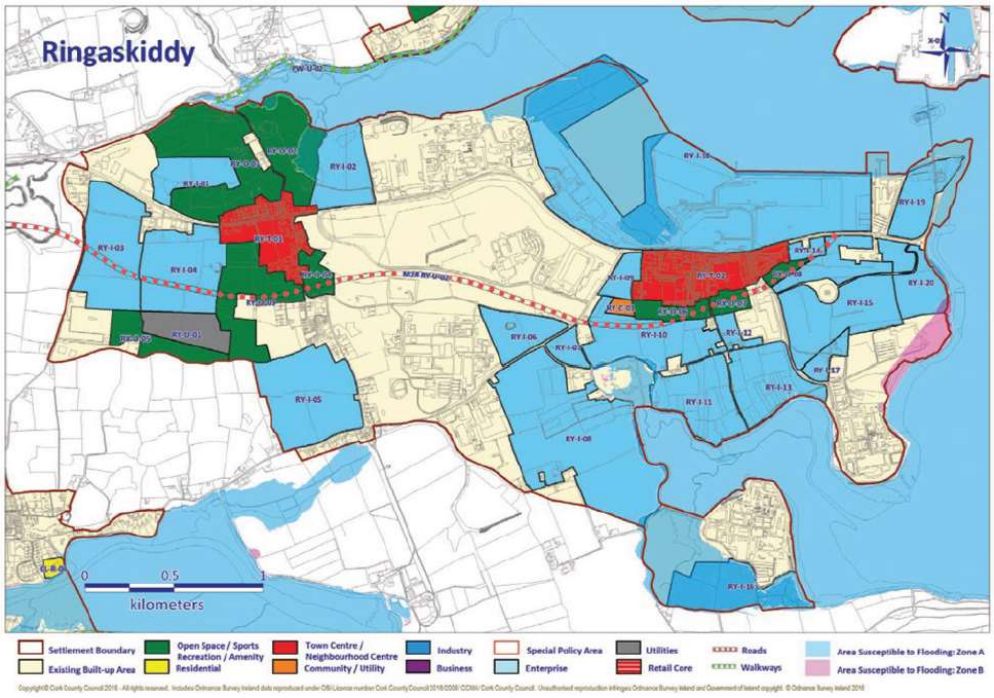


Figure12: View from Ringskiddy



Figure 13: View from Haulbowline close to Rocky Road



Figure 14: View from Cobh Harbour (cumulative)



Figure 15: View from Cobh St Coleman's Cathedral at night (cumulative)



Figure 16: View from Cobh – Scenic Route S53

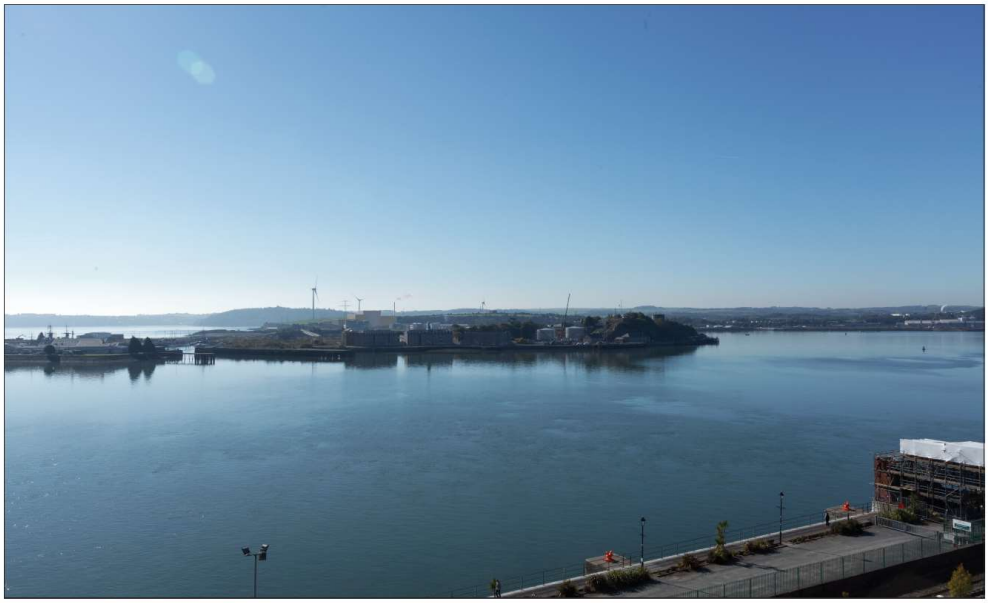


Figure 17: View from Cobh – Scenic Route S51 – Cumulative Effect



7 Alternatives

The reasonable alternatives studied by Indaver, which are relevant to the Ringaskiddy Resource Recovery Centre proposal and its specific characteristics are provided including an indication of the main reasons for the option chosen, including a comparison of effects.

A site selection study was carried out during 1999-2000. This study identified that Ringaskiddy was the most suitable location for the proposed development. Individual sites were then identified and assessed in accordance with a set of environmental factors and based on the outcome of this assessment and the sites available at that time in Ringaskiddy, the proposed site was subsequently purchased by Indaver in November 2000.

In 2015, the suitability of the Indaver owned site in Ringaskiddy for the development of a waste to energy facility was assessed. Indaver was aware at the time that changes may have occurred on the site or in its general vicinity. Further, Indaver was aware that the generally accepted technical requirements for a site for such a facility may also have changed. Consequently in 2015, Indaver commissioned Arup to undertake a technical review of the site and surroundings. Coakley O'Neill were commissioned to undertake an evaluation of the Indaver owned site in Ringaskiddy site with respect to planning policies at that time also. The conclusion of the 2015 site suitability assessment was that the Indaver owned site was still suitable for the development of a waste to energy facility.

In 2019, a further assessment of reasonable alternative locations for the project was carried out at both a National and Regional level. This assessment identified that the Southern Waste Region was the most appropriate location for such a facility (due to the waste infrastructure deficit) and that within the Region, Cork County was the most suitable (due to the scale of the population). Consequently, a planning review of appropriately zoned sites in Cork City and County was carried out. Coakley O'Neill were commissioned to conduct the planning review of six possible areas;

1. Carrigtwohill
2. Kilbarry
3. Little Island
4. Ringaskiddy
5. Whitegate
6. Bottlehill.

The planning report concluded that the only areas where there may be suitable sites from a planning perspective were in Little Island and Ringaskiddy.

In parallel, a further expert (Fichtner) was consulted with a view to assessing the areas from a heat feasibility perspective as to their suitability for the development of a district heating/heat network system in conjunction with the proposed development. The conclusion of this assessment was that Ringaskiddy was the most suitable based on the concentration of large heat loads within a relatively short distance of the plant.

The 2019 evaluation process has identified that there are no "reasonable

alternative" locations outside of Ringaskiddy. There may be other sites in Ringaskiddy which meet the basic site selection criteria for a waste to energy facility such as site size, zoning etc but none of these sites could be considered as "reasonable alternatives" to the chosen site given that Indaver own this site and given that planning permission has been secured. It is therefore not reasonable for Indaver to consider any other site in Ringaskiddy at this stage in 2019.

Waste Management Options and Technologies

When examining the types of technology that would be most appropriate for the waste-to-energy facility, Indaver considered the characteristics of the Irish waste market.

Current policy has identified a need for residual municipal solid waste thermal recovery and also for the need for thermal recovery for hazardous waste. While a standalone incinerator for residual municipal solid waste is possible, the Southern Region Waste Management Plan identified the additional need for the thermal treatment of 50,000 tonnes per annum of hazardous waste. A facility treating only 50,000 tonnes per annum of hazardous waste is not economically feasible.

The waste streams considered for this project include household, commercial, industrial, non-hazardous and suitable hazardous waste. From the experience of operating the Meath Waste-to-Energy Facility, Indaver can demonstrate that a moving grate incinerator is both robust and flexible and can treat the heterogeneous waste streams that characterise the Irish market.

Alternative Thermal Treatment Technologies

The following alternative thermal treatment technologies were considered as they are in accordance with the requirements of EU Industrial Emissions Directive:

- pyrolysis and gasification
- rotary kiln and fluidised bed system.

The Irish market for waste disposal is relatively small by international standards and is also varied in its composition. Because of this, the design of the waste-to-energy facility and the technology must be robust and flexible enough to adapt to changing waste streams and market conditions.

There are very few examples of large-scale, proven technologies appropriate for this small, heterogeneous waste market. Pyrolysis and gasification are not suitable because of the wide range of waste streams that the facility will have to handle, the requirement for the technology to be robust, and the requirement for energy recovery at the facility.

Indaver NV operates a rotary kiln incinerator at its facility in Antwerp, but the relatively high capital and operating cost of a rotary kiln incinerator and the kiln size limit of about 60,000 tonnes/annum means that a larger capacity unit than is called for in Cork is required for a rotary kiln to be economically viable. An additional issue is that rotary kilns are not suitable for the treatment of sludge-like wastes or municipal solid wastes if no other types of waste are added.

Fluidised bed systems, on the other hand, work best when processing uniform feedstocks such as peat or sewage sludge. This means that other wastes must be mechanically pre-treated in order to make the feedstock uniform, which is a significant capital investment. Given the diversity of the waste streams in the

Southern Region, the additional financial investment in mechanical pre-treatment is not justifiable, as only a small proportion of the total waste feed will be sludge.

Grate technology is therefore the most appropriate furnace type, because grate furnaces treat residual waste safely and efficiently, and are flexible enough to handle a wide range of waste types, and thus responding to future changes in market conditions and waste streams. This technology has proven successful in the Meath Waste-to-Energy Facility that has been in operation since 2011.The Ringaskiddy Resource Recovery Centre will use Best Available Technology, will be economically viable, and will be in line with policy and planning. The grate furnace is robust and flexible enough to handle the diverse streams of household, commercial, industrial, non-hazardous and suitable hazardous waste that are characteristic of the Irish market.

Indaver considered various technology options for energy recovery and flue gas cleaning and the chosen options are BAT.

Various site layout and configurations were considered before the option, which is the subject of this application, was chosen. Similarly, different architectural treatments and colours of main process building were considered, different coastal protection methods were considered and different options for addressing the flooding of the local road were considered before the options, which are the subject of this application, were chosen.

8 Construction Activities

This section summarises the construction activities and sequencing for the proposed Ringaskiddy Resource Recovery Centre and outlines the mitigation measures which will be implemented to ensure the potential effects of the construction activities on the environment are avoided, prevented or reduced.

It is anticipated that, with the proper implementation and management of the construction activities described in the EIAR (and in particular the Construction Environmental Management Plan (CEMP)) the construction phase of the development will have no significant or long-term effect.

The schedule for the construction and commissioning of the facility is approximately 31 months. The road upgrade will be undertaken first and will take circa 8 to 12 weeks to complete. This will be followed by the earthworks, which will take circa 13 weeks to complete. After that, the construction of the main element, the waste-to-energy facility, will begin. The placement of the shingle above the foreshore line will take approximately three weeks to complete and will likely be undertaken towards the end of the construction phase.

A maximum of 320 construction workers will be employed on site at any one time with around 250 workers working a daytime shift and 70 working a night shift. Temporary office accommodation, welfare facilities, and laydown areas will be established in the western field for the construction phase.

The site start time will ensure that construction workers arrive in the Ringaskiddy area prior to the morning peak hour for traffic on the local network. No construction vehicles will arrive or depart the proposed development site during the morning and evening peak periods (07:00-09:00 and 16:00-18:00) during the construction phase.

Typical working hours during the construction phase will be:

Start	Finish	
0600	2000	Monday – Friday
0700	1300	Saturday

It will be necessary to work overtime (including at weekends) and night shifts at certain critical stages during the project. Consideration of safety, weather or sub-contractor availability is likely to necessitate working outside normal hours. Over the 31 month construction phase there will be up to 8 weeks of night time working. Heavy or noisy construction activities will be avoided outside normal hours and the amount of work outside normal hours will be strictly controlled.

Construction Methods

Construction methods will be typical for a large industrial project. The proposed development will be constructed employing best practice in safety and efficiency.

The construction of the proposed development will require movement of materials to and from the site. All traffic movements associated with the import and export of materials have been included in the construction traffic impact assessment. It is envisaged that various crane systems will be used for lifting materials in to place.

Following the completion of construction and installation of equipment, and prior

to commencement of operation, there will be a testing and commissioning phase. This phase will comprise of installation compliance checks, commissioning tests, and performance demonstration tests.

Prior to commencement of normal operations, it is also likely that the industrial emissions licence will require a test programme to demonstrate performance, followed by the submission of a report to the EPA.

Potential Effects and Mitigation

Indaver will appoint a construction management team for the duration of the construction phase. The team will supervise the construction of the project and will monitor the performance of the contractors to ensure that the proposed construction phase mitigation measures are implemented and that construction effects and nuisance are minimised. Indaver will liaise with neighbours and the general community during the construction phase to ensure that any disturbance is kept to a minimum.

Environmental management of the site will specify measures to ensure that all works on site will be carried out in such a manner as to minimise adverse environmental effects and prevent nuisance.

It is anticipated that with the proper construction management, the construction of the proposed development will not give rise to any significant negative residual effects.

9 Population and Human Health

This section of the non-technical summary considers issues such as health and safety, social consideration, land-use, zoning and economic activity.

Human Health

A Hazard Identification and Risk Assessment study was carried out and determined that the proposed development will not be a major accident establishment and that the Seveso III Directive and Regulations will not apply to the proposed development. Notwithstanding this, a number of accident scenarios in the operation of the facility were assessed in the study to determine the risk each posed to human health and the environment. No priority risks were identified and just one substantial risk (namely a fire in the bunker) was identified. The study concluded that, with the control measures in place, the risks posed to human health and the environment by the facility will be as low as reasonably practical.

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

A soil dioxin and dibenzofuran monitoring programme was conducted in 2001 and repeated in 2008 and in 2015. The soil dioxin and dibenzofuran levels were found to be low by European standards.

A dioxin intake model was prepared. The model predicts the amount of dioxins taken in by a theoretical maximum at risk individual. This individual is assumed to live at the point of maximum dioxin and furan deposition from the proposed facility, and to be a subsistence farmer, who obtains all his/her meat, milk and vegetables from a 100m diameter site, upon which the maximum deposition flux effects. The intake of the theoretical maximum at risk individual is compared with the tolerable weekly intake, defined by the EU in order to protect human health. The model predicted that the intake by the theoretical maximum at risk individual would be considerably less that the EU tolerable weekly intake. The assessment concluded that the proposed development will not result in a significant intake of dioxin and furan even by the theoretical maximum at risk individual, and no effect on human health is likely.

The proposed mitigation measures will either avoid, prevent or reduce effects to human beings during the construction and operation phases of the proposed development.

From health protection terms, strong evidence is that there will be no deleterious effects. Mainly as a result of a misunderstanding of the health effects of modern well-run incinerators it is acknowledged that some public anxiety might remain, but this will be mitigated by an education program and no long-term adverse health effects are predicted.

The potential economic benefits both direct from employment in the facility itself and indirect from positive effects on other sources of employment has potential to give positive health effects.

Ringaskiddy Area Land Use and Future Trends

The Ringaskiddy area has experienced industrial and port development since the 1970s. In the general area there are several large pharmaceutical manufacturing plants as well as other industries and the Port of Cork. The land in the Ringaskiddy area not occupied by industrial plants or port related businesses is used for farming. The land is mainly in pasture with some tillage.

Past trends and the policies of the Cork County Development Plan 2014 – 2020 suggest that industrial and port development will continue in Ringaskiddy. Residential development in Ringaskiddy and Shanbally villages will be confined to that which is required to meet local needs. Residential and other development will continue around the Lower Harbour, apart from in the areas zoned for protection. Ringaskiddy is expected to continue as an important tourist transit port. One consequence of this general development will be an intensification of industrial and port activity adjacent to Ringaskiddy village, and in the Lower Harbour.

The proposed development is located in an industrial area designated as a Strategic Employment Area, in which large scale waste facilities will be considered. As the site of the proposed facility is zoned industrial, it is probable that it would be developed for pharmaceutical or chemical manufacturing, or port use, if the proposed development does not proceed. The site is currently undeveloped.

Cork Harbour is used for commercial fishing, aquaculture and recreational boating. There are a number of recreational and tourist amenities in the Harbour area.

Heritage and Amenity

Ringaskiddy is not currently a popular tourist destination but it is a tourist transit port, with a weekly ferry to France (Roscoff) and Spain (Santander) from March to November. Cruise ships occasionally dock at Ringaskiddy during the summer months, when the cruise ship berth at Cobh is occupied. Strategic plans are being prepared to develop the Lower Harbour area as a more significant tourism and recreational attraction.

There are a number of amenities in the immediate local area, namely Gobby Beach, which is used for walking and shore fishing, and pedestrian links to the Martello tower, one of which goes through the proposed site although there is no public right of way. Haulbowline Island is an East Cork Bird Trail Hotspot. There is extensive use of Cork Harbour, mainly the Lower Harbour, for sea angling, boating, leisure and recreational activities. There are also a number of local sports clubs in Ringaskiddy and Shanbally.

There may be some minor temporary disruption to local residents due to traffic, dust and noise during the construction phase. It is anticipated that with the proper construction management, the construction of the proposed development will not give rise to any significant negative residual effects on residential or recreational amenities.

The operation of the proposed development, while not encroaching on the shoreline or the L2545 road, will have an amenity effect due to increased traffic noise, the industrial ambience, and a visual effect. This effect will not, however, be significant.

The development will not have a significant effect on tourism associated with the ferry port or cruise ship traffic during either the construction or operational phases.

An amenity walkway, incorporating a viewing platform, is proposed as part of the development. The walkway will provide a connection from Gobby Beach towards the Ringaskiddy Martello tower. The walkway and the upgrade of the local road adjacent to the Indaver both constitute a planning gain for the benefit of existing and future users of the immediate area.

Refer to **Figures 8** and **12** to **17** of views of the proposed development.

10 Roads and Traffic

This section details the results of the assessment of the projected effect of the traffic generated by the proposed development during both construction and operational phases.

It is clear from the extensive consultations which Indaver have carried out with both the local community and the statutory authorities that traffic congestion on the main N28 approaches to Ringaskiddy and to the site, and how this congestion should be managed during the peak hours, is a major concern.

The management, minimisation and mitigation of traffic arising from the Ringaskiddy Resource Recovery Centre and its corresponding impact will be a fundamental element of the Indaver corporate commitment to the Ringaskiddy community and to the regulatory authorities. The minimisation of any significant effects of traffic on the road network in the vicinity of Ringaskiddy generated as a result of the Indaver facility will be a core value which will guide the operation of the site and will be one of the central pillars of its operating culture.

With all of the above issues in mind, Indaver has approached the design, construction and operation of the Resource Recovery Centre on the principle of minimising traffic at peak periods through the implementation of a HGV booking system, and the arrangement of operational personnel shifts and visitor traffic so that the facility generates minimal traffic on the local road network during the peak traffic periods once operational.

The assessment was carried out in accordance with standard practice for traffic impact analysis and was developed in consultation with Cork 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 assessment included the traffic from other projects in the area including the Port of Cork expansion project. Mitigation measures that would serve to reduce the effect of traffic generated by the proposed development were also identified.

Construction Phase Effects

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 junctions in the immediate vicinity of the proposed development was examined.

Throughout the construction phase, three types of construction traffic will access the site:

- Heavy Goods Vehicle (HGV) traffic
- Workforce traffic and
- General site traffic.

In order to minimise the potential effect of traffic flows during the construction stage, HGV, workforce and general site traffic will be scheduled so as to ensure no vehicles arrive at or depart from the proposed development site during the 07:00-09:00 and 16:00-18:00 peak periods. By scheduling the morning construction peak hour to coincide with the lower traffic flows between 06:00 -

07:00, 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 assessment also showed that there are large proportional increases in traffic flow for the morning construction peak (06:00 – 07:00). This is due to the background traffic being so low at this time.

The effect of the construction of the proposed development on local junctions was considered to have minimal to no effect during the morning peak (06:00-07:00) and a moderate effect at Shannon Park in the evening peak (18:00-19:00).

Operational Phase Effects

During operation, traffic will be generated by the operation of the proposed resource recovery centre, by workers commuting to the site, and by site visitors.

From an operational and logistics perspective, it is not feasible to eliminate waste deliveries to the site during the peak hours as can be done for the construction period. After consultation with Cork County Council and An Bord Pleanála, Indaver proposes to control the arrivals and departures of waste delivery vehicles to and from the site during the two-hour network morning and evening peak periods using the same SAP waste delivery management software system that Indaver already uses to control the delivery of waste in Meath.

The traffic assessment concluded that the operation of the proposed development will have little or no effect on the local road network west of the Barnahely Junction during the AM peak period. During the afternoon peak period, the relative effect on the local road network will be minimal. For the operational peak PM period, there will be little or no effect on the local road network other than east of the Ferry Port junction due to the low traffic flows on this portion of the local road network.

The appraisal also found that there will be little or no effect on the local road network during the network AM or PM peak periods due to the restrictions on waste acceptance and the scheduling of staff working hours outside of the network AM peak. Again, the greatest increase is on the link east of the Ferry Port Junction. This link is not congested in the PM peak.

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

Mitigation

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 included:

- Indaver Staff Mobility Management Plan;
- Structured Staff Operational Hours; and
- HGV Mobility Management Plan.

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

mitigation measures, the traffic generated by the proposed development will have no significant effect.

11 Air Quality

The likely effect of the proposed development on air quality was assessed for the construction and operational phases.

The assessment scope comprised the following components:

- Review of maximum emission levels and other relevant information needed for the modelling study;
- Identification of the significant substances released from the site;
- Review of background ambient air quality in the vicinity of the plant;
- Air dispersion modelling of significant substances released from the site;
- Particulate deposition modelling of Dioxins and Furans, Polycyclic Aromatic Hydrocarbons (PAHs) and heavy metals released from the site;
- Identification of predicted ground level concentrations of released substances at the site boundary and at sensitive receptors in the immediate environment;
- A full cumulative assessment of significant releases from the site taking into account the releases from all other significant industry in the area; and
- Evaluation of the significance of these predicted concentrations, including consideration of whether these ground level concentrations are likely to exceed the most stringent ambient air quality standards and guidelines.

A detailed baseline air quality assessment was carried out to assess background levels of those pollutants that are likely to be significant releases from the proposed development. Operational models were developed (AERMOD and CALPUFF) to assess the effect of the proposed facility under maximum and abnormal conditions. A conservative approach was adopted to ensure an over estimation of effects. Such an approach will result in the adoption of emission standards that protect ambient air quality.

Construction Phase

There is potential for emissions to the atmosphere during the construction of the proposed development. In particular, construction activities may generate dust in the immediate vicinity and along the route taken by the construction trucks. Construction vehicles, generators etc., will also give rise to some exhaust emissions. A series of mitigation measures are specified for implementation during the construction stage to ensure that dust emissions from the site are minimised. No adverse effect on public health or the environment, including the Cork Harbour SPA, is envisaged to occur at or beyond the facility boundary.

Operational Phase

Modelling results indicate that the ambient ground level concentrations will be below the relevant air quality standards for the protection of human health for all parameters under maximum and abnormal operation of the facility. Thus, no adverse effect on public health or the environment, including the Cork Harbour SPA, is envisaged to occur at or beyond the facility boundary.

12 Climate

Indaver 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.

The proposed development has incorporated climate adaptation measures to address the effects associated with climate change, for example, the rise sea levels or more extreme weather events and flooding. The levels of the low-lying parts of the site will be raised to well above the predicted flood level, with an allowance for climate change. The drainage in the L2545 road will be upgraded to mitigate the flooding of the road during heavy rainfall.

During the operation of the facility, the energy generated will be recovered and converted to electricity to meet the electrical demand of the facility. Surplus electricity will be exported to the National Grid.

There is the potential for carbon dioxide and nitrous oxide emissions to atmosphere during the construction from construction vehicles, generators etc. However, it is not anticipated that greenhouse gas emissions during the construction phase will be significant in the context of Ireland's total greenhouse gas emissions.

In the operational phase the contribution to total greenhouse gas emissions is minor in the context of strategic infrastructure. In addition, the export of surplus electricity to the national grid (18.5MW) will have a direct benefit in terms of preventing greenhouse gas emissions from the production of that electricity in a fossil fuel based power stations. Some of the energy generated is renewable and will displace energy currently generated via fossil fuels. In the absence of the proposed facility, waste would be collected and disposed of to landfill or exported for incineration in Europe. Landfills produce methane which is twenty eight times more powerful than carbon dioxide as a greenhouse gas, and by diverting waste from landfill, the negative effect of the production of methane is avoided. Reducing the export of residual waste will also reduce carbon emissions from transport of waste.

13 Noise and Vibration

The potential noise and vibration effects associated with the construction and operation of the proposed development were assessed.

A baseline noise survey was undertaken to quantify noise levels in the existing environment. The survey comprised both attended and unattended measurements.

Attended noise measurements were recorded during daytime (07:00 to 19:00hrs), evening (19:00 to 23:00hrs) and night-time (23:00 to 07:00hrs) periods. The daytime measurements were dominated by traffic noise and activities within adjacent facilities. Evening and night time measurements were influenced by passing intermittent traffic and faint plant noise.

There is potential for generation of considerable levels of noise during the construction phase associated with site preparation works, rock breaking, piling, and foundation construction activities, placing of sacrificial beach material, construction activities and construction vehicle movements.

The predicted results from the modelling exercise indicate that under a number of conservative assessment scenarios, the daytime, evening or weekend and night-time construction noise criteria (taken from the best practice guidance British Standard 5228) can be complied with for all of the key construction phases. The assessment has identified that the use of high impact activities such as rock breaking have the potential to lead to exceedances of the evening and night-time criteria, depending on their location on site without specific noise mitigation. The use of these activities will therefore be restricted to daytime periods only.

There is also potential for vibration at neighbouring buildings and residences primarily as a result of rock breaking and piling operations. Due to the distances between the nearest sensitive buildings and construction works, vibration levels are expected to be orders of magnitude below the relevant criteria used to avoid cosmetic damage to buildings based on experience from other sites and review of published data. Notwithstanding the above, any construction activities undertaken on the site will be required to operate below the recommended vibration criteria during all activities.

The construction traffic assessment indicated that the highest volume of construction traffic will be along the N28 between the site and Shannonpark with the greatest percentage change in traffic flows occurring during the early morning peak. In general, the assessment has determined that the effect of increased construction traffic is minor to major depending on the increase above existing traffic flows. The highest relative increases will be along the N28 to the east of the ferry port where low volumes of traffic are experienced in the early morning peak. The actual noise levels associated with passing construction traffic along this road is, however, in line with traffic noise levels during normal existing peak hours along the N28.

The primary potential noise sources during the operation of the proposed facility are associated with the process and building services plant, vehicle movements on site, and additional vehicles on public roads. There are no expected vibration sources associated with the operational phase.

The results of the modelling assessment indicate that the operational noise levels during daytime, evening and night-time periods are all below the relevant noise

criteria i.e. the EPA's noise criteria for licensed industrial activities, at the nearest noise sensitive locations.

The operational traffic assessment predicted that increases in traffic noise in the vicinity of the proposed during peak hour flows are of negligible to minor noise effect.

14 Landscape and Visual

The visual and landscape effects of the proposed resource recovery facility on the surrounding area have been assessed. Effects on the landscape (character and features) and on views of the landscape are considered separately. The assessment is accompanied by a series of photomontages illustrating the existing landscape and proposed development from various representative vantage points around Cork harbour. A selection of views of the proposed facility is shown in Figures 8 to 17.

Cork harbour is a complex and diverse landscape comprising natural and built elements as well as historic and more contemporary interventions. It is both a living and a working landscape, and has evolved and responded to the needs of the community over time. Additions to the harbour have ranged in nature to include settlements, military installations, tourism, port related activity, heavy industry and energy process, as well as pharmaceutical plants and energy transmission facilities. Many of the additions are large in scale, and some of them, historic and more recent, are more prominent than others. Each addition over time has contributed to the evolving character of the harbour. Collectively, all such interventions inform the current landscape character. The site lies within the 'Cork City and Harbour' broad Landscape Character Type as defined within the Cork County Development Plan 2014 (CCDP). A number of roads surrounding the harbour are designated scenic routes within the CCDP. Several of these areas and routes receive views towards the site. The harbour is designated as an area of 'National Tourism Significance' by Fáilte Ireland.

Due to the scale of the proposed development it will be visible from a wide number of locations with varying sensitives to change in the visual environment. These include areas of settlement, routes used for walking, cycling and driving, historic structures, recreational and working areas. The stack and top of the main process building will be higher than the Ringaskiddy ridge which varies in height from 10m to c. 45m aOD. A steam plume emission may be visible from the stack. The degree of visibility will vary greatly depending on climatic factors, including temperature and wind speed both of which will affect density and dispersion.

Mitigation

To mitigate the visual effects, the form, height, positioning and cladding of the process building has been carefully chosen to reflect the shape of the existing natural ridgeline, and to sit within it. The narrowest part of the building has been aligned to face and minimise visual effects on views from Ringaskiddy Martello Tower, and the building alignment arranged so as to ensure inter-visibility between the historic military structures of the harbour is maintained. The varying heights of the roof are at minimum heights to house the internal machinery. The cladding materials have been chosen to reflect the existing shades and tones apparent in the area. Many shapes, heights and colour ranges were tested using a 3D model and photomontages. The varying dark and mid tone green colours visually recede the buildings against the landform. The breaking down of the facades and roofline also helped to reduce the overall appearance of scale of the building.

Ancillary buildings will be of relatively small scale and will be placed behind the larger buildings or landscaped mounding where possible so as to reduce their visibility. These buildings will be clad in a similar colour and material so as to visually integrate them within the overall development from vantage points where they may be partially visible. Although closer to the road, due to their scale, these

buildings will not be as visible as the larger main process building in longer range views.

The overall strategy for the landscape planting proposals throughout the site is to utilise and emulate the species that are already present on the site and environs of Cork Harbour. Retaining as much vegetation as possible and also planting with the same native species as found in the local area will blend the site visually with the surrounding established vegetation particularly when viewed from a distance.

Along the northern boundary, the direction where most views of the site are from, the planting shall be dense mixed deciduous and evergreen planting on the earth mounds, using a range of age and sizes of tree, up to semi mature to provide some instant screening effect. The planting shall have a high percentage of the evergreen species for year round screening in particular pine which is found throughout the area. The mounds will be planted with native woodland and over time as this establishes and grows in height the building will become even less visible. The planting will be organised in a structured 'campus' style landscape reflecting the evolving approaches adopted at the nearby NMCI, Beaufort and Haulbowline campuses.

A native grassland/scrub habitat will be maintained along the proposed public amenity walkway and viewing area. Between the footpath and site, a mixture of native scrub and taller oak and pine woodland will be planted to assist in screening close range views of the development from the walkway. The existing hedgerow along the southern boundary will be retained and augmented with additional native planting.

Effects

During construction, the excavations and changes to existing ground levels will be quite noticeable in views of the site from the east, north and west, particularly in the immediate site environs, leading to temporary negative effects on views of the site from the east, north and west.

There will be a significant change in the appearance of the site, from the existing undeveloped site to that of an industrial and energy related campus, which is consistent with the emerging development of the lower harbour. As the woodland planting to the perimeter of the site establishes (after 5-10 years) the screening will increase and the character from the closest adjacent areas will appear as a more green area although the top of the building will be visible above the mounding and planting. From further away, the planting and mounding will have less effect.

Initial effects will be significant and negative on the adjacent local landscape, but as planting matures, these will become slight to moderate and neutral. Effects on the landscape character of the greater Cork Harbour Area will be slight to moderate and neutral due to the existing brad mix of industrial and other land uses and elements within the area of the proposed development.

There will be lighting effects at night-time from the lights on the stack and site lighting. Although light will be introduced into a predominantly dark headland from the majority of viewpoints, the lights will appear to merge with the existing lights at Cobh, Haulbowline the port of Cork or the Maritime College dependant on the direction of view.

The lower harbour area is currently and will continue to undergo a process of

change in its landscape character in the short, medium and long term with the other proposed developments in the area including redevelopment of the Ringaskiddy port, ongoing development at Haulbowline and Spike Islands, the N28 road upgrade, and continued development of other industrial, renewable energy and pharmaceutical projects in the lower harbour area.

The cumulative effect of these developments on the landscape character will be negative in the short term but is deemed to be positive in the medium to long term once operational as the area continues to evolve into a more developed cluster of industry, energy and education campus style landscape. The proposed development will be seen as an extension of this landscape. Overall the greater surrounding area is capable of absorbing the development without changing the character of the Cork City and Harbour Landscape Character Type as defined in the CCDP.

15 Biodiversity

The Biodiversity chapter of this EIAR is based on surveys of the proposed development site and surrounding area and a review of desktop data including previous ecology reports prepared for this site in 2001, 2008, 2010, 2014/2015 and 2018/2019.

Surveys carried out in 2014/2015 included habitat mapping, surveys of wintering birds, breeding bird's surveys, common tern breeding survey, mammals and intertidal survey. Following a review of the available data, additional surveys (such as habitats, mammals and invasive species) were carried out in 2018 and 2019.

The habitats recorded within the site were classified according to National Roads Authority Guidelines. No rare plants were recorded and the habitats within the proposed development site were classified as being of Low value (Local Importance). A number of mature stands and scattered emerging shoots of Japanese Knotweed were recorded within and adjacent to the western end of the study area.

A survey of the study area in 2001 recorded an active badger sett in the northern section of the site but surveys between 2014-2019 did not record any signs of badger activity and the previously identified sett is no longer in active use.

Surveys by DixonBrosnan did not record the presence of otter within a radius of 150m from the study area. Several small haul-out sites for Harbour Seals were recorded in the harbour however none were recorded in immediate proximity to the site. Bat surveys did detect limited usage of the proposed development site by Common and Soprano Pipistrelle with most activity confined to the external boundaries. No potential bat roosting sites were identified.

The proposed development site is of local value for a range of terrestrial bird species that are relatively common. The coastal area adjoining the site consists primarily of rock and shingle, and therefore does not support the high numbers of wintering waders that are characteristic of high value mudflats with high densities of macro-invertebrates. Some species that are considered of high conservation value (Annex I of the Birds Directive, qualifying species for the Cork Harbour SPA and Red List) were noted in this general area.

A marine survey report concluded that the intertidal habitats occurring in proximity to the proposed development site are common. No rare or uncommon species or habitats were recorded.

Potential direct, indirect and cumulative effects on ecology were assessed including effects on water quality, effects on terrestrial and marine habitats, effects on fauna, effects from the spread of invasive species including impacts during the construction and operational phase. A range of mitigation measures were also specified in relation to construction activities and operational relating to protection of habitats, protection of water quality, air quality and waste management.

The EPA document Guidelines on the information to be contained in Environmental Impact Assessment Reports (draft August 2017) provides a standard scheme for classifying effects. With regard to the residual effects, it was concluded that the effects will range from slight to not significant.

The impact on European Sites was specifically addressed by a Natura Impact Statement (NIS) which concluded that the following a comprehensive evaluation of the potential direct, indirect and cumulative effects on the qualifying interests and conservation objectives for the Cork Harbour SPA, it has been concluded that the proposed development will not have an adverse effect on the integrity of the Cork Harbour SPA.

16 Soils, Geology, Hydrogeology, Hydrology and Coastal Recession

The potential effects of the proposed development on soils, geology, hydrogeology, hydrology and coastal recession were evaluated for both the construction and operational phases. The existing environment of the site was analysed using data collected from a desk study, from preliminary site investigations and a coastal erosion and flood study. Mitigation measures were proposed as required to reduce the effects of the proposed development.

Environmental soil sampling carried out in 2000/2001 concluded that there was no significant soil contamination at the site. The bedrock aquifer (underground layer of water-bearing permeable rock) beneath the site and the Ringaskiddy area is classified as Locally Important Aquifer, that is, it is moderately productive only in in local zones. The aquifer at the site is classified as having extreme vulnerability as in some areas it is at or near the surface. Aquifer vulnerability is the ease with which the groundwater may be contaminated by human activity and depends upon the aquifer's intrinsic geological and hydrogeological characteristics. The proposed development is located adjacent to the West Channel of Cork Harbour. There are no watercourses within the site.

A flood risk assessment was undertaken. The site is classified as Flood Zone C according to the OPW Planning Guidelines (2009). The flood risk assessment concluded that the risk of fluvial (river) flooding on site is very low given the absence of any significant watercourse in the vicinity of the site. Small areas of the northern boundary are at risk of tidal flooding based on modelling for a 1 in 200 year flood event. A review of the site investigation data indicated that the risk of groundwater flooding is low. The review of both the historic flooding at the site and the preliminary flood risk assessment mapping indicated that there is a significant risk of pluvial flooding of the northern part of the site. Pluvial flooding is flooding that results from rainfall-generated overland flow, before the runoff enters any watercourse or sewer. There is also a significant risk of flooding of the L2545 road at the northern boundary of the site.

As regards coastal erosion, ground conditions and water seepage along the eastern coastal boundary of the site make the glacial till face vulnerable to coastal erosion. This is combined with wave action from the sea, which creates turbulence on the beach and at the base of the coastal slope, leading to recession of the glacial till face at the toe. In order to slow the rate of erosion, shingle will be deposited at the base of the face, above the high tide line on Gobby Beach as part of the proposed development.

Construction

Where possible, excavated materials will be reused on site. However, it is expected some of the excavated material may not be suitable for reuse on site. Materials suitable for re-use may deteriorate due to poor materials handling, storage, and exposure to adverse weather conditions.

Circa 75,000m^3 of surplus soil will be generated during the construction phase and will be removed from the site. The clean and inert surplus excavated material, which is integral to the construction phase, may be reused as a by-product on other sites subject to Article 27 under the Waste Directive Regulations 2011 and notification to the EPA. Where a re-use for the material

cannot be found, the material may be sent to suitably permitted waste facilities or licenced soil recovery facilities in accordance with relevant waste legislation or disposed at suitable authorised waste facilities. Circa 30,300m^3 of engineering fill and crushed stone will be imported onto the site. Materials required from quarries will only be sourced from quarries which are listed on the register maintained by the local authority.

Potential effects also include the risk that soils, groundwater or surface water could become polluted by accidental spillage of substances including fuels. Mitigation measures will be taken during the construction phase to avoid any effect on the soils, geology, hydrogeology and surface water.

Storm water will be managed carefully during construction. In general, storm water will be infiltrated to ground via managed soakaways. The laydown areas will be suitably drained and any areas which will involve the storage of fuel and refuelling will have paved areas with bunding and hydrocarbon interceptors to ensure that no spillages will get into the surface water or groundwater systems. Groundwater pollution will be minimised by the implementation of good construction practices. The re-grading of the site has the potential to locally alter the groundwater table and ground water flow in the immediate vicinity but the effect is not considered to be significant.

There will be no negative effect on the rate of coastal retreat as a result of the construction of the proposed development.

The levels of the low-lying parts of the site will be raised to well above the predicted flood level, with an allowance for climate change. The drainage in the L2545 road will be upgraded to mitigate the flooding of the road during heavy rainfall.

Operation

Potential effects on soils, geology, hydrogeology and hydrology during the operational phase will be limited to accidental spillage of potentially polluting substances. If an accidental spillage occurred, measures would be taken to remediate it.

There will be no discharges of process effluent from the site to surface water.

There will be no negative effect on the rate of coastal retreat as a result of the operation of the proposed development.

During operation, all substances that would have the potential to cause a negative effect on the soils and geology will be stored in appropriate containers and, if required, placed within bunded areas in the proposed development.

All waste entering the facility will be stored in fully contained structures. All storage structures will be constructed as watertight structures. Storm water attenuation will be provided and will also be used to contain fire-water run-off.

All underground process piping or process drains, which will contain liquids which could cause contamination, will be double contained and regularly maintained and inspected for integrity.

Run-off or from fire-fighting in external areas, which could be contaminated, will be collected and stored as required.

Roads, hard standings and yard areas will be paved to prevent any

contamination of groundwater or soil. Storm water run-off from these areas will drain via hydrocarbon interceptors and will be collected in the storm water holding tank.

A network of groundwater monitoring wells will be installed on the eastern part of the site and monitored as required to detect any changes in groundwater quality during the operational phase of the facility.

Tanker loading and unloading operations in the waste-to-energy facility will be undertaken in a dedicated tanker loading/unloading bay which will have a local collection system and holding tank to contain any spillage.

It is expected that, with the implementation of the mitigation measures described above, the construction and operation of the proposed development will not result in significant negative effects on soils, geology, hydrology or hydrogeology. There will be a positive effect on the L2545 road due to the improvement in drainage.

Refer to Section 4 above for details on coastal erosion mitigation measures.

The proposed placement of sacrificial beach nourishment material will mitigate the potential landslide hazard, which is primarily confined to the shore line at the site. Earth/rock retaining structures will be constructed in the eastern part of the site as required to ensure the continued stability of this part of the site.

The coastal protection works will reduce the rate of erosion of the glacial till slope along the site's boundary. The works are not expected to have a significant effect on the shore line to the south of the Indaver site. The shingle, which will form the sacrificial material, may be transported northwards by extreme weather events.

17 Archaeology, Architecture and Cultural Heritage

The archaeological, architectural and cultural heritage of the development site and immediate surrounding area was examined.

The methodology comprised a review of relevant legislation and guidelines, a desktop assessment of the proposed development site and the study area extending 2km from the development site, and a site inspection. A licensed intertidal and metal detector survey of the eastern boundary of the site at Gobby Beach in Cork Harbour was also undertaken. Consultation with Cork County Archaeologist, Cork County Conservation Officer, National Monuments Service Archaeologist for County Cork, and the Underwater Archaeology Unit of the National Monuments Service were undertaken.

No previously unrecorded archaeological sites were identified within the proposed development site during the site inspection.

There are no recorded archaeological sites within the proposed development site. There are a number of recorded archaeological sites within a 2km radius of the development site. These provide evidence for human settlement and activity dating back to the Bronze Age and possibly the Neolithic. The nearest recorded archaeological site to the proposed development site is Ringaskiddy Martello tower (CO087-053), which stands 70m to the south at its nearest point. The Zone of Archaeological Potential or Zone of Notification for this monument lies partially within the proposed development site.

There are no protected structures within the proposed development site. There are a number of protected structures within the 2km study area. The closest protected structure is the aforementioned Martello tower (RPS No. 00575). The early Ordnance Survey maps indicate the line of a path, which is no longer extant, that extended from Ringaskiddy Martello Tower to Gobby Beach across the eastern portion of the proposed development site and is within the curtilage of the Protected Structure.

Potential Effects and Mitigation

The construction of the proposed development will have a direct profound effect on the line of the path from Gobby Beach to Ringaskiddy Martello tower. Extensive ground reduction in the eastern portion of the site and ground works proposed in the northwestern portion of the site for a temporary construction compound will have a direct profound effect on any potential sub-surface archaeological material that may survive below the ground surface. The extensive southwestern portion of the proposed development site will not be affected by these works. The construction of the amenity walkway along the southern site boundary will not require ground reduction and so will have a neutral effect on any sub surface archaeological material. The works to the L2545 road will have no archaeological effect as they will be within the footprint of the existing road. The coastal protection works at Gobby Beach will not require ground reduction. An intertidal and metal detector survey of the beach was undertaken in May 2015 and one archaeological find (a small canon ball measuring 62mm in diameter was found). The traversing of the beach by plant and machinery to facilitate this work is likely to have a slight temporary direct effect on potential subsurface archaeological remains.

The resource recovery centre will have a significant visual effect on Ringaskiddy Martello tower in that the main process building and stack will be visible from the tower and will obstruct the view from the tower over the northern part of Spike Island. However, the process building has been positioned such that Westmorland Fort or Fort Mitchell on the island will remain visible in its entirety from the Martello tower. Further, the view to the north over Haulbowline Island, and Haulbowline Martello tower will not be affected by the resource recovery centre.

In advance of development proceeding a programme of geophysical survey (where ground conditions are suitable) and archaeological testing will be undertaken in the eastern portion and northwestern portions of the site where the proposed development will be constructed. Any archaeological features identified during the programme of archaeological investigations will be fully resolved to professional standard as outlined in the Policy Guidelines on Archaeological Excavation. During construction of the coastal protection works on Gobby Beach a single access route will be fenced off and archaeological monitoring of works will be undertaken. The eastern part of the site will be substantially reduced in level in order that the resource recovery centre will be set as low as possible within the landscape. The stack will be coloured off-white/grey to minimise its visual impact. The main process building will be coloured varying shades of natural green to break up the mass of the building and to minimise the visual effect on the landscape. There will be a residual significant effect on the landscape in the vicinity of the path from Gobby Beach to the Martello tower. Although the path no longer exists the landscape through which it ran will be permanently altered.

There will also be a residual significant effect on the view from Ringaskiddy Martello tower to the northeast over Spike Island.

18 Material Assets

An impact assessment of material assets was undertaken for the construction and operation phases of the proposed development. Material assets are defined by the EPA as resources that are valued and that are intrinsic to specific places, they may be either human or natural origin and the value may arise for either economic or cultural reasons. Cultural heritage is addressed in section 17.

The proposed development will require services and utilities such as electricity, water, gas, and raw materials. Service diversions will be required in order to facilitate the development's construction. Low-lying areas of land will be raised and the L2545 road will be upgraded. Shingle will be required for the coastal protection works. Small volumes of waste will be generated during the construction phase. Residues from waste will be generated during the operation phase.

Approximately 52,700 tonnes per annum, of bottom ash will be produced. The bottom ash is expected to be similar to the bottom ash from the Meath waste-to-energy facility. It is the intention of Indaver to identify potential uses for the bottom ash. The reuse of this material would assist in Ireland's envisaged transition to a circular economy as laid down in stated European and national policy positions as all wastes including those that are unavoidable such as residues are regarded as being capable of being transformed into useful and valuable resources. Such reuse is also compatible with the principle of self-sufficiency as laid down in the Waste Framework Directive.

The manner in which this material may be treated and transported is dependent upon how this material is classified and characterised which may be hazardous or non-hazardous. Bottom ash from waste incineration in EU countries, including the UK, Netherlands and Belgium, is processed for use as an aggregate in construction of roads or other large-scale projects. If no market can be found for the bottom ash, it will be sent to a suitably licensed landfill site for recovery or disposal. There are two landfills with the capacity to accept the bottom ash from the proposed facility. In addition, if the Bottlehill landfill site is available for acceptance of waste, it would be ideally suited to the treatment of bottom ash from Ringaskiddy.

If there is neither an option to send the ash for processing nor for landfill in Ireland then it will be exported to suitable outlets in Europe which are already able to recover aggregates from bottom ash.

Circa 2,000 tonnes of boiler ash and circa 9,100 tonnes of flue gas cleaning residues will be produced annually. It is expected that the boiler ash and flue gas cleaning residues from the Ringaskiddy facility will be similar in composition to the boiler ash and flue gas cleaning residues from the Meath facility. Boiler ash and flue gas cleaning residues from Indaver's Meath facility are sent for treatment to salt mines licensed to accept this type of waste in Northern Ireland or Germany for recovery.

Salt mines are highly suitable environments for containing boiler ash and flue gas cleaning residues. The impervious nature of the rock in salt mines offers a long-term geological barrier and a geo-technically stable environment to guarantee that the residues are permanently isolated from the environment.

The disposal or recovery of the bottom ash, boiler ash and flue gas cleaning residues is not expected to have a significant effect on the environment.

Circa 2,600 tonnes per annum of ferrous and non-ferrous metals will be recovered for recycling.

The proposed Ringaskiddy Resource Recovery Centre will be constructed and operated in accordance with good practice in energy and resource conservation, and efficiency. Materials required for the construction works will be sourced locally where possible. Materials required from quarries will only be sourced from quarries which are listed on the register maintained by the local authority. Surplus material resulting from the construction phase will be removed off-site for reuse or disposal to permitted sites.

The relevant authorities have been consulted with regarding the service diversions. There will be no effect on adjacent land use as a result of the proposed development. There will be no potential effects on the local settlements from the construction or operation of the facility.

During operation, energy efficient power systems will be employed, water conservation measures will be implemented, and wastes will be avoided, minimised or recycled where economically feasible.

The proposed development will have a beneficial residual effect in terms of reducing the quantity of hazardous waste being exported to Europe for thermal treatment. It will also reduce the quantity of non-hazardous industrial, commercial and municipal solid waste going to landfill, or being exported as refuse derived fuel to incinerators with energy recovery in Europe.

In addition, the proposed facility will produce approximately 21MW of electricity, with approximately 18.5MW for export to the National Grid. This is enough energy to power approximately 30,000 homes annually and replaces non-renewable fossil fuels in the generation of electricity. This is a very positive long term residual effect.

19 Major Accidents and Disasters

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

A hazard identification and risk assessment (HAZID & RA) was carried out, in which a systematic approach was adopted; a variety of scenarios was identified and risk assessed in the following manner:

- Identification of the relevant major accidents (end events) that could arise at the site.
- Identification of the potential initiating event(s) that could give rise to each end event, including consideration of on-site initiating events and external events such as disasters.
- Assessment of the level of risk presented by each scenario.
- Identification of the measures that are in place, or that need to be in place, to reduce the risks and/or mitigate the impacts of these scenarios.

The purpose of the assessment is to ensure that appropriate precautionary actions are taken to protect against such risks.

For each scenario, a risk rating was calculated and compared with a risk-ranking scale, where the ratings can range from ‘trivial’ to ‘priority’. In each case, consideration was also given to the control measures that Indaver will have in place to protect against these scenarios, e.g. by reducing the probability of occurrence or by reducing the severity of impact if the scenario did occur. Where appropriate, recommendations for additional protection measures were made and incorporated into the proposed development.

There were no scenarios found to present a ‘priority’ level of risk. There was one scenario identified as presenting a ‘substantial’ level of risk, which was a scenario involving a fire in the bunker area.

This scenario was examined in more detail to ensure that the potential impacts arising from the fire were described and assessed (impacts of the smoke plume to human health and to the environment, impacts of thermal radiation to the surrounding area).

A list was compiled of the risk reduction and mitigation measures that will be in place to protect against the risks from a bunker fire, to ensure that there will be appropriate protection measures in place through all stages of the potential development of this scenario. Measures will be incorporated to protect against the conditions arising under which a fire could occur in the first place, they will enable rapid detection and response at the early stages in the event that a fire scenario developing, they will enable extinguishment of the fire even in the event of escalation to a fully developed fire scenario, and protect against the risk of environmental contamination from fire-fighting run off.

In addition to the bunker fire scenario, several other accident scenarios were also considered for further assessment. These scenarios present lower risks than the bunker fire (based on lower probabilities of occurrence and/or lower severities of impact), but were included to broaden the assessment of credible worst-case scenarios that could arise at the site.

Based on the findings of this risk assessment, and on the controls that will be implemented as risk reduction and risk mitigation measures at the site, Indaver has ensured that appropriate precautionary actions will be taken to protect against risks to human health and to the environment arising from major accidents and disasters. The risks associated with accident scenarios at the Indaver facility in Ringaskiddy were found to be as low as reasonably possible.

20 Cumulative Effects, Other Effects and Interactions

Cumulative effects, indirect effects and main interactions between different aspects of the environment were addressed in the main text of the EIAR.

Interactions

Impact Interactions, or cross-media effects are where the impact in one environmental medium may also have an indirect impact on another medium.

An effects matrix was developed to identify potential effects in different media. Actual effects and their significance are dealt with in the most relevant section of the non-technical summary or chapter of the main text of the EIAR. Some of the major interactions are listed below, and the overall cumulative effect of the proposed development is summarised at the end of this section.

- Air quality and people
- Landscape and visual and people
- Noise and vibration and biodiversity
- Noise and vibration and heritage
- Traffic and noise and vibration
- Traffic and people.

Indirect/Secondary Effects

There is one potential project which may be associated with the Ringaskiddy Resource Recovery Centre; a potential future district heating system. The EIAR has included an assessment on the potential for significant secondary effects to arise from this consequential development. A future district heating system is not part of or necessary for the delivery of the proposed development.

The thermal energy generated in the waste-to-energy facility will be recovered as steam which can be used to generate electricity, directly in heat applications or in a combination of heat and power plant. The current facility design is to generate electricity from the steam and to allow for a future possibility to export heat.

The main potential impact of such a district heating system would be a reduction in the use of the fossil fuels, which are currently used to generate steam or heat in the facilities being supplied. There would be a consequent reduction in the greenhouse gas emissions. The pipework to supply the steam or hot water would probably be laid in the roads (or above-ground alongside them) in the area and there would be some disruption to road users for the duration of the construction phase.

Transboundary Effects

The potential for trans-boundary effects arises as follows:

- Boiler ash and flue gas cleaning residues from the proposed development will be shipped to continental Europe for recovery or disposal if there is no suitable facility available in Ireland or Northern Ireland. This activity is not

likely to have a significant negative effect on the environment.

- 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. This activity is not likely to have a significant negative effect on the environment.

Cumulative Effects

Existing and proposed developments with which there is the potential for cumulative effects with the proposed Ringaskiddy Resources Recovery Centre, are addressed in the chapters of the EIAR which address each environmental topic. Significant negative cumulative effects are not predicted to arise.

Overall Cumulative Effect

The proposed Ringaskiddy Resource Recovery Centre will recover energy and ferrous and non-ferrous metals from residual non-hazardous and suitable hazardous waste, a substantial proportion of which would otherwise be exported for energy recovery. The recovered energy will be used to generate electricity, most of which will be exported to the power grid, thus replacing energy generated from fossil fuels. A portion of the energy generated is considered to be renewable, as a portion of the residual waste is biodegradable. Thus, the proposed development will support the objectives of regional, national, and European waste and energy policy and Irish development plans.

The jobs created during construction and operation, and the contribution which Indaver and its employees will make to the local economy, will have a slight positive economic effect on the Ringaskiddy and Cork City and County areas. The placing of sacrificial material on the beach will reduce the rate of erosion of the coastline at the site. Raising the levels and improving the drainage of the L2545 road will have a positive significant local effect on road users by significantly reducing incidents of the road flooding.

Due to the design and proposed mitigation measures, the construction and operation of the facility is not expected to have a significant effect on air quality, climate, biodiversity, soils, geology, hydrology, hydrogeology or material assets. At peak times, the traffic from the facility will have negligible effect on the Ringaskiddy road network. Outside peak hours the Ringaskiddy road network operates below capacity and the traffic from the facility will not have a significant effect.

During the construction phase of the project, there will be a slight to major effect on nearby noise sensitive receptors. However, the calculated noise effects are within the relevant criterion set for this phase and this phase will be of finite duration. Noise from the operation of the facility will not have a significant effect.

The site will have somewhat more of an industrial character than it does at present and there will be a minor residual impact on the recreational amenity of the site and its immediate vicinity. The cumulative effect of the proposed and cumulative developments on the landscape character will have a short-term negative effect but this is deemed to be positive long-term cumulative effect once operational as the area transitions from a slightly unkempt, semi-industrial area, to a more developed cluster of industry, energy and education campus style landscape.

Although the impact on views from within a 0.5km radius to the north and east (including Rocky Island), within areas of Cobh at White Point, from the Martello Park Road as it passes adjacent to the site (including the residential property to the northwest of the site), the National Maritime College car park, Gobby Beach and Ringaskiddy Martello tower, will be significant to moderately negative in nature at the operational stage, this is due to the change in view from a predominantly green ridgeline, to an industrial building. However, this is in the context of an area that is already semi-industrial in nature. Overall, the greater surrounding area is deemed capable of absorbing the development without changing the character of the Cork Harbour Landscape. There is no potential for any significant cumulative effects.

21 Do Nothing Scenario

The intensification of industrial, port and other activity adjacent to Ringaskiddy village, and in the Lower Harbour will take place regardless of whether the proposed resource recovery centre is built or not. As the site of the proposed facility is zoned industrial, in the short term the site may continue in its current agricultural use, but it is probable that it would be developed for pharmaceutical or chemical manufacturing, or port use, if the proposed development does not proceed.

If the proposed development did not proceed, there would be a number of negative consequences for the waste management strategy of the Southern region. Waste in the area currently travels by road through Cork City to the City Quays for export, or is disposed to landfill outside of the Southern Region, rather than being recovered. Municipal and hazardous waste would continue to be exported for disposal or recovery in waste-to-energy facilities elsewhere in Europe. If the proposed development does not proceed, there will be no contribution to Ireland's renewable energy targets. In addition, the spatial imbalance in the provision of waste-to-energy facilities in Ireland would not be addressed.

If the proposed development did not go ahead, the L2545 road would continue to flood following heavy rainfall because the road drainage is inadequate. In the scenario where the proposed sacrificial beach material was not to be undertaken, coastal recession would continue as it is at present.