AECOM Imagine it. Delivered.

Proposed Amendments to Annual Tonnage at Dublin Waste to Energy Facility, Pigeon House Road, Dublin

Environmental Impact Assessment Report
Volume 2: Main Report

Dublin Waste to Energy Limited

Project number: PR-351653

February 2021

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

Prepared for:

Dublin Waste to Energy Limited

Prepared by:

AECOM Ireland Limited
4th Floor
Adelphi Plaza
Georges Street Upper
Dun Laoghaire
Co. Dublin A96 T927
Ireland

T: +353 1 238 3100
aecom.com

Table of Contents

Figures

Tables

0. Acronyms and Abbreviations

Abbreviation/ Acronym	Description
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
ABP	An Board Pleanála
AC	Air Conditioning
ACA	Architectural Conservation Area
ADMS	Atmospheric Dispersion Modelling
AER	Annual Environmental Report
AHU	Air Handling Units
AOD	Above Ordinance Datum
APC	Air Pollution Control
APCR	Air Pollution Control Residues
APP	Accident Prevention Policy
BAT	Best Available Techniques
bgl	Below Ground Level
BTV	Bulk Transfer Vehicle
C&D	Construction and Demolition
CAFE	Clean Air for Europe
CCAP	Climate Change Action Plan
CCGT	Combined Cycle Gas Turbine
CCR	Climate change resilience
CCTV	Closed-circuit television
CEMS	Continuous Emission Monitoring System
CEP	Circular Economy Package
CJEU	Court of Justice of the EU
CO	Carbon monoxide
CO_2eq	CO_2 Equivalent
COMAH	Control of Major Accident Hazards
CSO	Central Statistics Office
DCC	Dublin City Council
DCDP	Dublin City Development Plan
DDHS	Dublin District Heating system
DEFRA	Department of Environment and Rural Affairs
Dft	Department for Transport
DHPLG	Department of Housing, Planning and Local Government
DIV	Dutch Intervention Values
DLA	Dublin Local Authorities
DLRCC	Dún Laoghaire Rathdown County Council
DWtE	Dublin Waste to Energy
EC	European Commission

Abbreviation/ Acronym	Description
ED	Electoral Division
EFT	Emission Factor Toolkit
EfW	Energy from Waste
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
ELV	Emission Limit Values
EMRWMP	Eastern Midlands Regional Waste Management Plan
EMWR	Eastern Midlands Waste Region
EMS	Environmental Management System
EN	European Standards
EPA	Environmental Protection Agency
EPUK	Environmental Protection United Kingdom
ERP	Emergency Response Procedure
ESB	Electricity Supply Board
EU	European Union
EWC	European Waste Codes
FCC	Fingal County Council
FGT	Flue Gas Treatment
GHG	Greenhouse gas
GSI	Geological Survey Ireland
GSL	Geotech Specialists Limited
GTV	Groundwater Threshold Value
Ha	Hectare
HAZID	Hazard Identification
HC	Hydrocarbons
HCl	Hydrogen chloride
HDPE	High-density polyethylene
HDV	Heavy Duty Vehicles
HEPA	High Efficiency Particulate Abatement
HF	Hydrogen Fluoride
HGV	Heavy Goods Vehicle
HSA	Health and Safety Authority
HUDU	Healthy Urban Development Unit
IAQM	Institute of Air Quality Management
IBA	Incinerator Bottom ash
ICCI	In-combination climate change impact assessment
ICHEC	Irish Centre for High End Computer
IE	Industrial Emissions
IEMA	Institute of Environmental Management and Assessment
IFC	International Finance Corporation

Abbreviation/ Acronym	Description
IGI	Institute of Geologists of Ireland's Interim Guideline
IGV	Interim Guideline Values
IPCC	Intergovernmental Panel on Climate Change
IPH	Institute of Public Health
ISO	International Organization for Standardization
JTC	Junction Turning Counts
kV	Kilovolt
LCA	Life Cycle Assessment
LGV	Light Goods Vehicle
LoW	List of Waste
LPG	Liquefied Petroleum Gas
LV	Limit Values
M	Meter
MA&D	Major Accidents and Disasters
Ml	Millilitres
MPN	Most Probable Number
MSW	Municipal solid waste
Mt	Million tonnes
MW	Megawatt
MWth	Thermal megawatt
MWwTP	Municipal Wastewater Treatment Plant
NAF	National Adaption Framework
NHS	National Health Service
NIAH	National Inventory of Architectural Heritage
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NRA	National Roads Authority
OPW	Office of Public Works
PAH	Poly aromatic hydrocarbons
PAS	Publicly Available Specification
PC	Process Contribution
PM	Particulate Matter
pNHA	Proposed Natural Heritage Area
RCV	Refuse Collection Vehicle
RDF	Refused Derived Fuel
RFC	Ratio to Flow
RFID	Radio Frequency Identification
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
RWV	Residual Waste Vehicle
SAC	Special Area of Conservation
SCI	Special Conservation Interest

Abbreviation/ Acronym	Description
SDCC	South Dublin County Council
SDZ	Strategic Infrastructure Development
SEAI	Sustainable Energy Authority of Ireland
SEG	Socio-Economic Group
SF_6	Sulphur hexafluoride
SI	Statutory Instrument
SNCR	Selective Non-Catalytic Reduction
SO2	Sulphur Dioxide
SPA	Special Protection Area
SRF	Solid Recovered Fuel
t	Tonnes
tCO2e	tonnes CO2 equivalent
TII	Transport Infrastructure Ireland
TOC	Total Organic Carbon
tpa	Tonnes per annum
tpd	Tonnes per day
tph	Tonnes per hour
tpm	Tonnes per month
TTA	Traffic and Transport Assessment
UCC	University College Cork
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
V	Volt
WAM	With Additional Measures
WBCSD	World Business Council for Sustainable Development
WDV	Waste Delivery Vehicles
WEM	With Existing Measures
WFD	Water Framework Directive
WHO	World Health Organisation
WtE	Waste to Energy
µg	Microgram

Chapter 01: Introduction

01

1. Introduction

1.1 General

The Environmental Impact Assessment Report (EIAR) has been prepared by AECOM Ireland Limited (AECOM) on behalf of Dublin Waste to Energy Ltd (DWtE, hereafter referred to as 'the Operator') and Dublin City Council (DCC) (the 'Applicant') who is seeking planning permission for a proposed increase to the annual intake of waste at the Waste to Energy (WtE) facility (hereafter referred to as 'the Facility') from the permitted 600,000 tonnes per annum (tpa) to 690,000 tpa. This comprises an increase of 15% (hereafter referred to as 'The Proposed Tonnage Increase').

This chapter of the EIAR provides background to the Facility, the need for the project, an overview of the Facility, the Environmental Impact Assessment (EIA) methodology, structure of the EIAR, statutory consultation undertaken and the names and qualifications of the lead contributors to the EIAR.

The Proposed Tonnage Increase does not require any amendments to the existing Facility and as such, no construction or decommissioning works are required to facilitate the additional annual intake of waste. This EIAR therefore evaluates potential significant environmental effects arising from operation of the Facility only. Indeed it is important to note that, at certain times during existing operations, the Facility has already operated at a monthly pro-rata equivalent throughput of 690,000 tpa (57,500 tonnes per month (tpm)) within licence emission limits, while staying within the overall annual 600,000 tpa limit at all times.

This EIAR should be read in conjunction with all the particulars of the planning application, which will be submitted to An Bord Pleanála (ABP).

1.2 Background

The Applicant established the Facility on behalf of the four local authorities for the Dublin region (i.e. DCC, Fingal County Council (FCC), South Dublin County Council (SDCC) and Dun Laoghaire Rathdown County Council (DLRCC) to thermally treat household, commercial and non-hazardous industrial waste. The Facility, which is located on the Poolbeg Peninsula, Dublin (as shown in Figure 1-1), forms part of an integrated waste management strategy for the Dublin region that was set up in response to the Dublin Waste Management Plan 1998-2001.

ABP granted permission for the Facility on 19th November 2007 under section 226 of the Planning and Development Act, 2000 (as amended) with 13 no. conditions attached. The Facility has been operating since 2017.

The Facility is run by the Operator who are responsible for the ongoing operation and maintenance of the Facility.

Figure 1-1 Facility Location

The current operation of the Facility is regulated by a waste management licence (W0232-01) (now an Industrial Emissions (IE) Licence) issued in 2008 by the Environmental Protection Agency (EPA) pursuant to the Waste Management Acts 1996-2011. The Waste Licence was initially granted to the Applicant but subsequently transferred to the Operator in 2014, with a capacity to thermally treat up to 600,000 tonnes (t) of waste annually.

The Waste Licence defined the categories of waste that could be accepted at the facility which included:

- Non-hazardous Residual Waste (non-recyclable municipal waste, street cleaning residues, bulky waste, refuse derived fuel and sludges from urban wastewater treatment); and
- Non-hazardous Commercial & Industrial Wastes (defined European Waste Catalogue EWC codes).

A licence review application was submitted to the EPA in 2019 to accommodate the proposed increase in the amount of residual municipal non-hazardous solid waste the Operator can accept at their Facility. This licence application is currently in consideration by the EPA.

The Facility's current licence is for the operation of a WtE facility to burn non-hazardous waste to recover energy in the form of steam and electricity for export to the national grid at Pigeon House Road, Dublin 4, and for the transfer of heat to a municipal district heading scheme, when such a system is available.

A number of Technical Amendments have been approved by the EPA since the initial IE Licence was granted. These are summarised below:

- Technical Amendment A (2017): The licensee sought inclusion of the following text in Schedule B.1 of the licence: "*at least 95% of all 10-minute values taken in any 24 hour period shall not exceed 150 mg/m^3 or all the half hourly average values taken in the same period shall not exceed 100 mg/m^3*" and the replacement of existing footnotes to the table with a new set of footnotes; this request was approved by the EPA.
- Technical Amendment B (2018): The licensee requested that Schedule B.2, regarding the volume of cooling water discharge be amended; however, this request was not approved by the EPA. The licensee also requested that Schedule B.2, regarding temperature of the cooling water discharge be amended; this request was only partially approved.

- Technical Amendment C (2019): Request for the addition of two non-hazardous European Waste Catalogue (EWC) codes to schedule A of existing IE licence, thereby allowing for incineration of these additional waste streams at the Facility; this request was approved by the EPA. These specifically are:
  a. 07 02 12 - Sludges from on-site effluent treatment other than those mentioned in 07 02 11; and
  b. 07 05 12 - Sludges from on-site effluent treatment other than those mentioned in 07 05 11.
- Technical Amendment D (2020): Request for the addition of another two non-hazardous List of Waste (LoW) codes; this has been approved by the EPA:
  a. 18 01 04 - wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers); and
  b. 18 01 09 - medicines other than those mentioned in 18 01 08*.

The Dublin District Heating system (DDHS) is currently being developed and is expected to be in operation by c.2021/2022. The Facility will provide the baseload heat output for the DDHS which on its own will supply a heat source for over 50,000 homes. Only residual non-hazardous waste (household, commercial and industrial) is accepted at the Facility.

1.3 Proposed Tonnage Increase Overview

The Facility is located within DCC's functional area which is zoned Z7 "*to provide for the protection and creation of industrial uses and facilitate opportunities for employment creation*" (DCC, 2016).

The overall Facility is bounded by Dublin Port to the north, Shellybanks Road to the west and Ringsend Municipal Wastewater Treatment Plant (MWwTP) to the east. A construction laydown area, public footpath, roadway and the shoreline of Dublin Bay lies to the south. The nearest European site to the Facility is the South Dublin Bay and River Tolka Special Protection Area (SPA), part of which adjoins the Facility. This part of the SPA comprises a narrow strip of managed grassland, located between the Ringsend MWwTP to the north, and the scrubby hill comprising the Irishtown Nature Park to the south.

The Facility operates 24 hours a day, 7 days a week, 365 days a year. In accordance with the conditions of the sites IE Licence, waste deliveries are only accepted Monday to Saturday, 08.00 to 22.00. Waste generated at the Facility (except IBA and APCR) is removed between the hours of 08.00 to 18.30 Monday to Friday (inclusive) and 08.00 to 14.00 on Saturdays. In accordance with the conditions of the sites IE licence, IBA and APCR is permitted for removal at any time if destined for ships within the Dublin Port area. DWtE is currently assessing other ports and outlets on the island of Ireland to ensure optimum and sustainable logistics for export. Any change to transport and export arrangements of IBA and APCR will be subject to agreement with the EPA. The principal part of the site is 5.5. hectares (ha) (13.6 acres) in area.

The Facility comprises three building as follows:

- Main process building;
- Cooling water pump house; and
- Security building.

The main process building has two identical WtE lines, each with separate boilers and flue gas cleaning. The two lines supply steam to one high-voltage turbine/generator that is connected to the electrical grid. Cooling of the exhaust steam from the turbine takes place in a water-cooled condenser. The net (electrical) power output from the Facility is approximately 62-63 megawatt (MW).

The waste to energy process carried out at the plant consists of the following main elements within the site:

a. Waste acceptance;
b. Waste intake and storage;
c. Combustion process;
d. Energy recovery process; and
e. The power generated at the site supplies the national grid.

The Proposed Tonnage Increase from 600,000 to 690,000 tpa, requires no physical amendments to the consented operational Facility. Specifically:

- The increase can be achieved without any physical modifications to the existing buildings, plant or equipment which are currently in operation at the Facility. Further detail explaining how this is possible are provided below;
- The increase in waste tonnage throughput on an annual basis will require a revision to the IE Licence (W0232-02) issued by the EPA. It is noted that during the licence revision process, the Operator will not be seeking any increase in concentration or mass flow of any emission to air or water over and above its current IE licence limits, nor any change to current licence conditions; and
- The Proposed Tonnage Increase will not result in any additional traffic on the road network in excess of that assessed by ABP when the consent was granted for the Facility.

The key system in determining the throughput capacity of the WtE plant at the Facility is the boiler train; which consists of a stoker, boiler and air pollution control (APC) equipment. The boiler train is designed to allow a certain range of waste throughput processing and heat release capabilities. The stoker is designed to combust the quantities of waste within certain waste quantity and heat release ranges. The boiler is designed to absorb the heat and create steam for heating or electricity generation purposes. The air pollution equipment is designed to remove pollutants from the volume of combustion gasses produced in the boiler/stoker in order to meet the emissions limits mandated by the IE Licence.

The original design heat release rate for each of the WtE plant lines was 102.5 thermal megawatts (MWth) (Eslam Engineering, 2006). However, the as-built design basis as reported by technology provider (Hitachi Zosen) is up to 10% greater than the original design basis, i.e. up to a heat release rate of 112.7 MWth. This is not unusual as WtE plants are typically constructed with significant margin, in part due to the variability and onerous nature of the fuel. All the key equipment is sized to handle the higher heat release rate including the stoker, boiler, APC system, pumps and fans. In addition, the capacity of the turbine generator is sized such that it can fully accept the additional steam and produce the commensurate additional electrical energy from it.

A key parameter in waste throughput capacity of the stoker is the heating value of the waste expressed in megajoule/kilogram (MJ/kg) or kilojoule (kJ/kg). Since the maximum heat release capability of the stoker is a fixed amount, the higher the heating value of waste, the lesser amount of waste that can be combusted and vice versa. A simplified example would be if a stoker was designed with maximum heat release of 100 MJ/hr, it could process 10 kg/hr if the heating value was 10 MJ/kg and 20 kg/hr if the heating value was 5 MJ/kg. It should also be noted that there are also limitations on the ranges of heating value and throughputs that can be accepted.

The original design basis of the stoker allowed a range of heating value of 7,000 kJ/kg to 15,000 kJ/kg. The throughput range was 20.5 to 41.0 tonnes per hour (tph). However, as the as-built WtE plant is up to 10% oversized compared to the original design basis, up to 44 tph can be accommodated at the lower end of the calorific value range.

The nominal design basis was a capacity of 35 tph per line at an average waste calorific value of 10,540 kJ/kg. The as-built design basis would allow a capacity up to 38.5 tph at the same average calorific value.

Over the course of approximately one year of operations it has been observed that the heating value of the waste is approximately 9,600 kJ/kg and has ranged from 9,300 kJ/kg to 10,000 kJ/kg over that period. The lower average calorific value experienced at Facility extends the maximum hourly capacity to approximately 41 tph which will comfortably facilitate an increase in the maximum annual capacity of 90,000 t in annual throughout.

Regardless of a stated annual capacity and whether increased from 600,000 tpa to 690,000 tpa, the actual day to day and month to month capacity of the Facility will be determined by:

- The calorific value of the waste which is variable on a day to day and month to month basis;
- The availability of each of the WtE incineration lines as a result of planned and unplanned outages over any given time period; and
- The physical limitation of the WtE plant (maximum heat release rate) as well as strictly operating well within the environmental performance envelope defined by the sites IE Licence, i.e. compliance with all operating conditions and emission limit values (ELV).

In summary, as a result of variations in the annual average calorific value of the waste, the increase in nominal annual throughput can be achieved without the addition or modification of any plant at the Facility nor any requirement to change any operational limit value or ELV and indeed at certain times during existing operations the facility has already operated at a monthly pro-rata equivalent throughput of 690,000 tpa (57,500 tpm) within licence emission limits, while staying within the overall annual 600,000 tpa limit at all times.

1.4 Need for the Proposed Tonnage Increase

The Facility is an integral part of the waste management infrastructure in the greater Dublin area, providing approximately 62-63 MW net electrical power output to the national grid.

The Eastern Midlands Regional Waste Management Plan (EMRWMP) 2015-2021 provides an overview of the then current and planned thermal recovery capacity for residual waste. Table 16.7 of the EMRWMP, which provides the active and pending capacity for the thermal recovery of municipal solid waste (MSW), is reproduced in Table 1-1 below.

Table 1-1 Active and Pending Capacity for the Thermal Recovery of Municipal Solid Waste

Thermal Recovery Activity (Number of facilities)	Active (Tonnes)	Pending (Tonnes)	Total (Tonnes)	Intake (2013)
Waste-to-Energy (2)	220,000 (1)	600,000 (1)	820,000	206,000
Cement Kilns	215,000 (2)	127, 875 (1)	342, 875	140,000
Pyrolysis (1)	-	65,000 (1)	65,000	-
Total (6)	435,000	792,875	1,227,875	346,000

Source: Table 16.7, Eastern Midlands Regional Waste Management Plan (EMRWMP) 2015-2021

The EMRWMP analysed the need for thermal recovery of residual municipal waste by making a number of assumptions with respect to Ireland improving its recycling rate from the then current 40% to 50% by 2020 and 60% by 2030. It also made several assumptions with regard to the phasing out of landfills as a repository for residual waste.

It was forecast that by 2020 municipal waste generation would grow to between 3.0 and 3.2 million tpa and that the national need for thermal recovery facilities would grow to between 1.5 and 1.6 million tpa compared to the then current and anticipated thermal recovery capacity of 1.23 million tpa. This analysis informed the adoption of EMRWMP Policy E15a:

> '*The waste plan supports the development of up to 300,000 tonnes of additional thermal recovery capacity for the treatment of non-hazardous wastes nationally to ensure there is adequate active and competitive treatment in the market and the State's self-sufficiency requirements for the recovery of municipal waste are met. This capacity is a national treatment need and is not specific to the region. The extent of capacity determined reflects the predicted needs of the residual waste market to 2030 at the time of preparing the waste plan. Authorisations above this threshold will only be granted if the applicant justifies and verifies the need for the capacity, and the authorities are satisfied it complies with national and regional waste policies and does not pose a risk to future recycling targets. All proposed sites for thermal recovery must comply with the environmental protection criteria set out in the plan*.'

The 2019 'Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022 Bulletin' (WMPLA, 2020) reported that 1,019, 367 million tonnes (Mt) of residual MSW was thermally treated in Ireland between Q1-Q4 2019, which was below the anticipated target of 1,035,000 Mt (WMPLA, 2020). At the time of writing, the current levels of thermal recovery are estimated to be between 1.7 and 1.8 million tpa thus far in 2020. It is recognised that the WMPLA produce quarterly reports on waste capacity in Ireland and more recent data is available; however, in light of the Covid-19 pandemic the 2019 data is considered most appropriate for use in the assessment presented herein.

A summary of total residual MSW processed in 2019 is outlined in Table 1-2, which shows that only 22% of MSW was directed to disposal, with 78% recovered (both in Ireland and abroad).

Table 1-2 Summary of Municipal Solid Waste Processed in 2019-Tonnes

Treatment Option	Total	% of Total
Recovery	1,019,367	57%
Disposal (MSW only)	398, 133	22%

Export	370, 346[1]	21%
Total	1,787, 846	

Source: Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022 Bulletin (WMPLA, 2020)

Disposal of residual MSW is achieved by landfilling. However, there are currently only three active landfills taking residual MSW in Ireland. Residual MSW at these landfills currently competes with industrial bottom ash (IBA), construction and demolition wastes and secondary MSW materials for scarce void space.

With regard to the export figure cited above, baled residual municipal waste is exported as Refused Derived Fuel (RDF) for thermal treatment, generally in continental Europe. The 2019 Bulletin report identified a potential shortfall in capacity to process residual MSW in Ireland; therefore, it has been identified that an increase in export capacity will be required in the absence of progress on the provision of waste infrastructure Ireland.

Since 2015, the Facility's capacity (600,000 tpa) has come online and some additional capacity at cement kilns has become available. AECOM understands that the "pending" Pyrolysis plant (65,000 tpa) referenced in Table 1-1 has been fully licensed and construction began in January 2020.

There has also been a number of other potential thermal treatment routes not anticipated in the EMRWMP, i.e: A number of the cement kilns have applied for increased use of alternative fuels and raw materials (including solid recovered fuel - SRF). In most cases SRF is identified as one of a number of potential alternative fuels and must be produced from MSW to a bespoke specification. Consequently, not all nominal capacity for thermal treatment (licensed and pending in the planning and/or IE licensing system) is or will be available for thermal treatment of residual waste. It has also been identified that during the initial restriction phase of the Covid 19 pandemic (12 March to 18 May 2020), volumes at direct thermal recovery facilities remained on target, while the use of solid recovered fuel from waste at cement kilns decreased and ultimately stopped (RWMO, 2020). As a result, thermal coprocessing was identified as a vulnerable waste management option.

In May 2018, Indaver Ringaskiddy was granted planning permission for a 240,000 tpa WtE plant (including up to 24,000 tpa hazardous waste). The decision to grant planning permission was subsequently subject to a judicial review. The duration of the judicial review process and its ultimate outcome are uncertain. The WtE plant has yet to apply for an IE licence. Consequently, the date this capacity will be available (if at all) is highly uncertain. Even though the planning permission is subject to review, it is noted that the need for the development was rigorously examined during the planning process. The planning inspector, having reviewed the European, national and regional policy contexts, examined the need for an additional thermal recovery need capacity of 300,000 tonnes for the treatment of non-hazardous wastes in the period 2020 – 2030. The inspector concluded[2]: "*In this context the need for this development is, I consider, established*".

In summary, there is a clearly defined national need established in 2015 and confirmed in 2019 for additional thermal treatment capacity.

The Proposed Tonnage Increase would enable the Facility to process an additional 90,000 t annually which would be more sustainable both in terms of national residual waste treatment and energy generation, than the current alternatives of landfill or the export of waste. This capacity is available immediately, subject to revision of the IE Licence, without any requirement for additional plant or investment.

1.5 EIA Legislation and Guidance

EIA requirements derive from Directive 2011/92/EU of the European Parliament and the Council on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU (the "EIA Directive"). Directive 2014/52/EU had direct effect in Ireland from 16 May 2017 and was transposed into Irish planning law on 1 September 2018 in the form of the European Union (EU) (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

The proposed increase to the Facility's intake meets the threshold for a mandatory EIA and is therefore subject to an EIA and preparation of this EIAR to accompany the planning application.

The EIA has been undertaken in accordance with the requirements as set out in the EIA Directive and relevant guidelines and documentation including:

[1] The export capacity was 100% utilised at the end of Q4 2019 (WMPLA, 2020)
[2] *Inspector Report PA0045 January 27th 2017*

- EPA's draft guidelines 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (2017);
- European Commission (EC), 'Environmental Impact Assessment of Projects, Guidance on the preparation of Environmental Impact Assessment Reports' (Directive 2011/92/EU as amended by 2014/52/EU) (2017);
- EC's 'Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU) (2017);
- EC's 'Interpretation of definitions of project categories of annex I and II of the EIA Directive' (2015);
- EC's 'Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment' (2013);
- Government of Ireland's 'Guidelines for Planning Authorities and An Board Pleanála on carrying out Environmental Impact Assessment' (2018); and
- Other guidelines relevant to the environmental aspects assessed, as noted in specific chapters of the EIAR.

1.6 Methodology

1.6.1 Consultation

'*Consultation is a key element of each stage of the EIA process. The requirement for consultation is included in the definition of EIA in the Directive*….' (EPA, 2017). Consultation with relevant statutory and non-statutory bodies form important parts of the EIA process. Consultations, for example during the scoping process, help to ensure that all of the impacts, issues, alternatives, and mitigation measures, which interested parties believe should be considered in the EIA, have been addressed (EC, 2017b). Given nature of the Proposed Tonnage Increase and the focus of the EIA being on air quality, waste, traffic and population and human health, where publicly available is readily available, consultation for the EIA was focused on discussions with the following bodies only:

- DCC; and
- EPA.

1.6.2 EIA Process

EIA is the process for anticipating the effects (both positive and negative) from a proposed development or project on various environmental receptors. If the anticipated effects are unacceptable, design measures or other relevant mitigation measures can be implemented to reduce or avoid those effects. The EIAR describes the current state of the environment and assesses the likely significant effects and impacts of a proposed development on the environment, including the residual effects and impacts once mitigation and monitoring measures have been implemented.

The EIA process can involve several stages: consultation, screening, scoping, baseline surveys, impact assessments ongoing feedback into a project design and preparation of the EIAR. The EIAR is then submitted as part of a project planning application to the competent authority (in the case of the Proposed Tonnage Increase, ABP). The EIAR must include the relevant information and assessments in accordance with the aforementioned legal provisions in order for ABP to come to a reasoned conclusion on the significant effects of the Proposed Tonnage Increase on the environment.

The EIA Directive states that "*environmental impact assessment*" is a process consisting of:

> *(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2)*
>
> *(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7*
>
> *(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7*

(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination

(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a

Further details of the EIA process and methodology undertaken for the Proposed Tonnage Increase are presented in the following subsections.

1.6.3 Screening

The first step in the EIA process is 'Screening' which determines if an EIA is required, and usually commences at the project design stage. As outlined in Section 1.5, the Proposed Tonnage Increase meets the threshold for a mandatory EIA:

Part 10 of the Planning and Development Regulations 2001-2020 (as amended) states:

10. Waste disposal installations for the incineration or chemical treatment as defined in Annex IIA to Directive 75/442/EEC under heading D9, of non-hazardous waste with a capacity exceeding 100 tonnes per day.

22. Any change to or extension of projects listed in this Annex where such a change or extension in itself meets the thresholds, if any, set out in this Annex.

Court of Justice of the EU (CJEU) rulings have indicated that the concept of waste disposal within the EIA Directive include all operations leading to either waste disposal or recovery. Therefore, any facility generating electricity from waste or combustible materials and biomass from waste with a capacity exceeding 100 tonnes per day (tpd) falls within the scope of Class 10 of the regulations and requires a mandatory EIA.

The proposed 90,000 tpa increase in capacity exceeds the 100 tpd threshold.

1.6.4 Scoping

If it is determined that an EIA is required, the next step is to 'scope' the content of the EIAR. Scoping considers the potential for likely significant effects throughout different phases of a proposed project to determine "*the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR"* (EPA, 2017). EIA scoping was undertaken for the Proposed Tonnage Increase in accordance with the EPA's draft guidelines (EPA, 2017), EC's, 'Environmental Impact Assessment of Projects, Guidance on the preparation of Environmental Impact Assessment Reports' (Directive 2011/92/EU as amended by 2014/52/EU) (EC, 2017a) and EC's 'Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU)' (EC, 2017b);

As described in the draft EPA guidelines, "*the potential for likely significant effects throughout different phases of the proposed project, are considered as far as possible at scoping stage – whether they would individually require consent or not. These include, as relevant, site investigations, construction, commissioning and operation to eventual decommissioning. Scoping also considers the range of alternatives to be considered in an EIAR*" (EPA, 2017). Given the nature of the Proposed Tonnage Increase which looks to increase waste throughput at an existing operational WtE facility, the focus of the EIA scoping and the EIAR on the operational phase only.

The main purpose of the scoping process is to:

- Consider the potential for likely significant environmental effects from the Proposed Tonnage Increase;
- Identify which topics related to each environmental factor (as prescribed in the EIA Directive) for a given project are likely to result in a significant environmental effect and therefore should be scoped into the EIA. For example, in the case of this Proposed Tonnage Increase, emission characteristics is identified as a topic under air quality that is likely to result in a significant environmental result and is therefore scoped into the EIA.
- For topics scoped into the EIA:
  - Identify data and appropriate surveys to be undertaken to establish the existing baseline; and
  - Outline the scope and methodology for assessing the likely significant environmental effects identified.

The EIA scoping report for the Proposed Tonnage Increase is provided in Appendix A1-1.

As the Proposed Tonnage Increase involves additional volume of waste throughput to an existing operational Facility only, likely significant effects identified during scoping and carried forward for detailed assessment in the EIAR presented herein, were limited to the following environmental factors: air; climate, waste management; material assets, specifically roads and traffic; and population and human health. The additional waste throughput would result in additional emissions to air from the Waste Delivery Vehicles (WDV) and WtE plant stacks and could potentially have a significant effect on air quality. The increase in WDVs could also potentially effect roads and traffic. Further assessment of topics associated with air quality and climate; roads and traffic; and population and human health were therefore scoped into the EIAR. Further assessment of topics associated with major accidents and disasters and the interactions between impacts on different environmental factors were also scoped in, to align with the EIA Directive.

No likely significant environmental effects were identified in relation to the following environmental factors: land, soil, water, biodiversity, landscape, and cultural heritage, and therefore detailed impact assessments were not required. However, as "*environmental factors themselves cannot be scoped out and must feature in the EIAR*" (EPA, 2017) and to align with recent requests from the EPA on a similar EIAR; the aforementioned environmental factors remain as individual chapters within this EIAR and detail the baseline environment only.

1.6.5 Environmental Impact Assessment Report

Following on from scoping, an EIAR is prepared as part of the EIA process. Environmental topics scoped in are carried forward for further assessment and documented within the EIAR. Typically the EIAR includes a baseline assessment to determine the status of the existing environment; impact prediction and evaluation to determine the significance of effects identified (this can include cumulative effects); delineation of mitigation and monitoring measures to reduce the impacts identified; and a residual impact assessment of the significance of effects once any mitigation and monitoring measures have been implemented.

An EIAR is defined by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (Statutory Instrument (S.I.) No. 296 of 2018) (EU, 2018):

> *A report of the effects, if any, which proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of the Environmental Impact Assessment Directive.*

1.6.5.1 General Approach to Assessment

For each technical EIAR chapter, the classification and significance of effects is generally evaluated in accordance with the EIA Directive and the methodology outlined in the EPA's draft guidelines (EPA, 2017). Where more relevant and specific standards and methodologies exist, they are adopted and outlined in the respective methodology sections within each technical chapter (for example, specific criteria and assessment terminology used to assess change to air quality).

For the Proposed Tonnage Increase, the potential impacts from the combination of the current permitted 600,000 tpa of waste accepted at the Facility in addition to the proposed 90,000 tpa, have been assessed.

1.6.5.1.1 Determining the Sensitivity of the Existing Environment/Receptor

Each receptor and/or environmental resource which may be impacted by the Proposed Tonnage Increase is identified and assigned a value on the basis of its importance or sensitivity to the potential impacts. The terminology used to describe the sensitivity of resource/receptor is High, Medium, Low or Negligible. The sensitivity, importance or value of a receptor/resource is normally derived from:

- Designated status within the land use planning system;
- Reference to standards in environmental assessment guidance;
- The number of individual receptors, such as residents;
- An empirical assessment on the basis of characteristics such as rarity or condition; and
- Its ability to absorb change.

1.6.5.1.2 Determining the Character of Effects

The potential effects of the Proposed Tonnage Increase on the sensitive receptor are then determined. This is undertaken by assessing the character of effect (including magnitude, duration probability and quality) in comparison to baseline conditions using the relevant terminology outlined in the EPA's draft guidance (EPA, 2017).

The assessment of effects takes into account any embedded control that forms an inherent part of the current Facility's design and management procedures (and as included in the EIAR Chapter 2 Project Description). The assessment also takes into consideration cumulative impacts with consented, planned and reasonably foreseeable projects.

Where it has not been possible to quantify effects, qualitative assessments are carried out, based on expert opinion and professional judgement. Where uncertainty exists, this is noted in the relevant EIAR chapter. Overall, a character of effect of High, Medium, Low or Negligible is then assigned to the impact being assessed.

1.6.5.1.3 Classifying Significance

The matrix (Figure 1-2) adapted from the EPA's draft guidance (EPA, 2017) is then used to classify the significance of effect being assessed. This considers the overall character of effect with the sensitivity of the receptor/existing environment.

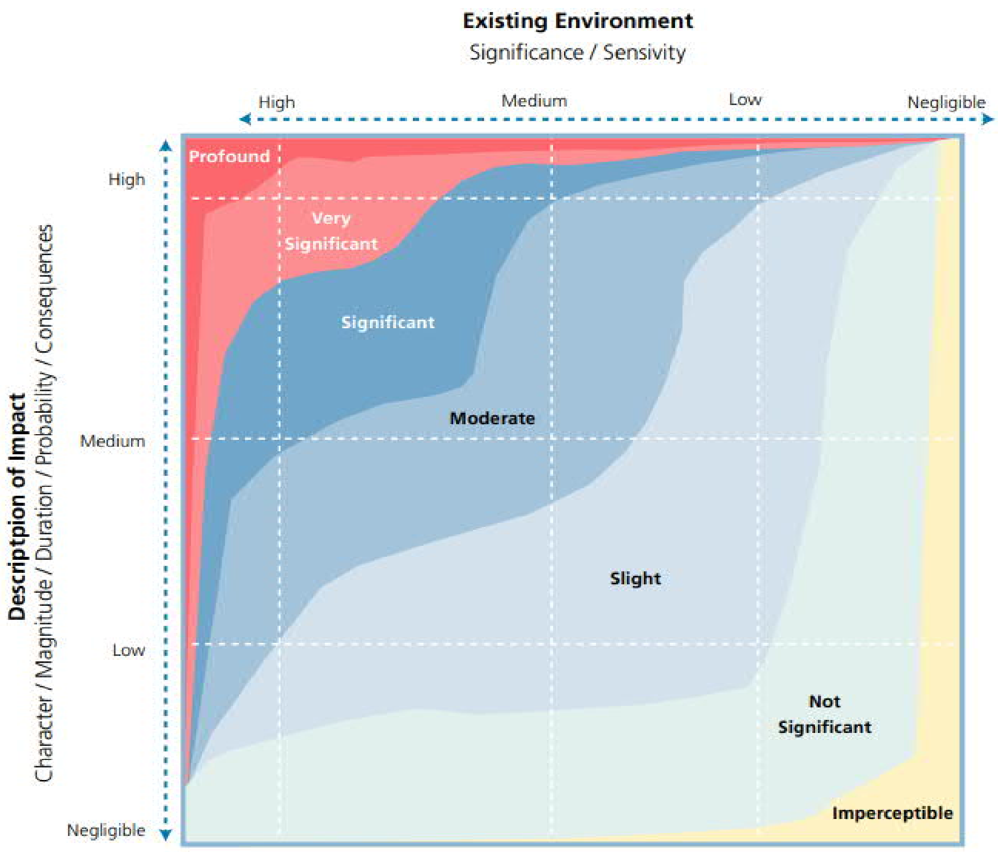


Figure 1-2 Determination of Significance (*Source: EPA's draft 'Guidelines On The Information to Be Contained In Environmental Impact Assessment Reports' (EPA, 2017)*)

1.6.5.1.4 Mitigation and Monitoring

Mitigation and monitoring measures are identified through the assessment process to prevent, reduce, offset/remedy the likelihood of the environmental impact identified arising.

1.6.5.1.5 Residual Impacts

'The Residual Impacts' are the final or intended effects which occur after the proposed mitigation measures have been implemented' (EPA, 2017). Determination of the residual impacts follows the same methodology outlined above.

It is important to note that the methodology outlined above is a general approach only. Characterising the character/significance of a potential impact can have specific criteria which is documented in the assessment chapters.

1.7 Format of the EIAR

This EIAR has been prepared in accordance with the EPA's draft guidance (EPA, 2017) and outputs from the scoping process. Table 1-3 provides the structure of the EIAR.

Table 1-3 Environmental Impact Assessment Report Contents

Volume	Content	
Volume 1	Non-Technical Summary	
Volume 2	Chapter 1	Introduction
	Chapter 2	Project Description
	Chapter 3	Waste Management
	Chapter 4	Alternatives
	Chapter 5	Population and Human Health
	Chapter 6	Land and Soils (baseline only)
	Chapter 7	Water (baseline only)
	Chapter 8	Biodiversity (baseline only)
	Chapter 9	Air Quality
	Chapter 10	Climate
	Chapter 11	Noise and Vibration (baseline only)
	Chapter 12	Landscape and Visual (baseline only)
	Chapter 13	Cultural Heritage (baseline only)
	Chapter 14	Roads and Traffic
	Chapter 15	Material Assets (baseline only)
	Chapter 16	Major Accidents and Disasters
	Chapter 17	Interactions
Volume 3	Appendices	*Various appendices to accompany the technical assessment chapters*

1.8 Expertise of the EIAR Team

Table 1-4 provides the name(s) of the main contributor(s) to each of the EIAR chapters, along with their relevant qualifications.

Table 1-4 Expertise of the Environmental Impact Assessment Report Team

EIAR Management/ Chapter	Consultant	Qualification/Summary of Relevant Experience
- Project Director	Fergus Hayes	Director, BA, BAI, MSc, Chartered Engineer MIEI, MEI Fergus is chartered engineer with over thirty years' experience focused on the interaction between industrial/infrastructure development and the environment. His key areas of experience are due diligence, environmental impact assessment and permitting, environmental compliance, air quality impact assessment, pollution control, emission monitoring and air quality assessments for both public and private sector clients. He regularly oversees and reviews AECOM deliverables across a diverse range of environmental disciplines to ensure that the technical content and quality are of a high standard.
- EIAR Verifier/Coordinator	Barry Sheridan	Technical Director BA MOD (Hons) Env Sci, HDIP Env Eng. HDip Noise & Vibration Barry is Technical Director and Head of Environment & Planning in Ireland. Barry has over 19 years of professional experience in a variety of areas within the environmental management, impact assessment, licensing, auditing sector and due diligence constraints/threat assessment area. He has nine years' experience of environmental impact assessment and planning consents for projects in Ireland & the United Kingdom (UK). For the Proposed Tonnage Increase, Barry has acted as technical reviewer of deliverables in the EIAR space for AECOM on this project
01 Introduction	Noelle O'Leary	Environmental Consultant, BSc (Hons), MSc, MIEnvSc Noelle has four years of experience supporting environmental impact assessment projects in Ireland. Of relevance to the Proposed Tonnage Increase, Noelle has been responsible for the utility assessments for a number of small-medium scale infrastructure projects in Ireland, as well as assisting in coordinating and drafting EIARs.
02 Project Description	Noelle O'Leary	*As above*
03 Waste Management	Mike Bains	Technical Director, BSc (Hons), CChem MRSC 24 years' experience in environmental consultancy, predominantly in the field of waste management in Ireland, the UK and internationally. Mike has been the subject matter expert for waste management in a large number of major projects, including nationally significant infrastructure projects in the UK such as the A303 Stonehenge project, which have been subject to public examination. Mike is also experienced in waste management in the pharmaceutical sector, including the Operator and also Johnson & Johnson, Pfizer and AstraZeneca.
	Rebecca Maskrey	Resource and Waste Consultant CIWMAssoc Rebecca is a Consultant within the Resources & Waste Management Team at AECOM. Rebecca has over 6 years' experience in the environmental sector, predominantly in the waste and resources discipline. Her previous experience includes providing research and data for a Waste Authority responsible for constructing an Energy from Waste Plant in the UK. For the Proposed Tonnage Increase Rebecca has contributed towards the Waste Chapter on this project.
04 Alternatives	Noelle O'Leary	*As above*
	Barry Sheridan	*As above*
05 Population & Human Health	Dave Widger	Regional Director, BSc (Hons), MSc David is a Regional Director in the Economic Development & Regeneration Team with over 19 years' experience in economic development and regeneration with particular expertise in health impact assessment, and community and socio-economic impact assessment of major mixed-use and infrastructure schemes. David is an experienced Technical Lead with significant experience of working with internal and external staff to deliver complex, major infrastructure projects. He has worked on and led population and health assessments for High Speed 2, Heathrow, A303 Stonehenge and Dublin Airport.

EIAR Management/ Chapter	Consultant	Qualification/Summary of Relevant Experience
	Jack Schofield	Consultant BSc (Hons) MSc PIEMA MIED Jack is an Economic Development Consultant who has over 3 years of professional experience at AECOM. During this time at AECOM, Jack has been involved in a broad spectrum of economic development work including socio-economic impact analysis, health impact assessments (HIA), people and community assessments and population and human health assessments. He has provided inputs for impact assessment proposals, scoping reports and full assessments. In completing full assessments, Jack has demonstrated that he can effectively compile baseline data and assess the potential direct and indirect impacts of developments on local, regional and national economies. Jack has prepared deliverables for a variety of high-profile projects including the A303 Stonehenge People and Communities ES Chapter and the Stratford Waterfront (London Olympic Park) Socio-economics and HIA ES Chapters. For the Proposed Tonnage Increase, Jack has been the author of the Population and Human Health EIAR Chapter.
06 Land & Soils	Noelle O'Leary	*As above*
07 Water	Noelle O'Leary	*As above*
08 Biodiversity	Tony Marshall	Associate Director, MCIEEM BSc (Hons) Tony is an Associate Director and leads AECOM's ecology team in Scotland. He has over ten years of experience as a professional consultant ecologist and has been the technical lead on large-scale infrastructure development projects for clients across Ireland and the UK. He has substantial experience in Environmental Impact Assessment and Appropriate Assessment at all stages of the processes, including screening, scoping, survey and assessment. Tony provided technical review of the biodiversity chapter of the EIAR.
09 Air Quality	Frankie Pickworth	Graduate Air Quality Consultant BSc Frankie is a graduate air quality consultant based in Leeds, United Kingdom (UK). Frankie has almost 2 years of professional experience in a variety of projects including road schemes, new developments and industrial projects for both environmental impact assessment air quality chapters and air quality planning consents. She has experience of working on projects both in the UK and Ireland but also internationally. For the Proposed Tonnage Increase, Frankie has modelled the impacts of the Proposed Tonnage Increase on air quality within the local area and has compiled these results into the air quality chapter for the EIAR for AECOM.
	Tom Stenhouse	Technical Director, Air Quality PhD MChem CEnv Tom is a chartered environmentalist, experienced project manager, project director, and team leader, who provides technical leadership in the field of air quality, greenhouse gases, odour and dust. He has a strong academic background in atmospheric chemistry and has undertaken assessments for a wide variety of projects; from road schemes, airports, and water treatment works, to oil & gas, office, retail and residential. During the past 17 years in consultancy Tom has worked on projects in Ireland and throughout the United Kingdom (UK). For the Proposed Tonnage Increase, Tom has acted as Lead Verifier for the Air Quality deliverables (EIAR) for AECOM.
10 Climate	Ian Davies	Associate Director, BA (Hons) Over 15 years of professional experience in the management and delivery of greenhouse gas and climate change assessments across the UK and Ireland. Ian has led the delivery of climate impact and mitigation strategy assessments for inclusion in EIA and ESIA on a range of climate impact assessments for large scale infrastructure projects, industrial and residential development.
11 Noise & Vibration	Barry Sheridan	*As above*

EIAR Management/ Chapter	Consultant	Qualification/Summary of Relevant Experience
12 Landscape	Mark Hammond	Mark is a Senior Landscape Architect with 6 years' experience. He is an Associate Member of the Irish Landscape Institute and Licentiate Member of the Landscape Institute UK. During his time with AECOM, Mark has been involved in a wide range of Landscape and Visual Impact Assessments (LVIA) relating to data centres, urban, commercial and industrial developments, as well as windfarms, quarries and grid infrastructure. Marks involvement in LVIA's includes on-site assessment, viewpoint scoping, report writing, the production of figures and the co-ordination of photomontage production. He both authors and provides the technical lead role for LVIA submissions throughout the Republic of Ireland. Experience also includes the preparation of RFI responses to planning authorities and supporting at Oral / Public Hearings.
13 Cultural Heritage	David Kilner	Senior Archaeological Consultant, BA (Hons), PG Dip, MSc, MIAI David has over 18 years of experience working in the heritage sector. Prior to joining AECOM, David was Senior Archaeologist with a commercial archaeological company based in Belfast which involved working all over Ireland. His experience covers a range of projects, from planning advice to archaeological baseline research and EIA to procuring and managing archaeological specialists and sub-contractors undertaking field survey.
14 Roads and Traffic	Brian McMahon	Associate Director Brian McMahon is a Chartered Engineer who joined AECOM in August 2012. He has 15 years' experience in the transport planning and traffic engineering area since graduating in 2004. He has been involved in a wide variety of projects in both the public and private sector and has gained significant technical experience and skills in the following areas – transport planning, traffic modelling, traffic management, urban roads and street design, cycle scheme design, greenway / cycle trail design, road safety and accessibility audits, local transport plans and strategies, public and stakeholder engagement, detailed design and specifications, contract documents and tender assessments. He has extensive experience in the preparation of planning applications from a transportation and infrastructure perspective. This includes work on various types of developments comprising large Commercial, Private, Industrial, Public Residential, Educational and mixed-use developments.
15 Material Assets	Noelle O'Leary	*As above*
16 Major Accidents and Disasters	Bob Hudson	Technical Director. MRSC. C Chem. Bob is a Technical Director within AECOM's UK Permitting and Process Safety Team (Air Quality Division) and has over 30 years' industrial and consultancy experience within Environmental Licensing and Permitting. Bob has worked in the chemical, pharmaceutical, manufacturing, non-ferrous metal, iron and steel, food and drink, waste and oil and gas industries as a producer (ICI Tioxide and BP), as an environmental regulator (HMIP and then the EA), as an engineering contractor (Davy McKee) and also as a consultant (three different environmental and engineering consultancies). Bob has acted as a technical reviewer of the Major Accidents and Hazards Section of the EIAR on this project.
	Alison Couley	Associate Process Safety Consultant Alison Couley is an Associate within AECOMs Air Quality, Permitting and Process Safety Team in the UK. Alison is a Chartered Chemical Engineer (CEng, MIChemE) with over 24 years' professional experience in process engineering and process safety, working for EPC contractors and consultants. Her areas of expertise include risk assessment (HAZOP, HAZID, ERA), Control of Major Accident Hazards (COMAH)/Seveso Compliance and DSEAR/ATEX.
17 Interactions	Noelle O'Leary	*As above*

Chapter 2: Project Description

02

2. Project Description

2.1 Introduction

The Facility was granted permission by ABP in 2007 to thermally treat up to 600,000 t of household and commercial waste per annum. It is proposed to increase the annual intake of waste at the Facility from the permitted 600,000 tpa to 690,000 tpa (15% increase).

Increasing the annual intake of waste at the Facility to 690,000 tpa will not require physical changes to the Facility and its associated infrastructure. The waste types received and operational processes, procedures and operational hours at the Facility will also remain unchanged. The current site layout and WtE plant items have sufficient capacity to accommodate the Proposed Tonnage Increase.

Key changes to accommodate the throughput of an additional 90,000 t of waste would be restricted to the following:

- Additional waste delivery vehicles (it is anticipated the Proposed Tonnage Increase will require 20 additional two-way WDV movements per average day (AECOM, 2020);
- Increased waste throughput and operation of the WtE plant; and
- Management of additional residual solid waste produced; for example, IBA and APCR.

This chapter details the location of the Facility and surrounding land uses; an overview of the Facility layout and operations; details environmental emissions and control measures inherent in operations, including the IE Licence requirements.

2.2 Facility Setting

2.2.1 Location

The Facility is centrally located on Poolbeg Peninsula on the east side of Dublin City (Pigeon House Road, Dublin 4). The peninsula, which lies within the Dublin Docklands, is an area of reclaimed land extending eastwards into Dublin Bay from Ringsend.

2.2.2 Topography

Topography at the Facility has a very gentle slope of 1.5 m from north to south with the highest area to the north at approximately 5 m above ordinance datum (AOD).

2.2.3 Surrounding Land Use

The Facility is surrounded to the north, east and west by a mixture of industrial uses.

Pigeon House Road lies to the immediate north of the Facility; Shellybanks Road to the immediate west; and Ringsend MWwTP to the east. Irishtown Nature Park is located to the southeast. A public footpath and shoreline of Dublin Bay is located to the south of the Facility. Dublin Port is located to the north of the Facility, across the Liffey Estuary Lower.

There is significant industrial activity surrounding the facility including the Electricity Supply Board (ESB) Dublin Bay Power Station to the west of the site across Shellybanks Road and the ESB Poolbeg Power Station to the east at the end of the peninsula. To the north, across the harbour, are further industrial activities and Dublin Port quays. Currently, the closest residential areas to the Facility are at Ringsend, Irishtown and Sandymount located between 1 and 2 km east and south of the Facility.

Four EPA licensed facilities are also located within a 1 km radius of the Facility:

- The Hammond Lane Metal Company Limited (P1002-01);
- ESB Poolbeg Generating Station (P0577-03);

- Synergen Power Limited (P0486-02); and
- Dublin Port Company (P1022-02).

All Away Waste is located within 1 km of the Facility and is licenced by DCC (Waste facility permit info: WFP.DC.10.0020.01).

The nearest European site to the Facility is the South Dublin Bay and River Tolka Special Protection Area (SPA), part of which adjoins the Facility. This part of the SPA comprises a narrow strip of managed grassland, located between the Ringsend MWwTP to the north, and the scrubby hill comprising the Irishtown Nature Park to the south. The next nearest European site to the Facility is the South Dublin Bay Special Area of Conservation (SAC) (site code: 000210), which covers the area of fully tidal mudflat within Dublin Bay circa 100 m to the south of the Facility.

According to Dublin City Development Plan (DCDP) 2016-2022, Map F, the Facility is located within Zone Z7: "*To Provide for the protection and creation of industrial uses and facilitate opportunities for employment creation*" (DCC, 2016).

Lands to the west and south west of the Facility have been designated as the Poolbeg West Strategic Development Zone (SDZ), comprising 34 ha and consists of an area between Pigeon House Road, Sean Moore Road, Sean Moore Park and extends in an easterly direction along Sandymount Strand as far as Irishtown Nature Park. This SDZ, known as the Poolbeg West is to provide for mixed used development:

"*Which may principally include residential development, commercial and employment activities including office, hotel, leisure, and retail facilities, and port related activities and the provision of educational facilities, transport infrastructure, emergency services and community facilities... including health and childcare services, as appropriate"* (DCC, 2019).

Figure 2-1 Poolbeg West Strategic Development Zone (*Source: DCC, 2019*)

Review of the planning portal, ABP register, Section 5 declarations, Part 8 development, foreshore licenses/leases, regional spatial economic strategies, the area development plan, national planning framework etc. identified a number of consented, planning and reasonably foreseeable projects in the surrounding area. Those within 1 km of the Facility are detailed in Table 2-1. Planned and consented projects identified within 5 km of the Facility are summarised in Appendix A2-1. Consideration of the future projects, where relevant, are assessed further within the cumulative impact subsections in the following technical Chapters: 3, 5, 9, 10, 14 and 16.

Table 2-1 Projects Consented, Planned and Reasonably Foreseeable within 1 km of the Facility

Reference	Proposed Development	Status
2071/20	Planning Permission for development at this site address: Circle K Yard 3, Alexandra Road, Dublin Port, Dublin 1. This site is regulated by the Major Accidents Directive. The development will consist of: Increasing the containment volume of the existing bund. Modifications will include raising the height of the existing bund wall by circa 0.5m, extending the bund to the east and lowering the ground level in the area of this bund extension from approximately 4.07m to 3.8m. The site's storm water, fresh water and foul sewer drainage will be modified to accommodate the bund extension.	Granted by Dublin City Council on 12/03/2020
PWSDZ3270/19	Permission for development at a site forming part of the former Irish Glass Bottle and Fabrizia sites, Poolbeg West, Dublin 4. The application site is located within the Poolbeg West Strategic Development Zone (SDZ) Planning Scheme 2019 area. The proposed development will consist of: streets, transportation, water services and utilities infrastructure; public realm and public amenity spaces; and, temporary landscaping of a school site, to facilitate Phase 1 development as provided for under the approved Poolbeg West SDZ Planning Scheme will also include for: earth works, excavation and the remediation of material within the application boundary; construction of new access roads and public spaces built up over existing ground and associated signage ad signalling temporary hoarding to internal and external boundaries; and, the temporary landscaping of the school site identified in the Planning Scheme.	Granted by Dublin City on 28/01/2020
3669/19	The development will consist of 1.) Construction of a single storey ESB Substation & Switchroom located adjacent to the existing terminal entrance/exit gate onto Shelly Banks Road. 2.) All associated site works. These works are sought as an addition to the existing planning permission ref 2656/16 previously granted on the site. These development works will result in the site being upgraded to Upper Tier under the SEVESO regulations.	Granted by Dublin City Council on 15/01/2020
3176/19	The development will consist of: a c.189m long, c.10m wide approach way and ramp; 1 no. office and staff facilities building (c.193 sq.m and 7.7m in height); 1 no. control kiosk (c.6 sq.m and 2.3m in height); 1 no. control cabin (c.20 sq.m and 2.3m in height); new lighting (including 18 no. lighting columns 10m high); demolition of 5 no. existing staff facilities buildings with a combined area of c.329 sq.m; building 1 has an area of c.198 sq.m, building 2 has an area of c.10.7 sq.m, building 3 has an area of c.35.5 sq.m, building 4 has an area of c.42.4 sq.m, building 5 has an area of c.42.4 sq.m; and associated site works to include 15 no. tug parking spaces, drainage, utility services, fencing 2.4m in height and pedestrian gate 2.4m in height on a site of approx. 1.3 hectares. A Natura Impact Statement (NIS) will be submitted to the Planning Authority with the planning application.	Granted by Dublin City Council on 29/07/2019
2804/19	Planning permission for development at our existing molasses storage terminal at the corner of South Bank Road and Pigeon House Road, Ringsend, Dublin, D04 TC98. The development will consist of the construction of a new molasses storage tank within the existing bund at the existing molasses storage terminal.	Granted by Dublin City Council on 11/06/2019
2482/19	PERMISSION & RETENTION: Permission for the continuation of use of an existing concrete batching plant and associated facilities (previously granted under File Ref. No. 1420/04 & ABP Ref. No. PL29S.207144 and File Ref. No. 2209/13 & ABP Ref. No. PL29S.241965), along with the retention permission for an existing concrete reclaimer all for a temporary period of five years.	Granted by Dublin City Council on 03/05/2019
3878/18	The development consists of the erection of a proposed 4m high acoustic screen fence, consisting of a steel frame, timber infill with concrete ballast base supports. The proposed fence will be erected adjacent to the existing 1.8m metal palisade fence at existing site boundary.	Granted by Dublin City Council on 29/01/2019
3711/18	Permission is sought for development that will consist of: construction of a bridge to span the existing cooling water outfall channel, adjacent to Pigeon House Road; construction of a new junction opposite the entrance to the Ecocem Ireland Plant; hard surfacing; site drainage and outfall; the use of lands for the storage of port-related maintenance and service equipment, construction project materials, contractor's site compound and project cargo; amendments to boundaries; and all associated services and site development works.	Granted by Dublin City Council on 03/07/2019
3373/18	The development will consist of a c. 30 MW capacity battery storage facility within a secured compound on a 1.06 Ha site and will, subject to detailed design, commercial and technical considerations, include: (a) up to 12 No. battery storage units [each typically comprising: a containerised battery (c.12.2m x 2.5m x 3.2m), HVAC (c.2.7m x 2.7m), inverter (c.3m x 3m) and transformer (c.3.3m x 3.3m)](b) a 279sq.m. single-storey control building; (c) ancillary electrical plant including 2 no. transformers, var support unit and cable sealing ends (d) a c.15.6m high lightning mast; (e) a 2.6m high palisade boundary fence and new access gates at the two existing vehicular entrances from South Bank Road, and on the northern boundary where access will be via the existing Dublin Bay Power Station; (f) ancillary site works including the installation of site services.	Granted by Dublin City Council on 24/01/2019

Reference	Proposed Development	Status
3314/18	The development will comprise of works to the existing Breakwater Road North and Breakwater Road South to upgrade access to the Dublin Port Operations Centre and the Dublin Ferryport Terminals (DFT), to consist of: re-alignment of traffic lanes and modification of Alexandra Road and Tolka Quay Road junctions to include pedestrian crossings, signage, traffic signals, flexible bollards, barriers, relocation of gate and removal of existing traffic island; provision of Optical Character Recognition system to include traffic lights, camera, barriers and gantry; 2.4m high palisade security fence along the western boundary of the DFT entrance; DFT check points with associated barriers, kiosks and traffic signals and; associated site works including underground drainage and electricity infrastructure. The proposed development will modify lane alignment on Breakwater Road North and Breakwater South, layout of the Breakwater Road North / Tolka Quay Road and the Breakwater Road South / Alexandra Road junctions, remove a bus stop from Breakwater Road North and, relocate a gantry to the north on Breakwater Road North. (As permitted under Reg. Ref. 3084/16) All development shall take place on a total area of c.1.1ha.	Granted by Dublin City Council on 14/08/2018
2130/18	Demolition of existing two-storey administration building (534 sq.m); construction of a new two-storey building (563 sq.m) containing an administration area, staff facilities and a non-ferrous metals recovery area; 2 no. 18 m long weighbridges; 1 no. dry wheelwash; car parking; all associated site development works all on a site of 1.79 Ha. This application relates to a development which comprises an activity for which an Industrial Emissions License under Part IV of the EPA 1992 (as amended) is required.	Granted by Dublin City Council on 20/03/2018
2858/18	The development of the two-storey extension of the existing stadium will consist of indoor running track, gym, meeting rooms, changing rooms and associated facilities (927.4 Sq. M.); 2 No.external wall-mounted signs; also alterations to the existing building to form a new link corridor. The development will be served by the existing car and cycle parking provision.	Granted by Dublin City Council on 16/10/2018
3454/17	The development will consist of the construction of a new two storey permanent steel gantry structure to allow for safe inspection and repair of refrigeration engines on shipping containers & all associated site works.	Granted by Dublin City Council on 12/09/2017
2492/17	The demolition of 3 no. existing buildings comprising Building A (c. 283sq.m), Building B (c. 303sq.m) and Building C (c. 112sq.m) and removal of all structural and infrastructural elements, vegetation, plinths, fences etc; new concrete surface treatment across entire site including underground drainage and electricity infrastructure; 4 no. CCTV (approx. 18m); new lighting (including 6 no. lighting towers (approx. 30m)); new approx. 4m high security fence to northern, eastern and southern (Tolka Quay Road) boundaries; and new substation. An existing substation on site will be retained. The development also includes the closure of the existing (eastern) vehicular entrance and widening of the existing western entrance to provide a 12m sliding gate on Tolka Quay Road. All development to take place on site of approx. 2.8 hectares.	Granted by Dublin City Council on 21/07/2017
2234/17	The development will consist of the creation of a new vehicular entrance to the southern boundary of ESB lands from South Bank Road including the erection of a new 4.5m wide 2.6m high entrance gate in the existing 2.6m high palisade boundary fence. The works shall also include the infilling of low lying areas within the development boundary of the site (1.13 ha) to a depth of up to c. 4 metres above Ordnance Datum and subsequent use for open storage within ESB Lands and all ancillary site and development works at ESB lands known as Area 'B', forming part of Dublin Bay Power Plant, bounding South Bank Road & Shellybanks Road, Ringsend, Dublin 4.	Granted by Dublin City Council on 07/04/2017
3794/16	The development will consist of the reinstatement of the recessed vehicular access, fencing and gates on the line of the original access to the ESB Station lands at Poolbeg. The works include the removal of 100m of existing 2.6m high palisade fence, 110m of chain link fence and 120m of 1.2m high pedestrian hand rail. This will be replaced with 4.5m wide 2.6m high palisade entrance gates and 100m of 2.6m high palisade fencing to create a splayed entrance along the original fence line. Development will also include works to the footpath with road markings at the entrance and all ancillary site and development works.	Granted by Dublin City Council on 18/11/2016
3638/18	The development will consist of a unified State services facility including: 2 no. Inspection Sheds (each 207sq.m and 7.5m in height), 2 no. single storey State Service office blocks (each 266sq.m and 3.5m in height), 5 no. Immigration Control Booths with a total floor area of 66sq.m and including canopy (293sq.m and 7.7m in height) and 4 no. gateways, control point comprising canopy (216sq.m and 7.7m in height) and 4 no. gateways, 24 no. staff car parking spaces, 20 no. car parking spaces, 18 no. HGV parking spaces, new 20m vehicular access onto Tolka Quay Road, 4 no. CCTV poles (18m high), new lighting (including 3 no. lighting columns 30m high and 8 no. lighting columns 12m high), 2.4m palisade fencing along sections of the northern and eastern site boundary and Alexandra Road, demolition of existing boundary wall along Tolka Quay Road and boundary fencing along Alexandra Road and, all associated site works. The development also includes modifications to check-in facilities and internal roads and circulation which will consist of: Demolition of existing freight office (612sq.m and 9.8m in height) and 3 no. check in	Granted by Dublin City Council on 15/01/2019

Reference	Proposed Development	Status
	booths with a total floor area of 32sq.m and associated site works and resurfacing to tie in with adjacent stacking areas, removal of Terminal Road West including associated fencing and resurfacing to tie in with adjacent stacking areas, realignment and lane alteration of Terminal Road South at junction with Terminal Road West; provision of signage gantry on Terminal Road South, extension of HGV check-in area including 6 no. booths with a total area of 60sq.m, 6 no. weighbridges and canopy (416sq.m and 7.8m in height). Associated site works including drainage, utility services, fencing, gates and bollards. All development to take place on a site of approx. 7.8 hectares.	
3084/16	The development comprises of works to the Port's private internal road network and includes works on public roads at East Wall Road, Bond Road and Alfie Byrne Road. The development will consist of: a) Construction of new roads and enhancements to existing roads within the Dublin Port estate north of River Liffey; b) Construction of enhanced landscaping and amenity route along the northern boundary; c) Construction of new pedestrian and cycle overbridge at Promenade Road; d) Construction of access ramps to pedestrian and cycle overbridge at Promenade Road; e) Construction of new pedestrian and cycle underpass at Promenade Road; f) Construction of 11 no. new signage gantries; g) Ancillary construction works, including site clearance, demolitions, earthworks, pavement construction, construction of verges, modifications to accesses, construction of new and amended drainage services, diversion and installation of utility services, installation of road markings and signs and accommodation works; h) Works to existing boundaries and construction of new boundaries; i) Construction of minor works to the junctions of East Wall Road with Tolka Quay Road and East Wall Road with Alexandra Road. The application is for a 10 year planning permission.	Granted by Dublin City Council on 04/09/2016
2596/15	The development will consist of the relocation of the existing vehicular and pedestrian entrances off Breakwater Road South to a new location off Breakwater Road South, alterations to the existing layout of the road and pavements and all ancillary site works.	Granted by Dublin City Council on 29/05/2015

Source: www.myplan.ie / www.dublincity.ie

2.3 Operations Overview

The following subsections provide a general overview of the current operations to receive, manage and process wastes at the Facility. Each subsection also provides an outline of any associated change to current operations as a result of the Proposed Tonnage Increase.

2.3.1 Hours of Operation

The furnace, flue gas treatment (FGT) lines and the turbine operate 24 hours a day, seven days a week. Typically for maintenance, one line at a time is shut down, while the other line continues to operate. Waste deliveries continue at reduced levels during maintenance due to the buffer capacity of the waste bunker.

Waste is accepted at the Facility between 08.00 and 22.00, six days per week (Monday to Saturday), as per the current IE Licence. Waste generated at the Facility (except IBA and APCR) is removed between the hours of 08.00 to 18.30 Monday to Friday (inclusive) and 08.00 to 14.00 on Saturdays. In accordance with the conditions of the sites IE licence IBA and APCR is permitted for removal at any time if destined for ships within the Dublin Port area. DWtE is currently assessing other ports and outlets on the island of Ireland to ensure optimum and sustainable logistics for export. Any change to transport and export arrangements of IBA and APCR will be subject to agreement with the EPA.

There will be no change to the current hours of operation as a result of the Proposed Tonnage increase.

2.3.2 Layout and Infrastructure

The principal part of the Facility is located south of Pigeon House Road and is rectangular in shape measuring circa 160 meter (m) x 340 m and covers an area of approximately 5.5 ha (13.6 acres) in area. Of this, the main process building occupies approximately 2.6 ha. The remaining 2.9 ha consists of soft and hard landscaping and internal road infrastructure (See Appendix A2-2 for Facility layout plan).

The entrance to the Facility is from Pigeon House Road at the north eastern boundary.

A service road is provided around the perimeter of the main building. The weighbridges and ramp to the waste acceptance hall are located due south of the entrance. A service yard is located on the western side of the main building.

A carpark is located in the southern part of the Facility.

The Facility comprised thee buildings as follows:

- A main process building approximately 200 m long, 130 m wide and 52 m high. The main process building houses the following:
  - Waste reception area;
  - Waste bunker;
  - Furnaces;
  - Boilers;
  - FGT lines;
  - Turbine hall;
  - Residue storage and handling areas on the western side of the main process building;
  - Control room;
  - Offices;
  - Staff facilities;
  - Administration area consisting of welfare facilities, offices and a canteen. The administrative areas have Air Conditioning (AC) in all areas for heating and cooling with local control. Fresh air is provided by Air Handling Units (AHUs) which also extract the stale air;
  - Worksop; and
  - Stores;
- A two-storey cooling water pump house located to the north of Pigeon House Road. The pump house contains a filter system, the main cooling water pumps and the biocide dosing system; and
- A security building located at the main access point to the Facility.

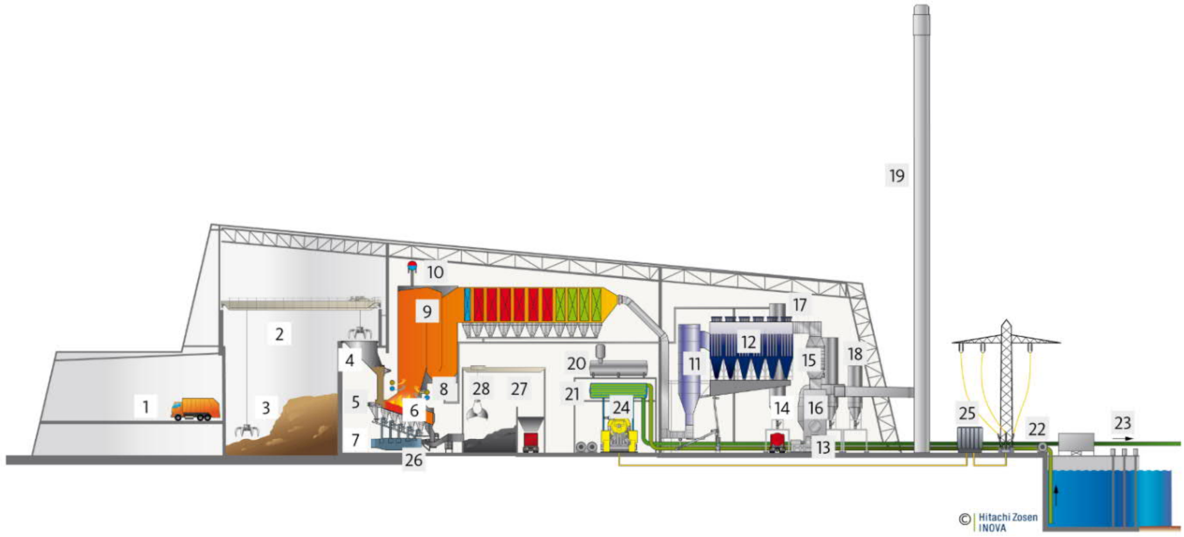
The Facility has an existing 11 kilovolt (kV) connection to the grid for export which is ramped up to 110kV for export. The Facility is connected to the 110kV switchyard located circa 500 m to west of the Facility. Similarly, when electricity is required it is imported at 110kV then ramped down to 11kV and then further to 400V for WtE plant use. There is one emergency generator onsite which in the event of a loss of power to the site maintains essential site services.

The Facility is serviced by electrical (for use when the turbine is not operational) and mains water supplies (sanitary and drinking purposes). There are robust telecommunication lines in existence for telephone and broadband services in the area.

The main process building has two identical waste-to-energy lines, each with separate boilers and flue gas cleaning. The two lines supply steam to one high-voltage turbine/generator that is connected to the electrical grid. Cooling of the exhaust steam from the turbine takes place in a water-cooled condenser. The current net (electrical) power output from the Facility is approximately 62-63 MW.

The Proposed Tonnage Increase does not require a change to the current Facility layout and infrastructure.

2.3.3 Waste to Energy Process Overview



Waste Delivery and Storage	Combustion and Boiler	Flue Gas Treatment	Energy Recovery	Residue Handling and Treatment
1 Tipping hall	4 Feed hopper	11 SemiDry reactor	20 Feed water tank	26 Bottom ash extractor
2 Waste bunker	5 Ram feeder	12 Fabric filter	21 Water cooled condenser	27 Bottom ash bunker
3 Waste crane	6 Hitachi Zosen Inova grate	13 Induced draft fan	22 Cooling water pump	28 Bottom ash crane
	7 Primary air	14 Silencer	23 Fish screen and return system/water intake filter	
	8 Secondary air	15 Flue gas heat exchanger	24 Turbine	
	9 Four-pass boiler	16 Wet scrubber	25 Transformer	
	10 Boiler drum	17 Residue silo		
		18 Additive silos		
		19 Stack		

Figure 2-2 Schematic Diagram of the Waste to Energy Process

Figure 2-2 presents a schematic of the WtE process at the Facility. When waste arrives at the facility it is logged electronically at the weighbridge. The waste is unloaded and inspected at the **Tipping Hall (1)**. The waste reception hall is kept under constant negative pressure to minimise odours/fugitive emissions to the surrounding environs. The waste is stored in the **Waste Bunker (2)**. The bunker capacity was designed to provide for 9,500 t of storage. In order to optimize the combustion process, waste is mixed in the waste bunker prior to thermal treatment. **Two waste cranes (3)** are available to mix and feed the waste into the **feed hopper (4)**. A third grab is on stand-by in case of maintenance or breakdown. From the hopper the waste is pushed into the **ram feeder (5)** and then the **grate (6)** at an appropriate rate. The Facility has two parallel independent waste to energy lines. The actual combustion of waste takes place on the grates. IBA is deposited into the **bottom ash bunker (27).** The hot gas from the combustion process is fed through the **boiler (9)** in four passes – three vertical and one horizontal. The boiler walls are lined with steel pipes and the heat energy from the gases turn the water in the pipes to steam, which is subsequently fed to the steam turbine. The **steam turbine** drives a **generator** producing electricity **(21, 22, 24 & 25)**. The Facility generates a net electrical power output of up to 62-63 MW. The flue gases then pass through a series of **cleaning processes** (**11, 12, 16, 17 & 18)**, which will reduce the stack emissions to below the level specified by the IE Licence. APCR containing fly ash, calcium-based salts, lime and activated carbon which is retained in the fabric filters in the air pollution control system is collected in hoppers located beneath the fabric filters. 90% of this material is recirculated back into the air pollution control system to maximise the reuse of the reagents and enhance the performance of the system. The remaining APCR collected in the hoppers is continuously discharged via a screw conveyor to two fully enclosed steel tanks (silos) located west of the flue gas cleaning area. IBA is discharged from the furnace to a water bath and conveyed to bottom ash bunker **(27)**. Continuous Emissions Monitoring System **(CEMS)** is provided to continuously emissions. The monitoring system meets the requirements of Chapter IV of the IE Directive and the IE Licence. All monitoring results are displayed in the control room. The **stacks (19)** are 100 m in height.

2.3.4 Facilities Management

The Operator employs a qualified and experienced facility manager. This facility manager or a nominated, suitably qualified and experience deputy, is present at the Facility at all times during its operation (or as otherwise required by the EPA).

Through the Facility's Environmental Management System (EMS), the Facility has a documented management system in place for the control, monitoring and evaluation of Facility's activities which may have an environmental impact.

The Facility has a dedicated Environment, Health and Safety (EHS) team who, on the basis of qualifications and technical ability, have an appropriate level of technical competence to manage EHS matters at the Facility.

There will be no change to the Facilities Management processes as a result of the Proposed Tonnage Increase.

2.3.5 Safety & Hazard Control

The Facility has prepared and adopted an Accident Prevention Policy (APP) and an Emergency Response Procedure (ERP). The APP addresses all potential hazards at the Facility, particularly in relation to the prevention of accidents with a possible impact on the environment.

The ERP identifies all potential hazards and specifies the roles, responsibilities, and actions required to deal quickly and efficiently with all foreseeable major incidents in a manner that minimises environmental impacts.

The Facility is enclosed by a security fence. The main gate is open during waste acceptance and normal working hours. Vehicle access is controlled by barriers, which is supervised by security personnel. The Facility is also equipped with closed-circuit television (CCTV).

There will be no change to the safety and hazard control measures at the Facility as a result of the Proposed Tonnage Increase.

2.3.6 Waste Acceptance

The Facility has two incineration lines. The heat produced from the process is used to generate electricity, of which approximately 62-63 MW is exported to the national grid and for the transfer of heat to a municipal district heading scheme, when such a system is available.

The list of wastes (LoW) and associated European waste catalogue codes currently licensed for receipt by the Facility is provided in Appendix A2-3. Household, commercial and non-hazardous industrial waste is thermally treated at the Facility. As outlined in Chapter 1 Introduction, a Technical Amendment was submitted to the EPA in 2019 for the addition of two non-hazardous EWC codes to Schedule A of existing IE Licence, thereby allowing for incineration of these additional waste streams at the Facility. These specifically are:

- 07 02 12 - Sludges from on-site effluent treatment other than those mentioned in 07 02 11; and
- 07 05 12 - Sludges from on-site effluent treatment other than those mentioned in 07 05 11.
- Another Technical Amendment was submitted to the EPA in April 2020, for the addition of another two non-hazardous EWC codes:
- 18 01 04 - wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers); and
- 18 01 09 - medicines other than those mentioned in 18 01 08*.

These non-hazardous wastes are expected to originate from sources such as hospitals, healthcare facilities and COVID-19 testing facilities.

The Facility assesses and approves customers in advance of WDVs arriving. When these vehicles arrive onsite, information that is unique to that particular waste load, such as the vehicle registration number, weight, producer/collector information, carrier, origin of the waste, and EWC code are stored on the AMCS weighbridge software system. This information is also stored on a Radio Frequency Identification (RFID) tag, which is attached to all regular customer vehicles.

The Proposed Waste Tonnage Increase would not require a change to the current LoW codes (waste types) licensed to the Facility.

2.3.7 Waste Intake & Storage

Waste Delivery Vehicles

The Traffic and Transport Assessment (TTA) for the Proposed Tonnage Increase assessed the current WDV travelling to and from the Facility to have an average trip generation rate of 95 WDV trips per day (190 combined trips entering and exiting the Facility per day), based on the 10 months of on-site delivery records (AECOM, 2020). The trip generation rate with the Proposed Tonnage Increase is anticipated to be 105 WDVs per day (210 combined trips entering and exiting the Facility per day) (AECOM, 2020) i.e. 20 additional two-way WDV movements per average day.

Unloading of Vehicles

The wastes are unloaded in a designated tipping bay of the Tipping Hall where the load is discharged directly to the bunker. Before exiting the Facility, the empty vehicle (if its tare weight is not known) must be weighed out at the weighbridge using the RFID tag thus completing the transaction. A weighbridge ticket will be printed for the driver to retain for the records of the haulier. The vehicle can then exit the Facility.

Waste Inspection/ Quarantine

Inspections of loads by the Tipping Floor Manager occur frequently throughout the day with each waste collector having at least one load inspected. If the inspected waste load is deemed acceptable it is loaded into the waste bunker. If the load is deemed unacceptable; it is placed in the quarantine bay area. The related waste contractor is contacted for the immediate removal of the quarantined load offsite for proper disposal at an appropriate authorised facility. All quarantined loads are weighed on the weighbridge when exiting the facility.

Waste Storage

Storage of waste takes place within the main process building. Storage of materials only takes place in designated areas in suitable tanks/receptacles. All bunds are integrity tested every five years. Details of such testing are reported annually to the EPA and detailed test records are maintained onsite.

2.3.8 Thermal Processing

Waste is fed to the combustion chamber via a hopper situated above the waste feeding chute. The waste feeding hopper is kept filled with solid waste in order to prevent air ingress into the combustion chamber. The waste is fed into the furnace by means of a number of feeding rams, which are integrated in the control of the combustion process.

The boilers are natural circulation boilers of the horizontal type with three vertical passes and one horizontal convection pass with evaporator, superheaters and economisers.

The combustion chamber is a fully evaporator-cooled chamber consisting of fully welded, gas proof membrane pipe walls (panels). Primary combustion air is drawn from the waste bunker, thus keeping the waste reception hall and the waste bunker area under negative pressure and preventing the release of odours and dust from these areas. Secondary air is drawn from the top of the boiler house and from the bottom ash storage area.

The waste feed rate, the supply of primary and secondary combustion air and the grate speed are controlled by an advanced combustion control system which measures air flow, flue gas oxygen and combustion temperature in order to obtain the best possible operational conditions.

Waste is combusted at a minimum temperature of 850^{o}C. The resulting flue gas is maintained at a temperature above 850^{o}C for a minimum of 2 seconds.

Each boiler has its own independent train of APC equipment. The system consists of a selective non-catalytic reduction (SNCR) system for NOx reduction, a carbon injection system for heavy metal reduction, a semi-dry flue gas scrubber with reagent feed section, a fabric filter baghouse, a flue gas cooler, a two-stage wet scrubber, an induced draft fan, a stack, and associated ductwork.

Throughout the Facility, compressed air is used There are 11 compressors onsite in total.

IBA constitutes the largest percentage of solid waste products resulting from the combustion process. After burnout of the waste at the end of the grate, the IBA falls down the bottom ash chute into the water bath of the wet ash extractor. The IBA is cooled in the water bath by evaporation. From the water bath, the IBA removed by the bottom ash extractor is discharged onto a conveyor to the bottom ash bunker for temporary storage. The IBA consists of non-hazardous and inert materials from the combustion process such as glass, metal, earth and other fractions. It is stored in a separate bottom ash bunker with sealed surfaces. The bottom ash bunker is located adjacent to the boiler area on the west side of the site. The bottom ash bunker has a capacity of 10,000 t. The Proposed Tonnage Increase will not require additional bunker capacity. As previously outlined in Section 2.3.1, this IBA waste is licenced for removal from the Facility at any time.

Included in the bottom ash bunker are grate siftings which comprise fine ash that falls through the grate bars of the furnace. These grate siftings are collected in hoppers under the grate and are transferred by a vibrating conveyor to the bottom ash bunker.

IBA is transported in covered trucks to Dublin Port located on the other side of Pigeon House Road for transfer to ship and subsequent delivery to an authorised recovery facility. At present the approved recovery facility is to a facility in the Netherlands. Metal (ferrous and non-ferrous) is recovered from the IBA. The remaining IBA material is used as aggregate in road building, embankments, road barriers and concrete pads for solar parks. It is intended that the use of the remaining IBA as an aggregate will be carried out with a third party in Ireland once the prerequisite licences and approvals are granted.

APCR containing fly ash, calcium-based salts, lime and activated carbon which is retained in the fabric filters in the air pollution control system is collected in hoppers located beneath the fabric filters. 90% of this material is recirculated back into the air pollution control system to maximise the reuse of the reagents and enhance the performance of the system. The remaining APCR collected in the hoppers is continuously discharged via a screw conveyor to two fully enclosed steel tanks (silos) located west of the flue gas cleaning area. The silos have sealed surfaces and a gross volume of 700 m^3. Additional silos will not be required to accommodate the Proposed Tonnage Increase. The silos are equipped with High Efficiency Particulate Abatement (HEPA) filers.

The APCR is transported offsite in closed containers for recovery which currently takes place in Langoya, Norway and in a salt mine in Germany. Additional IBA and APCR residue would be produced but anticipated volumes would be within the current capacity of the storage bunkers.

2.3.9 Energy Recovery Process

The Facility is currently designed to optimise power output.

Steam from the boiler drum is sent to the turbine and as the steam goes through the multiple stages of the turbine it is collected in the low-pressure header. The electricity produced is exported to the grid, minus whatever is used onsite by the '*house loads*'.

In the future, some of this heat will be exported to the DDHS, when the external infrastructure is completed. Heat export pipework and shell and tube heat exchangers are installed and ready for connection at the lower level of the facility. The DDHS is currently being developed and is expected to be in operation by c.2021/2022. The Facility will provide the baseload heat output for the DDHS which on its own will supply a heat source for over 50,000 homes. Once this is operational the Facility will have net energy efficiency of over 88%.

The turbine design optimises the power output and thus the electricity supply regime. The condenser pressure is minimised using cooling water from the River Liffey estuary thus securing a higher electrical efficiency compared to that obtained with air-cooled condensers and/or wet cooling towers. The design thus results in a net electrical power output of 62-63 MW.

2.3.10Flue Gas Cleaning

The flue gas cleaning process comprises an activated carbon and semi-dry lime scrubbing process followed by particle removal in a fabric filter, and a two-stage wet scrubbing process.

The reduction of any reformed dioxins takes place by adding activated carbon to the flue gas prior to the fabric filter, where activated carbon is collected together with fly ash and APCR.

The reduction of NOx from the combustion process will take place in a SNCR process by injecting ammonia water (NH_4OH) into the first pass of the boiler.

Emissions of particulate matter are controlled primarily through the use of a filter baghouse. This system employs over 5,000 filter bags though which the flue gas must pass. The baghouses (one (pulse jet type per boiler unit), contain 12 isolatable modules (arranged in 2 parallel rows), all operating in parallel and each with its own hopper. The number of modules ensures that taking a compartment out for cleaning and having another compartment out for maintenance will not result in any reduction in particulate filter efficiency.

Before flue gas finally exits through the stack, water is used in a wet scrubber to reduce temperature and remove any residual hydrogen chloride (HCl). In addition, a sodium hydroxide solution is used to remove residual SO_2. The wet scrubber consists of a co-current quenching flow section (Quench stage) and a static absorption column (Packed bed stage) which is fed via a common sump. All water collected from the wet scrubber is reused onsite as feed water for the semi-dry scrubber and/ or in the quench for the bottom ash discharging from the boilers.

2.4 Material and Energy Use

2.4.1 Raw Materials Use

Raw materials and supplies are delivered to the Facility by contractors/vendors. Storage of raw materials and supplies largely takes place in the main process building in the dedicated materials storage area.

Storage of materials takes place in designated areas. All fixed and mobile storage tanks are surrounded by containment bunds (110% capacity) that are designed to contain material in the event of spill or are double skinned.

Loading and unloading of materials takes place in designated areas which are protected against spills. All bunds are integrity tested every five years. Details of such testing are reported annually to the EPA and detailed test records are maintained onsite.

The Proposed Tonnage Increase will not alter the current raw materials usage.

2.4.2 Resource Use

Steam from the boiler drum is sent to the turbine which generates electricity. The electricity produced is exported to the grid, minus whatever is used onsite.

In the future, heat will be exported to the DDHS, when the external infrastructure is completed. Heat export pipework and shell and tube heat exchangers are installed and ready for connection at the lower level of the facility. The DDHS is currently being developed and is expected to be in operation by circa 2021/2022. The Facility will provide the baseload heat output for the DDHS which on its own will supply a heat source for over 50,000 homes. Once this is operational the Facility will have net energy efficiency of over 88%.

Water for sanitary and drinking purposes is supplied by mains water. The Operator has an arrangement with Ringsend MWwTP for the supply of “grey” water from the MWwTP. This water is treated via double reverse osmosis and ultra-filtration prior to use in the process.

Additional site process water is sourced from the stormwater attenuation tank and recycled process wastewater.

As outlined in Section 2.3.8, remaining IBA material from the thermal processing, is used as aggregate in road building, embankments, road barriers and concrete pads for solar parks.

2.5 Environmental Emissions

2.5.1 Wastewater Emissions

2.5.1.1 Stormwater

Stormwater drainage is collected and stored in a 725 m^3 underground attenuation tank and reused in the Facility process, where possible. Overflow from the attenuation tank is discharged to the Ringsend MWwTP, when required. Overflow from the surface water attenuation tank, which collects and stores stormwater drainage, is continuously monitored for pH and Total Organic Carbon (TOC).

There are two Class 1 oil/petrol interceptors on the stormwater drainage system upstream of the attenuation tank.

As the Proposed Tonnage Increase does not include any physical change to WtE plant or Facility area, there will be no change to stormwater infrastructure.

2.5.1.2 Process Wastewater

With the exception of cooling water, all the process wastewater (including boiler blow down, boiler water treatment rejects water and scrubber water), is collected for recycling in the FGT system or used for humidification/cooling of the bottom ash outlet. Wash water is discharged to the floor drains in the boiler house and is also collected and used in the process water system.

The Operator uses cooling water, which is abstracted from the Liffey Estuary Lower at Dublin Port, to condense steam from the turbine. The cooling water is dosed with very low levels of sodium hypochlorite to prevent biofouling and is discharged back to the Liffey Estuary Lower following use as outlined above. This leads to a slight increase in water temperature (generally 1-2 °C) close to the outfall. The cooling water from the Facility is discharged to the Liffey Estuary Lower via licenced emission point reference number SW-1 (Appendix A2-2). No additional cooling water will be generated for discharge from the Proposed Tonnage Increase.

Monitoring of cooling water discharge at emission point SW-1 takes place on a continuous basis for the following parameters: flow, residual chlorine, temperature and pH. Monitoring of emissions to water and annual reporting to the EPA will remain unchanged with the Proposed Tonnage increase at the Facility.

2.5.1.3 Sanitary Effluent

Sanitary effluent is discharged to the adjacent Ringsend MWwTP via a high-density polyethylene (HDPE) connection to the MWwTp plant in Ringsend on the eastern boundary of the Facility.

As the Proposed Tonnage Increase does not include any physical change to WtE plant or the Facility buildings, there will be no additional sanitary effluent.

2.5.2 Atmospheric Emissions

A2-1 and A2-2 within the main process building are the main emission points to air from the Facility (as annotated within Appendix A2-2). A2-1 and A2-2 correspond to the two stacks associated with each combustion line.

All processes, cleaning, loading, unloading and consumables storage are internal and as the main process building is under negative pressure, any fugitive releases become part of the combustion air. Therefore, the Facility does not release fugitive emissions.

Each combustion line has its own independent train of APC equipment. Throughout the air pollution treatment process the emissions are continuously monitored using a real time CEMS. Each stack has its own CEMS and in addition a redundant CEMS is continuously on standby in the event of one of the live systems going down. These systems are calibrated weekly and certified on an annual basis to best practice and EPA guidance. Furthermore, quarterly independent stack testing is undertaken, and testing is also carried out by the EPA's representatives.

The Proposed Tonnage Increase will increase the point source emissions to air from the Facility. The potential environmental impacts associated with this change to atmospheric emissions are assessed in Chapter 9 Air Quality.

2.5.3 Noise Emissions

The primary sources of noise emissions are those associated with external operations; for example, air handling units, chiller units, boiler operation and vehicular movement.

Operations to handle 690,000 tpa of waste will not result in any new noise sources and therefore noise emissions will remain unchanged.

Annual noise monitoring and annual reporting to the EPA will continue as per the current operations.

2.5.4 Process Solid Wastes

IBA, boiler ash and APCR are generated during the waste to energy process. IBA constitutes the largest percentage of solid waste products resulting from the combustion process.

The IBA, boiler ash and APCR generated during the WtE process (Section 2.3.3) is as follows:

- IBA: 117,748 t of waste was generated in 2019. IBA is currently exported to the Netherlands which recovers the metals (ferrous and non-ferrous). It is proposed that prior to the end of 2021 this process will take place within Ireland, subject to licensing and consenting requirements; and
- APCR and boiler ash: 29,433 t of waste was generated in 2019. APCR and boiler ash are exported to the NOAH AS facility at Langoya Island, Norway and the K&S Salt mines facility in Germany. At Langoya, the APCR is used to neutralise waste sulphuric acid, and at K&S the APCR is used to backfill mine voids – both are classified as recovery operations.

Incinerator residues from cleaning of the FGT system and storage areas, as well as IBA, fly ash, boiler ash and APCR, are monitored at the Facility for a number of parameters including, TOC, metals and their compounds and sulphates.

The Proposed Tonnage Increase will result in additional process solid wastes, in particular IBA and APCR. The increase is expected to be in proportion to the increase in capacity, i.e. by 15%. An assessment of potential significant effects from the Proposed Tonnage Increase to waste management are discussed in Chapter 3 Waste Management. Monitoring of incinerator residues and annual reporting to the EPA will continue as per the current operations with the Proposed Tonnage increase at the Facility.

The number of WDVs trips is predicted to increase from 4 to 5 Residual Waste Vehicles (RWV) per day.

2.6 Summary

Key summary points from the chapter are as follows:

- The Facility was granted permission by ABP in 2007 to thermally treat up to 600,000 t of household and commercial waste per annum. It is proposed to increase the annual intake of waste at the Facility from the permitted 600,000 tpa to 690,000 tpa (15% increase). For the purpose of the EIA, the project is referred to as the Proposed Tonnage Increase;
- The Proposed Tonnage Increase will not require physical changes to the Facility and its associated infrastructure. The waste types received and operational processes, procedures, environmental monitoring and reporting, and operational hours at the Facility will also remain unchanged;
- The current Facility layout and WtE plant items have sufficient capacity to accommodate the proposed increased in tonnages. As a result of variations in the annual average calorific value of the waste, the increase in nominal annual throughput can be achieved without the addition or modification of any WtE plant at the Facility nor any requirement to change any operational limit value or ELV;
- Key changes to accommodate the throughput of an additional 90,000 tpa of waste would be restricted to the following:
  - Additional WDV (20 additional two-way WDV movements per average day);
  - Increased throughput and operation of the WtE plant; and
  - Management of additional residual solid waste produced; for example, IBA, which is expected to increase in proportion to the increase in capacity (i.e. 15%);
- No additional raw materials, resources, services will be required for the Proposed Tonnage Increase operations;
- Additional environmental emissions associated with the Proposed Tonnage increase would be point source emissions to air and process solid waste. These are carried forward for further assessment within the EIAR presented herein (Chapter 9 Air Quality and Chapter 3 Waste Management);
- There will be an anticipated 20 additional two-way WDV movements per average day This is also assessed and presented within this EIAR in Chapter 13 Roads and Traffic;
- The Facility operates with environmental controls inherent in its day to day operations. Including:
  - Environmental management provisions including licencing and monitoring of:
    - waste received;
    - incinerator, boiler and energy recovery processes;

  - surface water emissions;
  - storm water emissions;
  - atmospheric emissions;
  - noise emissions;
  - incinerator residue;
  - meteorological; and
  - ambient groundwater;

- Conducting annual environmental reporting to the EPA;
- Implementing the Facility's EMS which allows for control, monitoring and evaluation of Facility's activities which may have an environmental impact;
- The presence of a dedicated EHS team to manage EHS matters at the Facility;
- Adopting an APP and an ERP at the Facility;
- Storage of materials and waste accepted at the Facility only occurs in designated areas in suitable tanks/receptacles, which are surrounded by containment bunds that are designed to contain material in the event of spill or are double skinned; and
- Design measures including the operation of a flue gas cleaning system to manage emissions to air from the processing at the Facility.

Chapter 03: Waste Management

03

3. Waste Management

3.1 Introduction

The purpose of this chapter is to evaluate the Proposed Tonnage Increase in throughput of the Facility in regard to:

- Description of the regulatory and policy context for waste management in Ireland as it applies to the use of energy-from-waste as one part of a sustainable waste management system;
- Discussion of the current methods of managing waste in Dublin and Ireland as a whole, and how the Proposed Tonnage Increase will continue to be a key component of the waste management system; and
- Description of the residual wastes that would be generated by the Proposed Tonnage Increase and how they would be managed.

The study area with respect to waste policy includes the whole of Ireland; the study area with respect to the management of waste generated by the Facility extends to the European Union, recognising that some of waste is currently exported for management elsewhere in the EU.

3.2 Regulations and Policy

3.2.1 European Regulations

3.2.1.1 Landfill Directive (1999/31/EC)

Waste sent to landfill must comply with requirements of the Landfill Directive Council Directive 99/31/EC of 26 April 1999 on the landfill of waste, as amended by Regulation (EC) No 1882/2003, Regulation (EC) No 1137/2008, Council Directive 2011/97/EU and Directive (EU) 2018/850 (hereafter referred to as the 'Landfill Directive') (EU, 2018a). The objective of the Landfill Directive is to reduce the negative impacts caused by landfilling waste on the environment, in particular on surface waste, groundwater, soil, air and human health by introducing strict procedures and requirements for waste and landfills. The Landfill Directive places stringent engineering and operation conditions on landfill operators and requires them to obtain a permit which stipulates the conditions that the landfill site must adhere to.

The Landfill Directive also aims to reduce reliance on landfill as a disposal option. It does this by setting challenging targets for all EU countries (including Ireland) with regard to the diversion of biodegradable municipal waste from landfill. By 2020, biodegradable municipal waste going to landfill must be reduced to 35% of the total quantity (by weight) produced in 1995.

Directive (EU) 2018/850 amends the Landfill Directive and requires Member States to significantly reduce waste disposal by landfilling. This will prevent detrimental consequences for human health and the environment and ensure that economically valuable waste materials are recovered through proper waste management and in line with the waste hierarchy. Member States will be required to ensure that, as of 2030, waste suitable for recycling or other recovery, in particular that which is contained in municipal waste, will not be permitted to be disposed of to landfill. Use of landfills should remain exceptional rather than the norm. Furthermore, the Member States must take the necessary measures to ensure that by 2035, the amount of municipal waste disposed of in landfills is reduced to 10% or less of the total amount of municipal waste generated by 2035.

3.2.1.2 The European Union Waste Framework Directive (2008-18)

The EU's Revised Waste Framework Directive 2008/98/EC as amended by Directive 2018/851/EU (hereafter referred to as the 'Waste Framework Directive') (EU, 2018b) provides a framework for the management of waste across the European community. It establishes definitions related to waste management such as definitions for waste, recycling and recovery, and Article 4 set out the Waste Hierarchy; which is required as a priority order to be applied into Member States waste management law and policy.

The Waste Framework Directive introduces the "polluter pays principle" and "extended producer responsibility". It requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

The Waste Framework Directive imposes a number of obligations on member states regarding waste management, including that they adopt waste management plans and waste prevention programmes, and achieve the following recycling and recovery targets by 2020:

- 50% preparing for re-use and recycling of certain waste materials from households and other origins similar to households; and
- 70% preparing for reuse, recycling and other recovery of construction and demolition waste.

The Waste Framework Directive is enshrined in Irish law by the Waste Management Acts 1996 to 2011 and the European Union (Waste Directive) Regulations 2011-2020.

3.2.1.3 The Circular Economy Package

The Circular Economy Package (CEP) (EC, 2018) revises targets set for the recycling of municipal waste, which the EU estimates accounts for between seven and ten per cent of the total waste generated in the EU.

Directive (EU) 2018/851 amends the Waste Framework Directive and, amongst other measures, requires that Member States must implement measures to increase the reuse and recycling rate for municipal waste; which must be a minimum of:

- 55% by weight by 2025;
- 60% by 2030; and
- 65% by 2035.

The CEP's revision to the Waste Framework Directive also includes specific targets for packaging and separate requirements for bio-waste and landfill. EU member states will be expected to achieve:

- A common EU target for recycling 70% of packaging waste by 2030, which recycling targets for specific packaging materials:
  - Paper and cardboard: 85 %
  - Ferrous metals: 80 %
  - Aluminium: 60 %
  - Glass: 75 %
  - Plastic: 55 %
  - Wood: 30 %
- A binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2035; and
- Separate collection obligations are strengthened and extended to hazardous household waste (by end 2022), bio-waste (by end 2023), textiles (by end 2025).

Minimum requirements are established for extended producer responsibility schemes to improve their governance and cost efficiency.

Prevention objectives are significantly reinforced, in particular, requiring Member States to take specific measures to tackle food waste and marine litter as a contribution to achieve EU commitments to the United Nations (UN) Sustainable Development Goals.

3.2.1.4 Waste Hierarchy

The Waste Framework Directive requires that waste legislation and policy of the EU Member States shall apply as a priority order the following waste management hierarchy:

Figure 3-1 Waste Hierarchy

Where:

- 'preparing for re-use' means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing (e.g. repair of pallets or electrical equipment);
- 'recycling' means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations (e.g. recycling of plastic bottles or composting of green waste);
- 'other recovery' means any operation the principal result of which is that the waste serves a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function (e.g. energy-from-waste); and
- 'disposal' means any operation which is not recovery, even where the operation has as a secondary consequence the reclamation of substances or energy (e.g. landfill).

3.2.1.5 Principles of self-sufficiency and proximity

The Waste Framework Directive requires Member States to establish an integrated and adequate network of waste disposal installations and of installations for the recovery of mixed municipal waste collected from private households, with the network designed to enable Member States to move towards an aim of individual self-sufficiency, taking into account geographical circumstances or the need for specialised installations for certain types of waste.

The network is required to enable waste to be disposed of or recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health. This is generally referred to as the "proximity principle".

3.2.2 National Waste Regulations

National waste management regulations in Ireland include the following:

- Waste Management (Collection Permit) Regulations 2007 (as amended) (Government of Ireland, 2007a);
- Waste Management (Facility Permit and Registration) Regulations 2007 (as amended) (Government of Ireland, 2007b);
- Waste Management (Licensing) Regulations 2004 (as amended) (Government of Ireland, 2004);
- Waste Management (Packaging) Regulations 2014 (as amended) (Government of Ireland, 2014);
- Waste Management (Planning) Regulations 1997 (as amended) (Government of Ireland, 1997);
- Waste Management (Landfill Levy) Regulations 2015 (as amended) (Government of Ireland, 2015);

- Waste Management (Food Waste) Regulations 2009 (as amended) (Government of Ireland, 2009);
- Waste Management (Hazardous Waste) Regulations 2007 (as amended) (Government of Ireland, 2007c);
- Waste Management (Shipments of Waste) Regulations 2007 (as amended) (Government of Ireland, 2007d);
- The Waste Management Acts 1996 to 2011 (Government of Ireland, 1996-2011);
- Environmental Protection Agency Acts 1992 to 2011 (Government of Ireland, 1992-2011);
- The Protection of the Environment Act 2003 (as amended) (Government of Ireland, 2003);
- Litter Pollution Acts 1997 to 2009 (Government of Ireland, 1997-2009); and
- Planning and Development Acts 2000 to 2020 (Government of Ireland, 2000-2020).

3.2.3 National Waste Policy

3.2.3.1 A Waste Action Plan for a Circular Economy Ireland's National Waste Policy 2020-2025

'A Waste Action Plan for a Circular Economy Ireland's National Waste Policy 2020-2025' (Government of Ireland, 2020) is the current waste management policy Statement for Ireland and covers the period of 2020 - 2025.

The Waste Action Plan for a Circular Economy fulfils the commitment in the Programme for Government to publish and start implementing a new National Waste Action Plan. This new national waste policy will inform and give direction to waste planning and management in Ireland over the coming years. It will be followed later in 2020 by an All of Government Circular Economy Strategy.

The previous national waste policy, 'A Resource Opportunity – Waste management policy in Ireland (2012)', drove delivery on national targets under EU legislation, but the Irish and international waste context has changed in the years since its launch. The need to embed climate action in all strands of public policy aligns with the goals of the European Green Deal. The policies statements relevant to this Chapter are outlined in Table 3-1.

Table 3-1 Relevant Policies from 'A Waste Action Plan for a Circular Economy'

Policy Section	Description
The Circular Economy	The Action Plan explains that over the past two decades Ireland has made significant progress in driving our performance up the waste hierarchy and moving away from disposal as the primary treatment option. The next step for Ireland and the purpose of the Action Plan is to now look at waste through the lenses of the circular economy. It explains the benefits of living in a circular economy and states that the goal is to have circular economy that reduces carbon impact and protects our natural resources, environment and health. Such a circular economy also supports viable and sustainable enterprise opportunities, jobs and training. The Action Plan also highlights the value of shorter and more localised supply chains, especially as the fragility of global supply chains have been exposed.
COVID-19	The COVID-19 pandemic is raised as highlighting a need for circularity more than ever before. It has done so by exposing the fragilities with the global economic model and causing a rethink about the ways people work, produce, transport, and consume. The Action Plan states that the transition to a circular economy includes some important answers including (but not limited to): • Self-sufficiency and local production/consumption. • Shorter and more resilient supply chains for certain products.
Municipal (Household and Commercial) Waste	The Action Plan outlines a number of recycling targets and incentivisation measures such as standardised bin colours and penalties for those who don't segregate their waste. It also reiterates the challenge to meet the following recycling targets for municipal waste in line with the revised Waste Framework Directive: • 55% municipal waste recycling target by 2025 • 60% municipal waste recycling target by 2030 • 65% municipal waste recycling target by 2035 In addition, the Landfill Directive has been amended to require that by 2035 no more than 10% of MSW goes to landfill. Domestically, transposition this year (2020) of the revised EU Waste Directives will hardwire the new legal commitments agreed in 2018 on recycling and landfilling for 2025 and 2030 into the Irish economy and society.

Policy Section	Description
	The Action Plan also explains intentions to introduce a waste recovery levy of €5 per tonne. This will apply to recovery operations at Municipal Solid Waste (MSW) Landfills, Waste to Energy Plants and Co-Incineration Plants and the Export of MSW.
Supporting Indigenous Treatment Capacity (Waste Management Infrastructure)	The Action Plan notes that currently, Ireland is reliant on exports of municipal, C&D, packaging and other wastes in order to manage the waste it produces – which it estimates was 9.5 million tonnes in 2020. It explains that this reliance can potentially leave Ireland exposed if there were external shocks to the export market. It also means that they are exporting materials, energy and jobs that could be harnessed within the country. It further states that: *"There will always be a risk that outlets throughout the EU (for example, under-capacity Waste to Energy facilities), or facilities in a post-Brexit UK may be in a more competitive position relative to Irish facilities. As a result, we do not have direct control of our waste and any effort made by a member state to apply the proximity principle at a state level would need to be carefully calibrated to ensure compliance with State Aid rules as well as the principle of free movement of goods*." Actions in relation to supporting indigenous treatment capacity, include in introducing legislation/procedures to strengthen the provision of contingent capacity, and examining measures, including legislation, to strengthen the powers of the regulatory authorities to direct waste and to ensure that collectors have contingent capacity in place.

Source: A Waste Action Plan for a Circular Economy Ireland's National Waste Policy 2020-2025 (Government of Ireland, 2020)

3.2.4 Regional Policy

3.2.4.1 Eastern Midlands Waste Region Waste Management Plan 2015 - 2021

For the purposes of waste management planning, Ireland is divided into three regions: Southern, Eastern-Midlands and Connacht-Ulster. The Eastern Midlands Waste Region (EMWR) comprises DCC, Dún Laoghaire-Rathdown, Fingal, South Dublin, Kildare, Louth, Laois, Longford, Meath, Offaly, Westmeath and Wicklow County Councils. The Region covers both urban and rural areas with a population of approximately 2.2 million and is dominated by Dublin which has the largest population and highest economic activity in the region and nationally (EMWR, 2015).

The EMRWMP 2015-2021 (EMWR, 2015) provides a framework for the prevention and management of waste in a sustainable manner in its 12 local authority areas.

The EMRWMP has three overarching targets:

1. 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan.
2. Achieve a recycling rate of 50% of managed municipal waste by 2020.
3. Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices (unprocessed residual waste meaning residual municipal waste collected at kerbside or deposited at landfill/civic amenity sites/ transfer stations that has not undergone appropriate treatment through physical, biological, chemical or thermal processes including sorting).

Objectives relevant to this Chapter are as follows:

- Policy and legislation – the region will implement EU and National waste and related environmental policy, legislation, guidance and codes of practice to improve management of material resources and wastes;
- Infrastructure development – the region will promote sustainable waste management treatment in keeping with the waste hierarchy and the move towards a circular economy and greater self-sufficiency; and
- Protection – apply the relevant environmental and planning legislation to waste activities to protect the environment, in particular European sites and human health against adverse impacts of waste generated.

Policy 15a of the EMRWMP refers to the development of additional waste thermal treatment capacity and is discussed in Chapter 2 of this EIAR. If targets in this section and updated to take into account new policy, state so and state role of the Proposed Tonnage Increase in meeting those targets.

3.2.5 Local Policy

3.2.5.1 Dublin City Development Plan 2016-2022

The DCDP 2016-2022 (DCC, 2016) sets out policies and objectives to guide how and where development will take place in the city over the lifetime of the Plan. The main waste management objective of the Plan is to facilitate the development of recycling in order to minimise the use of landfill. The Plan also states that the 2013 and 2016 Landfill Directive targets are at risk of not being met without considerable policy effort, although it should be noted that the EPA's website shows that these targets are currently on track and due December 2020. The policies and objectives of the Plan relevant to this Chapter are provided in Table 3-2 and Table 3-3. The DCDP identified the Facility as a critically important piece of infrastructure which would make Dublin city a more sustainable and energy efficient city, less dependent on imported and fossil fuels, more competitive and environmentally clean.

Table 3-2 Policies from the Dublin City Development Plan Relevant to this Chapter

Policies	Description
SI19	To support the principles of good waste management and the implementation of best international practice in relation to waste management in order for Dublin city and the region to become self-reliant in terms of waste management.
SI20	To prevent and minimise waste and to encourage and support material sorting and recycling.
SI21	To minimise the amount of waste which cannot be prevented and ensure it is managed and treated without causing environmental pollution.

Source: Dublin City Development Plan (DCC, 2016)

Table 3-3 Objectives from the Dublin City Development Plan Relevant to this Chapter

Objectives	Description
SIO15	To provide for municipal/public recycling and recovery facilities in accessible locations throughout the city.
SIO19	To implement the Eastern-Midlands Regional Waste Management Plan 2015-2021 and achieve the plan targets and objectives.

Source: Dublin City Development Plan (DCC, 2016)

3.3 Waste Arisings

3.3.1 National

Table 3-4 shows the amount of municipal waste generated in Ireland and the quantities of municipal waste disposed of to landfill.

Table 3-4 Municipal Waste Disposed to Landfill

Municipal Waste	2016	2017	2018
Municipal waste generated (t)	2,763,167	2,768,043	2,912,353
Disposal of managed municipal waste to landfill (t)	710,877	622,882	418,029
Disposal percentage for managed municipal waste	26%	23%	15%
Biodegradable municipal waste disposed to landfill (t)	390,000	307,000	189,934

Source: EPA National Waste Statistics) https://www.epa.ie/nationalwastestatistics/nationalindicators/ Accessed 20/July/2020

3.3.2 Eastern Midlands Waste Region

The most-recently published EMWR Annual Report 2016/2017 (EMWR, 2018) stated that:

> *MSW processing options were not as restricted in 2017 with the commencement of the DWE Plant which alleviated some of the pressure on processing options that were evident in 2016…Processing of MSW at Waste to Energy plants in Ireland is now at 30% and when this is added to MSW processed in cement kilns, it indicates that 42% of MSW is thermally treated in Ireland. We remain reliant on export for processing of 20% of the MSW generated. Pre-treatment before export of MSW has the added issue that it generates organic fines which have to be*

stabilised and outlets for stabilised fines were quite restricted in 2017. MSW waste arisings will continue to grow in 2018, 2019 and 2020 and this will put pressure on processing options going forward.

Figure 3-2 taken from the EMWR Annual Report 2016/2017 (EMWR, 2018) shows the routes for managing residual waste in Ireland in 2017. This implies that approximately 620,000 t of waste were landfilled and 325,000 t of waste were exported to Europe as refuse-derived fuel (RDF), i.e. 945,000 t of waste in total.

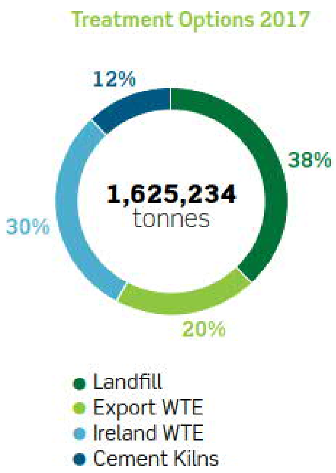


Figure 3-2 Residual Waste Management in Ireland (2017) (*Source: EMWR Annual Report 2016/2017*)

The EMWR Annual Report 2016/2017 indicated that the Poolbeg Facility managed 270,000 t of waste in 2017 (with a licensed capacity of 600,000 tpa), Table 3-5 column "2017 (Actual)" reflects this and the tonnages shown in Figure 3-2.

Assuming that the Facility operated at its licensed capacity in subsequent years (i.e. an additional 330,000 tpa over the amount managed in 2017), this would still leave a total of approximately 615,000 tpa of municipal waste in Ireland that is either landfilled or exported as RDF, as shown in Table 3-5.

Table 3-5 Actual and Projected Management Routes for Residual MSW

Waste	2017 (Actual)	Projected (with Facility operating at 600,000 tonnes per annum capacity)
Total residual MSW:	**1,625,234**	**1,625,234**
Cement Kilns	195,028	195,028
Ireland WTE	487,570	817,570
Poolbeg Facility:	*270,000*	*600,000*
Export WTE & Landfill	***942,636***	***612,636***

Source: EMWR Annual Report 2016/2017 (EMWR, 2018)

3.3.3 Recycling and Residual Municipal Solid Waste Management

The most recently published full-year EPA statistics indicate that of the 2.9 Mt of municipal waste that was generated in Ireland in 2018, 38% was recycled (8% of this was composted), 43% was used in energy recovery and 14% was landfilled.

A bulletin prepared by Ireland's three waste regions titled 'Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022' (WMPLA, 2020) provides information on the management of residual MSW in 2019 and projections for future years. The summary data for management of residual MSW in 2019 is shown in Table 3-6 .

Table 3-6 Residual Municipal Solid Waste Management in Ireland, 2019

Management Route	Tonnes of waste (2019)
Recovery (Energy from Waste (EfW) and cement kilns)	1,019,367
Disposal (MSW only)	398,133
Export	370,346
Total	**1,787,846**

Source: Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022 (*WMPLA, 2020)*

This data reflects some changes from 2018 but follows a broadly consistent pattern, showing that the total amount of residual MSW landfilled or exported in 2019 was approximately 770,000 t.

The bulletin notes that (WMPLA, 2020):

> *"Ireland will continue to rely on export for the next few years to meet our residual waste processing requirements."*

As Table 3-5 projection shows, by being able to send a higher volume of MSW to the Facility, the Proposed Increase Tonnage could see a reduction in the amount MSW that would otherwise be exported or sent for landfill. Ireland's Regional Waste Management Offices have issued an 'Interim Report on the Performance of the Waste Sector in Ireland in response to the COVID-19 initial restrictions' (RWMO, 2020). The report noted that:

> *"Following the suspension of construction activity, the demand for cement reduced which ultimately lead to the closure of all cement kilns in the country. This development had immediate implications for outlets for solid recovered fuel from waste which accounts for 240,000 tonnes of municipal solid waste annually."*

This demonstrates that co-processing of waste in cement kilns is relatively more vulnerable to disruption than the use of purpose-built EfW facilities.

3.3.4 Regional Landfills

EPA data (Table 3-7) shows that there are currently three landfill sites in operation in the EMWR.

Table 3-7 Landfill Sites Operating in the EMR region of Ireland

Authorisation number	Facility name and location	Waste for disposal (maximum tonnes per annum)	Waste types for disposal (maximum tonnes per annum)	Waste types for recovery (maximum tonnes per annum)
W0146	Knockharley Landfill Co. Meath	88,000*	100,000 household* 45,000 commercial* 30,000 industrial*	25,000 construction & demolition 70,000 inert waste
W0165	Ballynagran Residual Landfill Co. Wicklow	175,000	62,500 household 67,500 commercial 45,000 industrial	28,000 construction & demolition
W0201	Drehid Waste Management Facility Co. Kildare	120,000	120,000 non-hazardous municipal, commercial and industrial wastes	No limit for inert waste where used in landfill engineering
	Total	383,000		

Source: Environmental Protection Agency[3]

** Note that whilst the EPA data indicates that Knockharley Landfill has an annual capacity of 175,000 tpa, the actual capacity of the facility is 88,000tpa.*

[3] https://www.epa.ie/nationalwastestatistics/infrastructure/

3.4 Assessment of Impacts

The Facility currently provides significant capacity for managing residual waste in the EMWR, thereby diverting this waste from landfill disposal, and the Proposed Tonnage increase will continue to support this and in doing so, also assist in achieving the objectives of the DCDP.

However, EPA data shows that there is still a relatively large amount of residual waste within Ireland and in the EMWR which is either landfilled or exported to Europe for energy recovery contrary to the Waste Hierarchy, the proximity principle, the principle of self-sufficiency and Ireland's policy to support indigenous treatment capacity.

The Proposed Tonnage Increase will provide an additional 90,000 tpa of capacity for managing residual waste, in addition to the facility's licensed 600,000 tpa. Review of EMWR waste management data for 2017 indicated that there is likely to be approximately 615,000 tpa of municipal waste either landfilled or exported, even with the Facility operating at its existing licensed capacity of 600,000 tpa. Table 3-6 shows that the actual data from 2019 indicates that in reality a total of 770,000 t of residual municipal waste were exported or landfilled.

The Proposed Tonnage Increase at the Facility will recover waste that is currently either disposed of to landfill or exported for energy recovery outside of Ireland and will ensure compliance with the Waste Framework Directive which requires Member States to be self-sufficient in the recovery of municipal waste.

The primary purpose of the WtE process is to provide an environmentally sound outlet for waste which is non-recyclable and to meet the requirements of the Circular Economy as required in EU Legislation and Government Policy. The Facility forms a key component of an integrated waste management system which falls within the "recovery" tier of the waste hierarchy: it diverts non-recyclable residual waste from landfill, recovers valuable energy and treats residual waste that remains following the separation of material for recycling. By doing so, it also assists in meeting EMWR's target to Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The operation of the Facility is consistent with the on-going policies of the Irish Government to encourage householders and businesses to segregate plastics at source for recycling, and to increasing the recycled content of plastic products. Because of the high calorific value of plastics, the presence of a high level of plastic in the residual waste steam would have a deleterious effect on the operating capacity of the Facility, and therefore policies which would remove recyclable plastics from the residual waste stream would be beneficial to the operation of the Facility. The Government's policies to increase recycling efforts therefore complement with Proposed Tonnage Increase.

This is consistent with the waste hierarchy and the proximity principles set out in the EU's Waste Framework Directive, and as reflected in Ireland's waste management policy.

The COVID-19 outbreak highlighted that the co-processing of MSW in cement kilns is potentially vulnerable to disruption. Expansion of capacity at the Facility will therefore increase the resilience of Ireland's waste management infrastructure to future disruptions.

3.4.1 Waste Generated by the Proposed Tonnage Increase

As described in the Chapter 2 Project Description, the main waste materials generated by the Facility are IBA and APCR.

Both IBA and APCR are exported from Ireland to authorised facilities in the EU for recycling (in the case of IBA) or recovery (in the case of APCR).

3.4.1.1 Incinerator Bottom Ash

IBA is currently exported to the Netherlands which recovers the metals (ferrous and non-ferrous). It is proposed that prior to the end of 2021 this process will take place within Ireland, subject to licensing and consenting requirements.

The remaining bottom ash material is used as an aggregate in road building, non-structural concrete products or landfill cover material.

Utilising IBA in both the recovery of metals and for aggregate in road building manner in the future will reduce reliance on virgin materials.

3.4.1.2 Air Pollution Control Residue and Boiler Ash

APCR and boiler ash is exported to the NOAH AS facility at Langoya Island, Norway and the K&S Salt mines facility in Germany. At Langoya, the APCR is used to neutralise waste sulphuric acid, and at K&S the APCR is used to backfill mine voids – both are classified as recovery operations.

The types of waste received, and the pollution control equipment utilised at the Facility are not expected to vary from the current situation, and therefore the quantities of IBA, APCR and boiler ash generated by the Facility are expected to increase in proportion to the increase in capacity, i.e. by 15%. This is not expected to cause any significant impacts to the existing management arrangements for these residual wastes.

The quantities of waste generated in 2019 and the expected additional waste generated by the expansion in capacity are shown in Table 3-8.

Table 3-8 Waste Generated by the Facility

	Waste generated in 2019 (actual), tonnes	Estimated additional waste generated by capacity increase (tonnes per annum)
Ferrous metals	10,178	1,527
Non-ferrous metals	7,865	1,180
Incinerator bottom ash	117,748	17,662
Air pollution control residues and boiler ash	29,433	4,415

3.4.2 Cumulative Impacts

The Proposed Tonnage Increase is intended to recover waste so it will result in a net reduction rather than increase in waste that needs to be managed by other means. The cumulative impacts of the Proposed Tonnage Increase in the wider context of waste management in Ireland are already considered in this chapter. The waste management assessment presented also describes how the specific waste streams generated by the Proposed Tonnage Increase (IBA, boiler ash and APCR) will be managed and that the receiving facilities (which are located in Europe and receive waste from many countries) have adequate capacity to accept these wastes. Therefore, no further cumulative waste management impacts are expected.

3.5 Summary

In summary:

- This chapter described the regulatory and policy context for waste management in Ireland as it applies to the use of energy-from-waste as one part of a sustainable waste management system; provided a discussion of the current methods of managing waste in Dublin and Ireland as a whole, and how the Proposed Tonnage Increase will continue to be a key component of the waste management system; and described the residual wastes that would be generated by the Proposed Tonnage Increase and how they would be managed;
- EPA data shows that there is still a relatively large amount of residual waste within Ireland and in the Eastern Midlands Region which is either landfilled or exported to Europe for energy recovery contrary to the Waste Hierarchy, the proximity principle, the principle of self-sufficiency and Ireland's policy to support indigenous treatment capacity;
- The Proposed Tonnage Increase at the Facility will recover waste that is currently either disposed of to landfill or exported for energy recovery outside of Ireland and will ensure compliance with the Waste Framework Directive which requires Member States to be self-sufficient in the recovery of municipal waste;
- The types of waste received, and the pollution control equipment utilised at the Facility are not expected to vary from the current situation, and therefore the quantities of IBA, APCR and boiler ash generated by the Facility are expected to increase in proportion to the increase in capacity, i.e. by 15%. This is not expected to cause any significant impacts to the existing management arrangements for these residual wastes; and
- The cumulative impacts of the Proposed Tonnage Increase in the wider context of waste management in Ireland are already considered in this chapter. No further cumulative waste management impacts are expected.

Chapter 04: Alternatives

04

4. Alternatives

4.1 Introduction

A critical requirement of the EIA process is the consideration and presentation of reasonable alternatives studied which are relevant to the key project decisions in the context of environmental impact. An EIAR should include an outline of the main alternatives studied by the developer and an indication of the main reasons for the final choice, taking in account the environmental effects. This chapter describes the reasonable alternatives considered and the main reasons for the selection of the preferred option under each of these headings.

The EIA Directive requires an EIAR to contain: "*A description of the reasonable alternatives (for example in term of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effe*cts (EU, 2014).

The Department of Housing, Planning and Local Government's (DHPLG) 'Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment' (DHPLG, 2018) state: "*Reasonable alternatives may relate to matters such as project design, technology, location, size and scale. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment. For example, some projects may be site specific so the consideration of alternative sites may not be relevant. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. A 'mini- EIA' is not required for each alternative studied.*"

Pursuant to EC's 'Environmental Impact Assessment of Projects, Guidance on the preparation of Environmental Impact Assessment Reports' (Directive 2011/92/EU as amended by 2014/52/EU) (EC, 2017) and to Section 3.4.1 of the EPA's draft EIAR guidelines (EPA, 2017), the consideration of alternatives also needs to be cognisant of the fact that "*in some instances some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location'…*". The draft guidelines are also instructive in stating: "*Analysis of high-level or sectoral strategic alternatives cannot reasonably be expected within a project level EIAR… It should be borne in mind that the amended Directive refers to 'reasonable alternatives… which are relevant to the proposed project and its specific characteristics*".

It is important to note that the proposed increase in the annual intake of waste at the Facility does not require the delivery of any new physical infrastructure or construction works. Therefore, this EIAR chapter only considers alternatives to the proposed operation of the Facility and does not assess any alternative infrastructure onsite.

To satisfy this requirement, the following key project decisions were evaluated:

- Alternative Locations; and
- Alternative Processes.

Alternative designs, technology, size or scale were not considered relevant for the assessment, as no physical amendments to the consented operational facility are necessary to facilitate the proposed tonnage increase.

4.2 Alternative New Facility On Greenfield Site

The current site has an established use of waste management and is now part of the essential waste recovery infrastructure of the greater Dublin area.

The selection of the existing Facility to take the Proposed Tonnage Increase of waste minimises all of the environmental effects associated with constructing a new WtE facility on a new site. Developing a new WtE facility on a new site would require the acquisition of new land, the construction of a new waste processing building and supporting infrastructure (offices etc.) and potentially the provision of new services. As outlined in Chapter 2 Project Description, the existing WtE plant and equipment at the existing Facility has the capacity to accept and process the increased waste quantities within the specifications of its current design, no additional land resources would be required to facilitate the increase.

The existing Facility is the preferred location due to the following:

- Environmental Considerations
  - Avoidance of the use of a greenfield site; and
  - Capacity to minimise potential impacts to sensitive receptors.
- Development Considerations
  - Site is currently occupied by the Operator;
  - Existing authorisation to accept waste; and
  - Existing processing capacity.
- Infrastructure Considerations
  - Proximity to greater Dublin Area; and
  - Existing site services that can accommodate the increase in tonnages.

4.3 Alternative Processes

4.3.1 Disposal (Landfill)

An alternative option to the proposed increase of waste to be accepted at the Facility would be the transfer of the forecasted municipal waste volumes to various landfills across the region.

Table 4-1 indicates that there has been a significant decrease in the availability of landfills accepting municipal waste over the last 12 years. The number of landfills accepting this type of waste has fallen from 120 in 1992 to three in 2019, which are currently operating with a total capacity of 383,000 tpa (Table 4-2)[4]. However, the residual MSW competes with industrial bottom ash, Construction and Demolition (C&D) wastes and secondary MSW materials for scarce void space.

It was identified in the 2019 'Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022 Bulletin' that disposal void space was 98% utilised by the end of Q4 2019 (WMPLA, 2020).

Table 4-1 Number of Operational Landfills, 2007-2019

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Number of landfills accepting municipal waste for disposal	29	31	28	28	21	18	11	9	6	7	5	5	3

Table 4-2 Landfills Accepting Municipal Waste for Disposal, 2020

Authorisation Number	Facility Name and Location	Waste for Disposal (maximum tonnes per annum)
W0146	Knockharley Landfill Co. Meath	88,000[5]
W0165	Ballynagran Residual Landfill Co. Wicklow	175,000
W0201	Drehid Waste Management Facility Co. Kildare	120,000
	Total	383,000

[4] The EPA's data release does not include inert waste landfills.

[5] Note that whilst the EPA data indicates that Knockharley Landfill has an annual capacity of 175,000 tpa, it is understood that due to planning constraints, the actual capacity of the facility is 88,000tpa.

Disposing of municipal waste to landfill would therefore create significant pressure on scare void capacity of the existing landfills. Both Drehid Waste Management Facility (ABP ref No. 300506)[6] and Knockharley Landfill (ABP ref No. 303211)[7] have submitted planning applications to increase waste intake at their facilities; however, these have not yet been consented and as discussed below, disposal of waste to landfill has been identified as the least favourable waste management option.

The EMRWMP 2015-2021 has made several assumptions with regard to the phasing out of landfills as a repository for residual waste, and as outlined in the EPA's 2016 'Ireland's Environment - An Assessment' "*it would be a retrograde step if the quantity of municipal waste disposed to landfill were to start to increase again*" (EPA, 2016). A number of EU directives have also set targets for recovery of waste and its diversion away from landfill. This sentiment is further echoed in Department of Communications, Climate Action and Environment publication; 'A Waste Action Plan for a Circular Economy Ireland's National Waste Policy 2020-202'", which offers that "…*In addition, the Landfill Directive has been amended to require that by 2035 no more than 10% of MSW goes to landfill*". This concept is further discussed in Chapter 3 Waste Management.

It has been identified that in countries with a low share of landfilling and high rate of recycling, waste treatment can have an overall positive impact on greenhouse gas (GHG) emissions i.e. has an overall effect of reducing GHGs from the economy as a whole ('Municipal Waste Management in Ireland', European Environment Agency, prepared by David Watson, 2013) (Watson, 2013).

The waste sector, including solid waste disposal, was responsible for 1.5% of Ireland's GHG emissions in 2018 (EPA, 2020). Emissions from the waste sector decreased by 3.2% in 2018, with decreases in the following subcategories; landfills, and wastewater treatment and discharge of 3.5% and 0.2% respectively. Overall emissions decreased by 0.03 Mt CO_2 equivalent (CO_2eq) compared to 2017 emissions.

It has been identified that long-term decreases include decreased quantities of MSW disposed of at landfills and a decrease in the proportion of organic materials (food and garden waste) in MSW. Improved management of landfill facilities, including increased recovery of landfill gas utilised for electricity generation and flaring is also a big driver in decreased emissions from the waste sector.

Figure 4-1 shows a sensitivity analysis performed on the With Existing Measures (WEM) scenario[8]. This scenario is based on an additional 350,000 tpa requiring landfill management in Ireland, which would result in an increase in emissions by approximately 1.2 Mt CO_2eq over the 2019-2030 projected period (EPA, 2020).

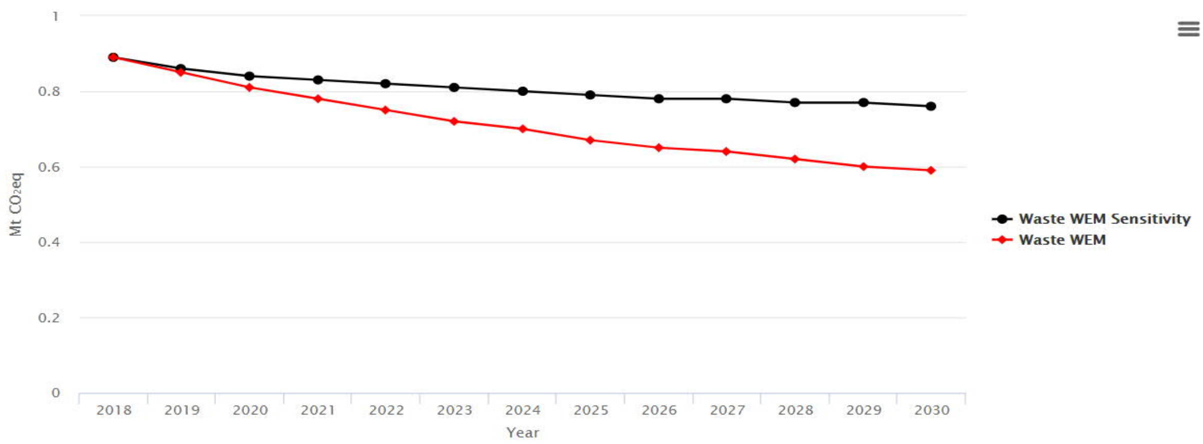


Figure 4-1 Projections from the Waste Sector under the WEM scenario out to 2030, including a Sensitivity Assessment for the WEM Scenario based on an Increase in Municipal Solid Waste going to Landfill (*Source: EPA, 2020*)

[6] New non-hazardous landfill providing for 250,000 tpa; 15,000 tpa metals recovery; Increase in intake for composting from 25,000 up to 45,000 tpa; development of a hazardous landfill to accept up to 85,000 tpa.

[7] An increase in the rate of waste acceptance up to 440,000 tpa comprising up to 435,000 t of non-hazardous wastes, including 150,000 t IBA, as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, C&D wastes and baled recyclables. In addition, the acceptance of up to 5,000 tpa of stable non-reactive hazardous waste is proposed.

[8] The WEM scenario assumes that no additional policies and measures beyond those already in place by the end of 2018 (latest national GHG inventory), are implemented (EPA, 2020).

Disposal of waste to landfill in Ireland has therefore been identified as the least desirable waste management option, as illustrated in the EPA's Waste Hierarchy (Figure 4-2), which sets out the order in which options for waste management should be considered based on environmental impact. The overall intent of the hierarchy is to highlight waste management options, and to move waste management away from landfill into options in the upper tiers.

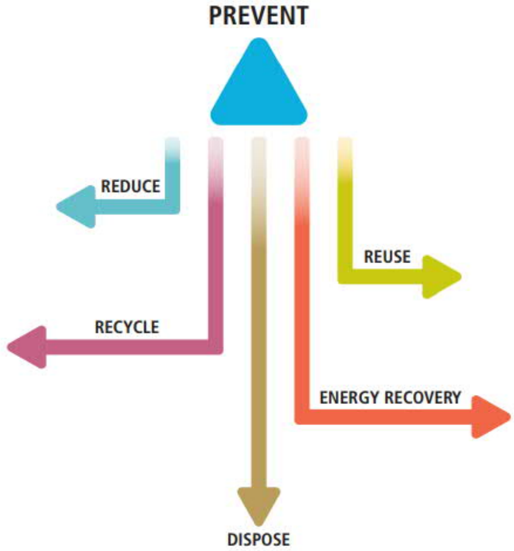


Figure 4-2 Waste Hierarchy (*Source: EPA, 2016*)

Taking the above into consideration, the alternative option to transfer the forecasted municipal waste volumes to various landfills across the region would not comply with Ireland's waste management objectives as set out in the Waste Action Plan 2020 – 2025, the EMRWMP 2015 – 2021 and would be in breach of the Landfill Directive and the Waste Framework Directive and their transposing regulations and the waste hierarchy.

4.3.2 Increase Recycling Capacity

Despite the objective to increase recycling capacity in Ireland, there will still be a need for the management of residual MSW that cannot be recycled.

Table 4-2 and Table 4-3 below show total waste generation for two different recycling rate scenarios, as well as the estimated residual waste generated, and the capacity to process this waste based on current capacity (including the commissioning of the pyrolysis plant in Offaly in 2021) (WMPLA, 2020).It is important to note that the tables include for an estimate of a secured export rate of 350,000 tpa.

Table 4-2 Scenario 1 Recycling rate 2020 remaining at 41% (Summary of MSW Projections – 2020, 2021 and 2022 (Quantities in Tonnes)

	2020	2021	2022
MSW	3, 089, 921	3, 151, 170	3, 214, 098
Recycling Rate	41%	42%	43%
Balance for Treatment/Disposal	1, 823, 053	1, 827, 679	1, 832, 035
Residual Waste Capacity	1, 750, 000	1, 780, 000	1, 815, 000
Deficit	74, 053	47, 679	17, 036

Source: *Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022 Bulletin (WMPLA, 2020)*

Table 4-3 Scenario 2 Recycling rate 2020 remaining at 42% (Summary of MSW Projections – 2020, 2021 and 2022 (Quantities in Tonnes)

	2020	2021	2022
MSW	3, 089, 921	3, 151, 170	3, 214, 098
Recycling Rate	42%	43%	44%

	2020	2021	2022
Balance for Treatment/Disposal	1, 792, 154	1, 796, 167	1, 767, 754
Residual Waste Capacity	1, 750, 000	1, 780, 000	1, 815, 000
Deficit	42, 154	16, 167	--

Source: Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022 Bulletin (WMPLA, 2020)

With an estimated export rate of 350,000 tpa, the results shown in the tables still indicate a potential shortfall in capacity to process residual MSW in the range of 42, 000 to 73, 000 t for 2020 in the absence of progress on the provisions of waste infrastructure in Ireland (WMPLA, 2020). Therefore, the Proposed Tonnage Increase if consented will reduce the potential shortfall in capacity identified and will also reduce Ireland's reliance on export of waste overseas, which is discussed in the following section. Even once the apparent capacity gap shown in Tables 4-2 and 4-3 has closed, there will still be a need to recover in Ireland the 350,000 tonnes of residual waste which is annually exported.

4.3.3 Export of Waste Overseas

The export of residual MSW overseas continues to be a significant activity required for the essential management of residual MSW generated in Ireland (WMPLA, 2018; 2020). In 2019, 370, 346 t of residual MSW was exported overseas for thermal treatment (WMPLA, 2020), generally in continental Europe (EMWR, 2015; WMPLA, 2020). As outlined above, it is anticipated that a capacity deficit in the range of 42,000 to 73,000 t for residual MSW will occur in 2020 despite an estimated export rate of 350,000 tpa. Therefore, if consented, the additional proposed 90,000 tpa will further reduce Ireland's reliance on export of waste overseas in compliance with the core proximity principle and self-sufficiency waste principles.

A growing dependence on the export market may lead to an over-reliance on overseas markets to manage waste in Ireland, which will in turn have consequences for national policy ambitions of becoming self-sufficient in treating residual wastes in indigenous thermal recovery facilities (EMWR, 2015). There is also uncertainty as to the length of time capacity in Central and Northern European facilities will remain at current levels.

In addition to this, the export of waste overseas reduces the potential energy output exported to the national grid from thermal processing in Ireland. For example, an export rate of 350,000 tpa equates to c. 36MW which is enough to power c.60,000 homes per annum. Therefore, the need for the Ireland to become more self-sufficient in waste management has been identified, as outlined in Policy A4 of the EMRWMP which states:

"*Aim to improve regional and national self-sufficiency of waste management infrastructure for the reprocessing and recovery of particular waste streams, such as mixed municipal waste in accordance with the proximity principle. The future application of any national economic or policy instrument to achieve this policy shall be supported*".

4.3.4 Thermal Coprocessing (Cement Kilns)

Recovery of residual MSW in Ireland is achieved through direct thermal treatment, as well as co-processing in the cement manufacturing process. In 2019, cement kilns processed circa 223, 500 t of SRF in 2019 (WMPLA, 2020).

As outlined in the 2020 'Interim Report, Performance of the Waste Sector in Ireland, Covid 19 - Initial Restrictions Phase', once construction activity was suspended in Ireland, all cement kilns closed as the demand for cement reduced. This resulted in a reduction in the treatment of SRF from waste, which accounts for 240, 000 t of municipal solid waste annually. As a result, thermal coprocessing was identified as a vulnerable waste management option that is heavily reliant on the strength and growth of the construction industry. Additional capacity at a dedicated energy-from-waste facility such as the Facility therefore provides a greater degree of resilience in the waste management system, when compared to co-processing in cement kilns.

4.3.5 Do-Nothing Alternative

There is a clearly defined national need established in 2015 and confirmed in 2019 for additional thermal treatment capacity in Ireland in order to manage the forecasted growing volumes of municipal waste. The do-nothing alternative means that the Proposed Tonnage Increase in annual intake of waste at the Facility would not be achieved and therefore alternative waste management options would need to be considered, including disposal to landfill, export overseas and thermal coprocessing. This is not compatible with aspirations for Ireland becoming self-sufficient in the treatment of residual waste, or the Landfill Directive and the Waste Framework Directives.

4.4 Summary

In summary:

- The Proposed Tonnage Increase would enable the Facility to process an additional 90,000 tpa, which is more sustainable both in terms of national residual waste treatment and energy generation, than the current alternatives of landfill or the export of waste overseas. It also would reduce the reliance on thermal coprocessing, which has been identified as a vulnerable waste management option that is heavily reliant on the strength of the construction industry;
- The Proposed Tonnage Increase at the extant Facility would obviate the environmental impacts associated with the construction of any new facility to provide equivalent capacity; and
- The capacity is available immediately at the existing Facility, subject to revision of the IE Licence, without any requirement for additional plant or investment.

Chapter 05: Population and Human Health

05

5. Population & Human Health

5.1 Introduction

This chapter of the details the findings of an assessment of the likely significant effects on population and human health as a result of the Proposed Tonnage Increase in the annual intake of waste at the Facility from the permitted 600,000 tpa to 690,000 tpa.

The appraisal of likely significant effects of the Proposed Tonnage Increase on population and human health has been conducted by reviewing the current socio-economic environment and the potential impact on this environment at multiple spatial scales. As the Proposed Tonnage Increase does not involve any construction works or changes to the design or infrastructure of the Facility, this assessment will focus on impacts to:

- Amenity and local communities (effects on amenity uses of a site or of other areas in the vicinity);
- Employment; and
- Human health and well-being (to consider the impact of the Proposed Tonnage Increase on the health and wellbeing of the communities).

This chapter describes the relevant national legislation; assessment methods used; baseline conditions; potential direct and indirect population impacts during the Proposed Tonnage Increase including potential effects on amenity and local communities, employment and potential human health and well-being impacts of the Proposed Tonnage Increase; mitigation measures; and relevant residual effects.

5.2 Legislation and Guidance

The following national legislation is directly applicable to the Proposed Tonnage Increase in terms of the assessment of population and human health effects:

- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017);
- Draft 'Advice Notes for Preparing Environmental Impact Statements' (EPA, 2015);
- 'Guidelines on the Information to be contained in Environmental Impact Statements' (EPA, 2002); and
- 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (EPA, 2003).

5.3 Methodology

5.3.1 Methodology for Determining Baseline Conditions and Sensitive Receptors

5.3.1.1 Baseline Conditions

A baseline community profile will help to establish an in-depth understanding of the population situated within close proximity to the Facility where the Proposed Tonnage Increase is sought, identifying potentially vulnerable groups. In order to gather baseline information pertaining to employment, demographics, human health and local amenities, a robust desktop study has been undertaken, drawing on information from the following sources:

- Central Statistics Office (CSO);
- DCC; and
- ABP.

Baseline data collection for the population and human health assessment has therefore considered the communities and areas of land which may be potentially impacted by the Proposed Tonnage Increase. The impact areas for certain impacts such as human health, amenities and community facilities, and local land uses have been informed by other assessments during the assessment stage of the EIAR.

5.3.1.2 Study Area

As there is no national guidance available on an appropriate study area to focus the assessment of population and human health, the study area for the population and human health assessment has considered all receptors in the surrounding areas of land which may be potentially impacted by the Proposed Tonnage Increase. The study area has been defined with reference to the potential for impact from the Proposed Tonnage Increase using professional judgement and based on availability of relevant information. It should be noted, however, that it is not always possible to determine the catchment area for community facilities. Residents of an area may utilise facilities located within different districts, counties or regions without regard for statutory boundaries.

5.3.2 Methodology for Determining Operational Effects

Effects on amenity and local communities, employment opportunities and human health are described using the criteria provided in EPA guidance (EPA, 2015;2017) and the National Health Service's (NHS) London 'Healthy Urban Development Unit's (HUDU) Rapid Health Impact Assessment Tool' (NHS, 2019), as detailed in the following sub-sections.

5.3.2.1 Amenity and Local Communities

The assessment on amenity and local communities is concerned with how the Proposed Tonnage Increase potentially impacts on the ability of residents and users of community and recreational facilities to achieve enjoyment and/or quality of life.

Assessing the impact of the Proposed Tonnage Increase on amenity and local communities has taken into account the effects from other assessment topics (Air quality, Noise and Traffic) which could affect people's enjoyment of a community facility, open space, public right of way or residential property. Due to the nature of the Proposed Tonnage Increase, the amenity and local communities' assessment only considers the indirect effects on the amenity of properties and/or community resources in the study area. As there is no physical construction activity as a result of the Proposed Tonnage Increase, direct effects (i.e. properties and/or facilities being cut off or split) are not considered within the assessment on amenity and local communities.

In assessing this, a descriptive approach has been used which gives an overall indication of the change in the amenity of the receptor. The assessment considers the sensitivity and magnitude of receptors and is based on professional judgement using a four-point scale of high, medium, low and very low. Depending on the type of receptor being assessed, the magnitude of effect considers the number of users and the extent to which these users experience impacts on their amenity.

5.3.2.2 Employment Opportunities

This assessment includes all potential direct, indirect and induced effects on the workforce in Dublin and the surrounding area. There is no consolidated methodology or practice for assessing the impact on employment in EPA guidance. The impacts of the Proposed Tonnage Increase on employment have therefore been assessed qualitatively based on potential jobs which the Proposed Tonnage Increase may create. This assessment will determine whether the Proposed Tonnage Increase has the potential to facilitate direct and indirect jobs. Direct jobs include the workforce that would be required to operate the Proposed Tonnage Increase. Indirect jobs would include those created in the supply chain to operate the Proposed Tonnage Increase.

5.3.2.3 Human Health

The human health assessment includes impacts on the health of residents of properties and users of community resources in the study area. Whilst relevant guidance from the Institute of Public Health in Ireland (IPH), specifically the 'Health Impact Assessment Guidance' (IPH, 2009), has been considered, there is no consolidated methodology or practice for describing effects on human health in EPA guidance. The impacts of the Proposed Tonnage Increase on human health will therefore be assessed qualitatively using the human health determinants set out in the 'HUDU Planning for Health: Rapid Health Impact Assessment Tool' (NHS, 2019). Whilst not designed or specifically developed for Ireland, a checklist approach will provide a broad overview of the potential health impacts and is applicable to a wide range of proposals. The checklist is split into 11 broad determinants and is based on the World Health Organisation (WHO) publication 'Healthy Urban Planning' (WHO, 2006).

The WHO Europe defines health as "*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*" (WHO, 2006). Consequently, public health encompasses general wellbeing, not just the absence of illness. Some effects are direct and obvious, others are indirect, while some may be synergistic, with different types of impact acting in combination. In keeping with this definition, this assessment considers the potential impacts of the Proposed Tonnage Increase on physical, mental and social health.

Factors that have the most significant influence on the health of a population are called 'determinants of health'; these include an individual's genetics and their lifestyle, the surrounding environment, as well as political, cultural and societal issues. The interrelationship between these factors is shown in Figure 5-1.

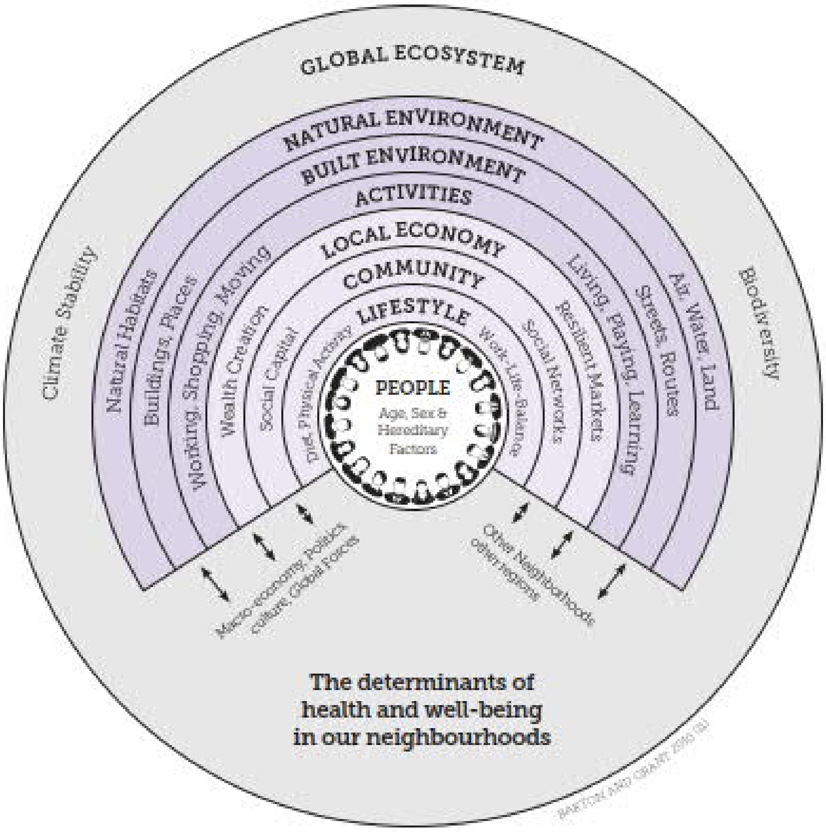


Figure 5-1 Social Determinants of Health (Source: Barton and Grant (2006))

An initial scoping exercise was undertaken to determine the health determinants within the 'HUDU Planning for Health: Rapid Health Impact Assessment Tool' (NHS, 2019) which are relevant to this assessment. The following health determinants in the 'HUDU Planning for Health: Rapid Health Impact Assessment Tool' are associated with construction activities or the provision of new physical infrastructure and were not deemed to be of relevance to the Proposed Tonnage Increase and therefore have been scoped out:

- Housing design and affordability;
- Access to health and social care services and other social infrastructure;
- Accessibility and active travel;
- Crime reduction and community safety;
- Access to healthy food; and
- Social cohesion and inclusive design.

The health determinants which will be assessed as part of this chapter are listed below:

- Access to open space and nature;
- Air quality, noise and neighbourhood amenity;
- Access to work and training;
- Minimising the use of resources; and
- Climate change.

HUDU advises that the tool is generic and should be adapted to local circumstances. This assessment of human health effects includes the likely direct and indirect and cumulative effects once the Proposed Tonnage Increase is operational. Potential impacts on the health and well-being of the existing local community and residents has been considered, in particular for more vulnerable groups (such as children and the elderly). Health inequalities have also been considered. Mitigation and enhancement measures for the operational phase (some of which may have already been considered through the development of the Proposed Tonnage Increase) have been considered and key indicators for monitoring health and well-being impacts moving forward have been established. This qualitative approach does not draw on specific receptors and significance levels and will not seek to conclude the significance of impacts.

5.3.3 Classification of Effects and Significance Criteria

For amenity and local communities and employment opportunities, conclusions on the classification of effects have been made by assessing the magnitude of impact, combined with the sensitivity of resources and receptors to these impacts.

Table 5-1 Type of Effects

Type of Effects	Definition
Beneficial	An impact that is has a potential advantageous or beneficial effect on receptors within a specific geographical area, which may be minor, moderate, or major in effect.
Negligible	An impact that is expected to have imperceptible effects on receptors within a defined area.
Adverse	An impact that is expected to have a disadvantageous or adverse effect on receptors within a specific geographical area, which may be minor, moderate or major in effect.
No effect	An impact that is likely to have no effect on an area or local receptors.

Duration of effect is also considered, with more weight given to permanent changes than to temporary ones.

The impact assessment has been undertaken in accordance with the broad magnitude of impact and sensitivity of receptor definitions summarised in Table 5-2 and

Table 5-3.

Table 5-2 Magnitude of Impact Criteria

Magnitude of Impact	Definition
High	An impact that is expected to have considerable adverse or beneficial effects on receptors. Such impacts will typically affect large numbers of residents, users, businesses or workers. High magnitude impacts will typically be long-term in nature, resulting in the permanent change of the study area's baseline conditions.
Medium	An impact that is expected to have a moderate effect on receptors. Such impacts will typically have a noticeable effect on a limited number of residents, users, businesses or workers, and will lead to a permanent (but not drastic) change to the study area's baseline conditions.
Low	An impact that is expected to affect a small number of residents, users, businesses or workers. Or an impact that may affect a larger number of receptors but without materially changing the study area's baseline conditions. Such impacts are likely to be temporary in nature.
Very Low	An impact that is likely to be temporary in nature, or which is anticipated to have a slight effect on the residents, users, businesses or workers.

Table 5-3 Sensitivity of Receptors

Sensitivity of Receptors	Definition
High	Receptor is likely to be directly affected. Receptor is well placed to take advantage of beneficial impacts, and/or is not well placed to deal with any adverse impacts.
Medium	Receptor is likely to be indirectly affected. Average ability to maximise beneficial impacts or cope with adverse impacts.
Low	Receptor is unlikely to benefit. Receptor is not well placed to take advantage of beneficial impacts, and/or is well placed to deal with any adverse impacts.

Once the magnitude of the impact has been identified, this can be cross-referenced with the importance of the sensitivity of the receptor to derive the overall significance of impact as per the EPA guidelines (EPA, 2017) By bringing together magnitude and sensitivity, the assessment considers the classification of the effects as outlined in Table 5-4. Moderate and Major effects are considered to be significant. Minor and Negligible effects are considered to be not significant.

Table 5-4 Significance Criteria

Sensitivity of Receptors	Definition			
	High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible

The assessment of human health is a qualitative rather than quantitative assessment, due to the diverse nature of health determinants and health outcomes which are assessed. Although the assessment of human health effects describes the likely qualitative health outcomes, it is not possible to quantify the severity or extent of the effects which give rise to these impacts. As such, the potential health impacts are described as outlined in Table 5-5, based on broad categories for the qualitative effects identified. Where an effect has been identified, actions have been recommended to mitigate negative impact on health, or opportunities to enhance health benefits. It should be noted that in many cases, embedded controls to reduce these effects or measures to enhance certain benefits already form part of the existing Facility and the assessment has considered these impacts as such.

Table 5-5 Human Health Impact Categories

Impact category	Impact symbol	Description
Positive	+	A beneficial impact is identified
Neutral	0	No discernible health impact is identified
Negative	-	An adverse impact is identified
Uncertain	?	Where uncertainty as to the overall impact

5.4 Baseline

This section establishes a comprehensive and coherent socio-economic and human health profile of the study area, including consideration of the labour market and health indicators. Dependent on the availability of data from the CSO, the baseline section presents analysis of socio-economic indicators which provides the narrative and evidence base of the current status of the area surrounding the Facility. Baseline analysis in this section sets the context for the potential impacts of the Proposed Tonnage Increase.

The Facility is situated within the Pembroke East A Electoral Division (ED), which itself is situated in the county of Dublin City and the Dublin Regional Authority.

This section establishes the current baseline with regards to the following characteristics relevant to the potential impacts of the Facility:

- Population;
- Labour market indicators; including:
  - Participation rate and unemployment;
  - Education and skills;
  - Occupational profile;
  - Income profile;
- Human health; and
- Local community facilities and land uses.

5.4.1 Population

5.4.1.1 Population

As shown in Table 5-6, the resident population of the Pembroke East A ED was 5,078 (CSO, 2016a). Pembroke East A ED, where the Facility is located, had a higher proportion of working age (19-64 years) residents and lower proportion of retirement age (65+ years) in comparison to the Dublin Regional Authority and the average for Ireland as a whole.

In 2016, 3,617 (71.2%) of the residents in the Pembroke East A ED were aged between 19 and 64 years. The proportion of working age residents in the Pembroke East A ED was noticeably higher than the average recorded for the Dublin Regional Authority (63.4%) and Ireland (60.3%) as a whole. In addition, the Pembroke East A ED had a smaller proportion of residents aged 18 years or under (18.2%) in comparison to the Dublin Regional Authority (23.8%) and Ireland (26.3%). The proportion of residents aged 65 years or older in the Pembroke East A ED (10.5%) was smaller than the average for the Dublin Regional Authority (11.4%) and Ireland (13.4%).

Table 5-6 Population by Age, 2016

	Pembroke East A		Dublin Regional Authority		Ireland	
	No.	%	No.	%	No.	%
Aged 18 years or under	926	18.2	321,038	23.8	1,251,796	26.3
Aged 19-64 years	3,617	71.2	854,762	63.4	2,872,502	60.3
Aged 65 years or over	535	10.5	153,896	11.4	637,567	13.4
Total Population	5,078	-	1,347,359	-	4,761,865	-

Source: Central Statistics Office (CSO) (2016), Census 2016 (CSO, 2016a).

5.4.1.2 Deprivation

The Podal HP Deprivation Index (Haase and Pratschke, 2017) is the primary source for deprivation in Ireland by combining three dimensions of affluence or disadvantage (demographic profile, social class composition and labour market situation) to provide a Relative Index Score for every Small Area in Ireland. The Relative Index Scores are normally distributed around a bell-shaped curve to display the current levels of deprivation compared to other areas, with most areas clustered around the mean and comparatively fewer areas exhibiting extreme levels of affluence or deprivation. The eight classifications for deprivation range from extremely affluent to extremely disadvantaged.

According to the latest data and as shown in Figure 5-2, the Pembroke East A ED is classified as 'marginally above average' (5th least deprived rank out of 8 classifications) in 2016 with a relative score of 2.15. The Pembroke East A ED is surrounded by North Dock ED, South Dock ED, Pembroke West A ED and Pembroke East B which are classified as 'affluent'.

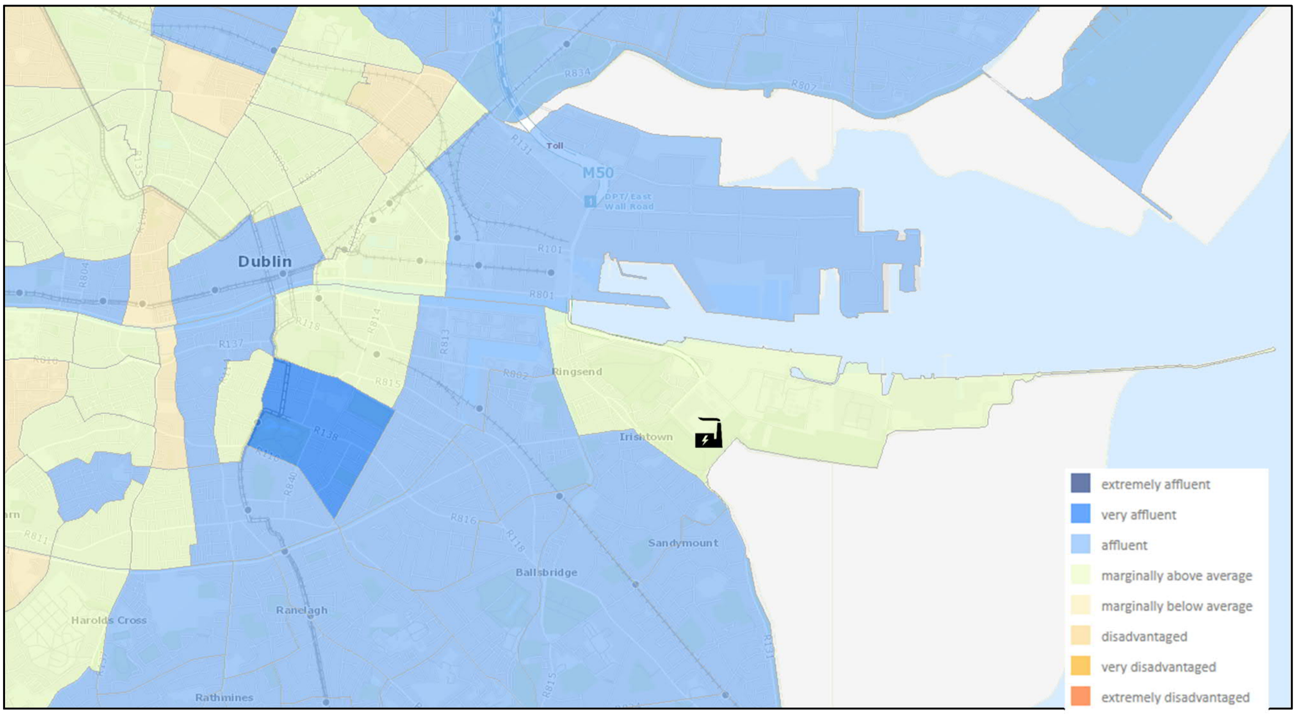


Figure 5-2 Deprivation Index, 2016 (Source: Irish Deprivation Index, (2016). (*Source: [Online]. Available from: https://maps.pobal.ie/WebApps/DeprivationIndices/index.html)*

5.4.2 Labour Market

5.4.2.1 Employment

The Facility currently employs 57 permanent members of staff. Of the permanent members of staff, 3 reside in the Sandymount, Irishtown or Ringsend areas, 3 reside in the City Centre, 31 reside in the wider Dublin area and the remaining 20 reside in the Kildare-Meath area.

A further 10 staff are sub-contracted to the Facility and reside within Irishtown, Ringsend or the City Centre.

5.4.2.2 Participation Rate and Unemployment

The total size of the labour force in Q1 of 2020 in the Dublin Regional Authority was 752,800 (CSO, 2020a). The Dublin Regional Authority had approximately 34,800 unemployed people aged 15 years or over and approximately 718,000 people aged 15 years or over in employment.

The unemployment rate (15-64 years) in the Dublin Regional Authority (4.6%) in Q1 of 2020 was slightly lower than the national average (4.7%). Similarly, the participation rate (15 years+) in the Dublin Regional Authority (65.7%) was higher than the national average (62.3%).

5.4.2.3 Live Register

The Live Register is used to provide a monthly series of the numbers of people (with some exceptions) registering for Jobseekers Benefit or Jobseekers Allowance or for various other statutory entitlements at local offices of the Department of Social Protection. Table 5-7 shows that the proportion of residents in the Dublin Regional Authority (37.2%) on the Live Register for twelve months or more is higher than the national average (32.4%).

Table 5-7 Live Register, 2020

Indicator	Dublin Regional Authority		Ireland	
	Claimants	%	Claimants	%
Claiming for under 12	30,872	62.8%	149,204	67.6%
Claiming for over 12	18,292	37.2%	71,667	32.4%
Total	49,164	-	220,871	-

Source: CSO (2020b); Live Register

5.4.2.4 Education and Skills

The working-age residents within Dublin City are generally well-qualified. Table 5-8 shows that 35.9% of residents within Dublin City are qualified to Ordinary bachelor's degree / professional qualification and above, which is considerably higher than the recorded national average (28.5%). Dublin City (1.5%) also recorded a lower proportion of residents with no formal education in comparison to the national average (1.7%).

Table 5-8 Highest Level of Education Completed, 2016

Indicator	Dublin City		Ireland	
	No.	%	No.	%
No formal education	5,807	1.5%	52,214	1.7%
Primary	43,102	11.3%	334,284	10.8%
Lower secondary	44,219	11.6%	449,766	14.5%
Upper secondary	56,059	14.7%	573,643	18.5%
Technical/vocational	25,005	6.6%	271,532	8.8%
Advanced certificate/completed	14,191	3.7%	182,318	5.9%
Higher certificate	14,340	3.8%	153,351	5.0%
Ordinary bachelor	27,047	7.1%	237,117	7.7%
Honours bachelor	50,756	13.3%	331,293	10.7%
Postgraduate diploma or degree	53,063	13.9%	284,107	9.2%
Doctorate (Ph.D.)	5,897	1.5%	28,759	0.9%
Not stated	41,268	10.8%	198,668	6.4%
Total	380,754	-	3,097,052	-

Source: CSO (2016a); *Census 2016.*

5.4.2.5 Occupational Profile

Socio-economic group (SEG) classifies the entire population into one of ten groups based on the level of skill and educational attainment of the occupation (of those at work, unemployed or retired) while all other persons are classified to the socio-economic group of the person in the family on whom they are deemed to be dependent.

The strong qualifications profile in Dublin City has translated to the residents holding high-level occupations. The relative proportion of people working as employers and managers in the local authority of Fingal (13.3%) is broadly in line with the average for Ireland (13.6%). Similarly, Dublin City (8.7% and 12.7%) had a proportion of people working as higher professionals and lower professions in comparison to Ireland (6.5% and 12.7%).

Dublin City (6.2%) also has a lower proportion of manual skilled workers in comparison to the national average (8.0%). Similarly, Dublin City (6.8%) had a lower proportion of semi-skilled workers in comparison to the national average (8.3%).

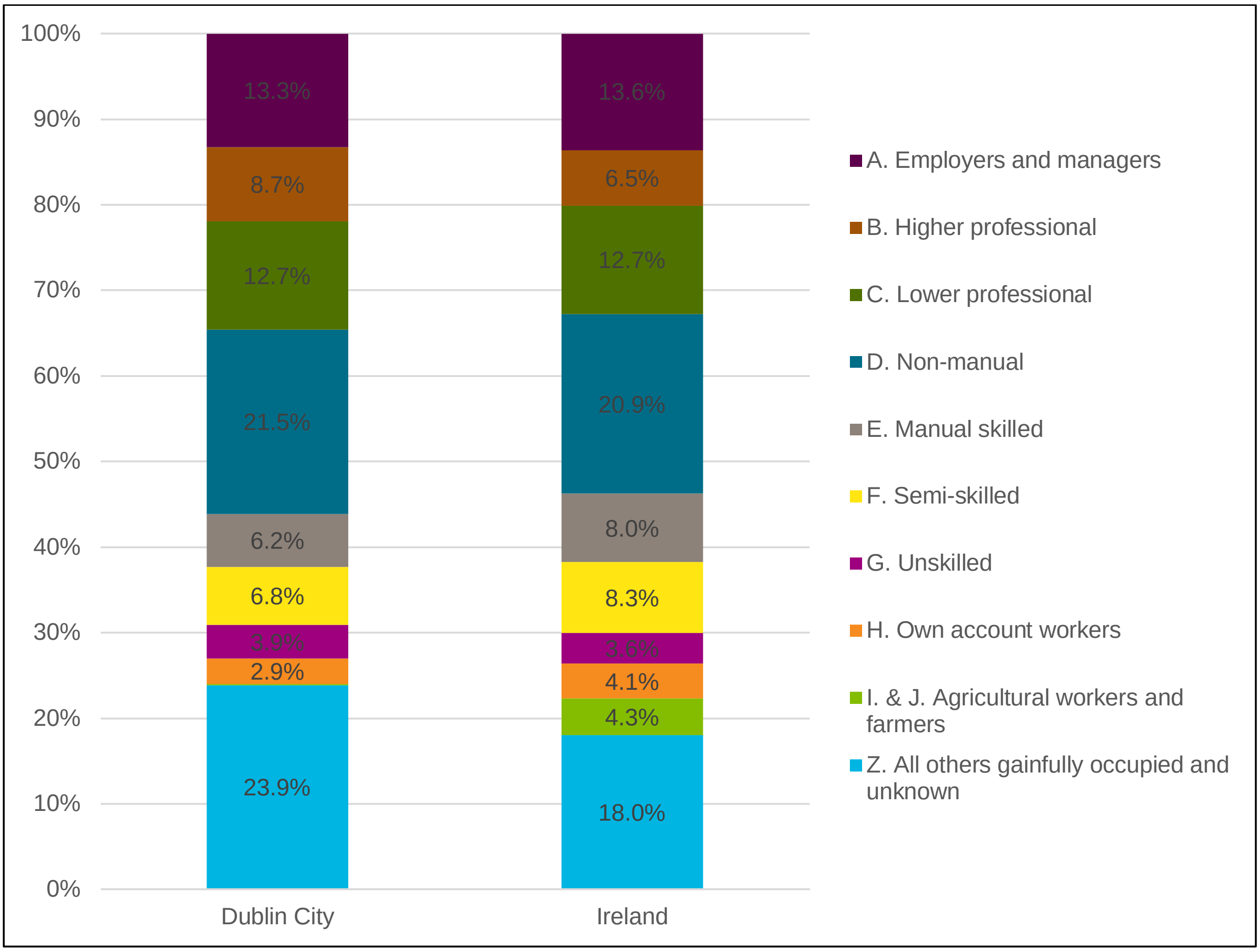


Figure 5-3 Occupational Profile by Socio Economic Group (15+ years) (%), 2016 (Source: CSO (2016a); Census 2016).

5.4.2.6 Income

Income levels in Dublin City are noticeably higher than across the national average, likely helped by the high-level occupations that the residents in Dublin City tend to hold. The median household annual income in Pembroke East A ED in 2016 was €52,841, comfortably higher than the median rate for Ireland (€45,256). The median household weekly income within the Pembroke East A ED is greater than the average for Dublin City – as displayed in Table 5-9.

Table 5-9 Household Income, 2016

Indicator	Pembroke East A ED	Dublin City	Ireland
Median household annual income (€)	52,841	47,294	45,256

Source: CSO, Geographic Profiles of Income in Ireland (2016) (CSO, 2016b).

5.4.3 Human Health

5.4.3.1 Life Expectancy

The life expectancies in the Dublin Regional Authority and Ireland have been increasing in recent years creating an ageing population, a trend that is currently being experienced across most developed countries. In 2016, male residents in the Dublin Regional Authority were expected to live to 80.1 years whilst female residents were expected to live to 83.4 years, compared to 78.3 years and 82.7 years respectively in 2011 (CSO, 2020c). The life expectancies in 2016 are broadly in line with the country's averages (79.6 years for males and 83.4 years for females).

5.4.3.2 Self-Perceived Health

The health conditions in Pembroke East A ED are broadly in line with the averages for Dublin City and Ireland. In 2016, 83.0% of the population aged 15 years and over in Pembroke East A ED considered themselves to be in very good or good health, which is broadly in line with the rate for Dublin City (82.8%) but lower than the overall rate for Ireland (87.0%).

Within Pembroke East A ED, 2.2% of residents considered themselves to be in bad or very bad health, which is broadly in line with the rate for Dublin City (2.0%) but higher than the overall rate for Ireland (1.6%).

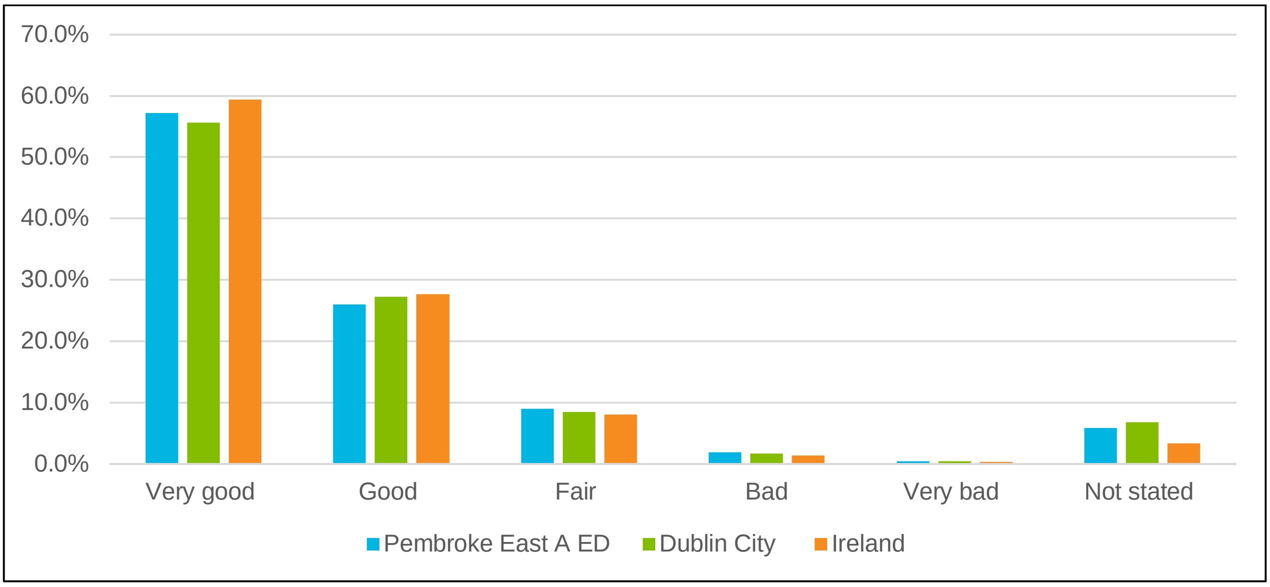


Figure 5-4 Health Conditions for All Persons Aged 15+ Years, 2016 (*Source: CSO (2016a); Census 2016*)

5.4.3.3 Disabilities

In 2016, a total of 771 people (15.2%) within Pembroke East A ED stated that they had a disability. This is higher than the rate recorded in both Dublin City (14.7%) and Ireland (13.5%) as a whole.

5.4.3.4 Physical Activity

Most residents aged 15 and over in the Dublin Regional Authority (73%) are not limited at all in their daily activities, with 24% limited slightly and only 3% considered to be severely limited. This profile broadly aligns with the national results, where 72% are not limited at all, 24% are limited slightly and 4% are severely limited. However, the residents in the region of Dublin tend to engage in more physical activity than the country's average.

Figure 5-5displays the proportion of residents aged 15 and over undertaking physical activity in the Dublin Regional Authority and Ireland. A greater proportion of residents in the Dublin Regional Authority walk and cycle to get to and from places. Similarly, a greater proportion of residents in the Dublin Regional Authority partake in sports, fitness or recreational physical activities and muscle strengthening activities.

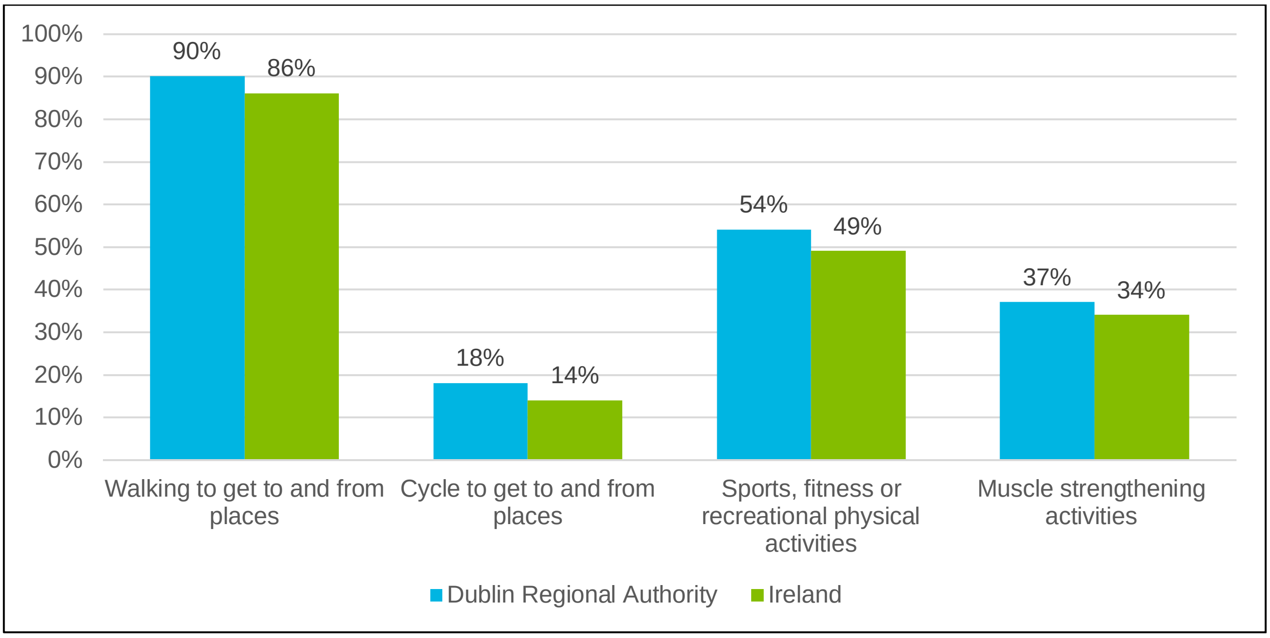


Figure 5-5 Physical Activity Undertaken for All Persons Aged 15+ Years, 2015 (*Source: CSO (Ireland) (2015), Irish Health Survey 2015)*

5.4.3.5 Mental Health

The Irish Health Survey reports the mental health status of residents (aged 15 year and over). In 2015, 72% of residents stated they experience no or minimal depression in the Dublin Regional Authority, which was marginally lower than across Ireland (74%). The full mental health statistics for Dublin Regional Authority and Ireland are shown in Table 5-10, which indicates on the whole residents in the Dublin Regional Authority experience similar levels of depression as residents across the county.

Table 5-10 Mental Health Status for All Persons Aged 15+ Years

Mental Health Indicator	Dublin Regional Authority	Ireland
None to minimal depression	72%	74%
Mild depression	19%	18%
Moderate depression	6%	5%
Moderately severe or severe depression	3%	3%

Source: CSO (Ireland) (2015), Irish Health Survey 2015.

5.4.4 Local Community Facilities and Land Uses

5.4.4.1 Local Community Facilities and Land Uses

Located on the south bank of Dublin Port, the area surrounding the Facility is predominately made up of industrial activities including energy generation (Poolbeg Generating Station and ESB Dublin Bay Power Plant), wastewater and sewage treatment (Celtic Anglian Water), manufacturing (Ecocem) and waste management (Hammond Lane Metal Recycling and All Away Waste and Skip Hire).

However, there are a number of community facilities within close proximity to the Facility. This includes a number of sports facilities such as the Irishtown Stadium, Cambridge Boys Football Club, Clanna Gael Fontenoy GAA Club, Ringsend Soccer Field, Ringsend Tennis Courts and Ringsend Outdoor Basketball Court. This cluster of outdoor sports facilities is located approximately 1.2 km west of the Facility. Sean Moore Park and Ringsend Park are located east (800 m and 1.3 km respectively) of the Facility. Poolbeg Yacht and Boat Club is also located approximately 1 km to the east of the Facility, whilst the Half Moon Swimming & Water Polo Club is located 2.3 km east of the Facility along The Great South Wall.

Despite the industrial characteristics of the Poolbeg Peninsula, there are a number of publicly accessible open and natural spaces. The Irishtown Nature Park, a small man-made park, is located immediately south east of the Facility. Poolbeg Beach, popular with kitesurfers, is located approximately 500 m east of the Proposed Tonnage Increase.

Both the Irishtown Nature Park and Poolbeg Beach form part of several kilometres of walking trails along the Poolbeg Peninsula all the way along The Great South Wall and Poolbeg Lighthouse. Dublin Bay, another beach, is located immediately south of the Facility.

The nearest existing residential properties to the Proposed Tonnage Increase are located approximately 1km to the east in Ringsend. In addition to residential properties, Ringsend is home to Ringsend College, St Patrick Boys National School, Ringsend GNS and Ringsend Creche, Pre-School, After School and Childcare.

Subject to modifications, the Poolbeg West SDZ was approved by ABP on 9th April 2019. Located immediately south west of the Facility, the 34 ha site is expected to deliver between 3,000 and 3,500 additional residential units. The Poolbeg West SDZ is also expected to accommodate 80,000–100,000 m^2 of commercial floorspace, providing employment for up to 8,000 workers. Part of the SDZ is required to provide additional port capacity as part of Dublin Port Company's anticipated growth from a throughput of 30 Mt to 77 million tpa by 2040.

Additional residential properties are located in Irishtown and Sandymount, which are both situated south of Ringsend. Both Irishtown and Sandymount contain a number of community facilities including sport facilities, educational institutions, shops and open spaces. The Aviva Stadium and the Shelbourne Park Greyhound Stadium are located on the western bank of the River Dodder, approximately 1.8 km from the Facility.

5.4.4.2 DWtE Community Gain Fund

A Community Gain Liaison Committee and a Community Gain Fund were established for the catchment area of Irishtown, Ringsend and Sandymount in accordance with Planning Permission (REF: 29S.EF2022) and Industrial Emissions Directive Licence (REF: W0232-01) which were granted by ABP and the EPA respectively.

The Committee developed the DWtE Community Gain Fund Grant Scheme which is an agreed mechanism to assess and provide funding for proposals from local community groups, voluntary organisations, environmental, arts and educational groups, sports clubs, individuals and businesses for the development of environmental, community, educational and recreational projects. Priority is given to projects that enhance their local area and in so doing provide the maximum opportunity to advance community, educational, recreational and environmental initiatives.

The DWtE Community Gain Fund is funded by the Operator and the disbursement of grants is facilitated by DCC. As per the application by DCC for approval under section 226 of the Planning and Development Acts, 2000 to 2020, a number of planning conditions were established to ensure that the operators of the Facility should contribute towards the cost of environmental, recreational or community facilities which will be of benefit to the community in the area. As such, Planning condition 3 is presented below:

> *"A community gain fund shall be established to support facilities and services which would be of benefit to the community in the general catchment area. This fund shall include a once-off capital contribution equivalent to 3% of the capital cost of the facility and an annual contribution per tonne of waste accepted for thermal treatment at the plant. The annual contribution shall be €1 per tonne in the first year following commissioning of the plant and thereafter shall be updated in accordance with the consumer price index"* (ABP, 2007).

The local area which benefits from qualifying projects comprises the areas of Irishtown, Ringsend and Sandymount, as defined in Figure 5-6.

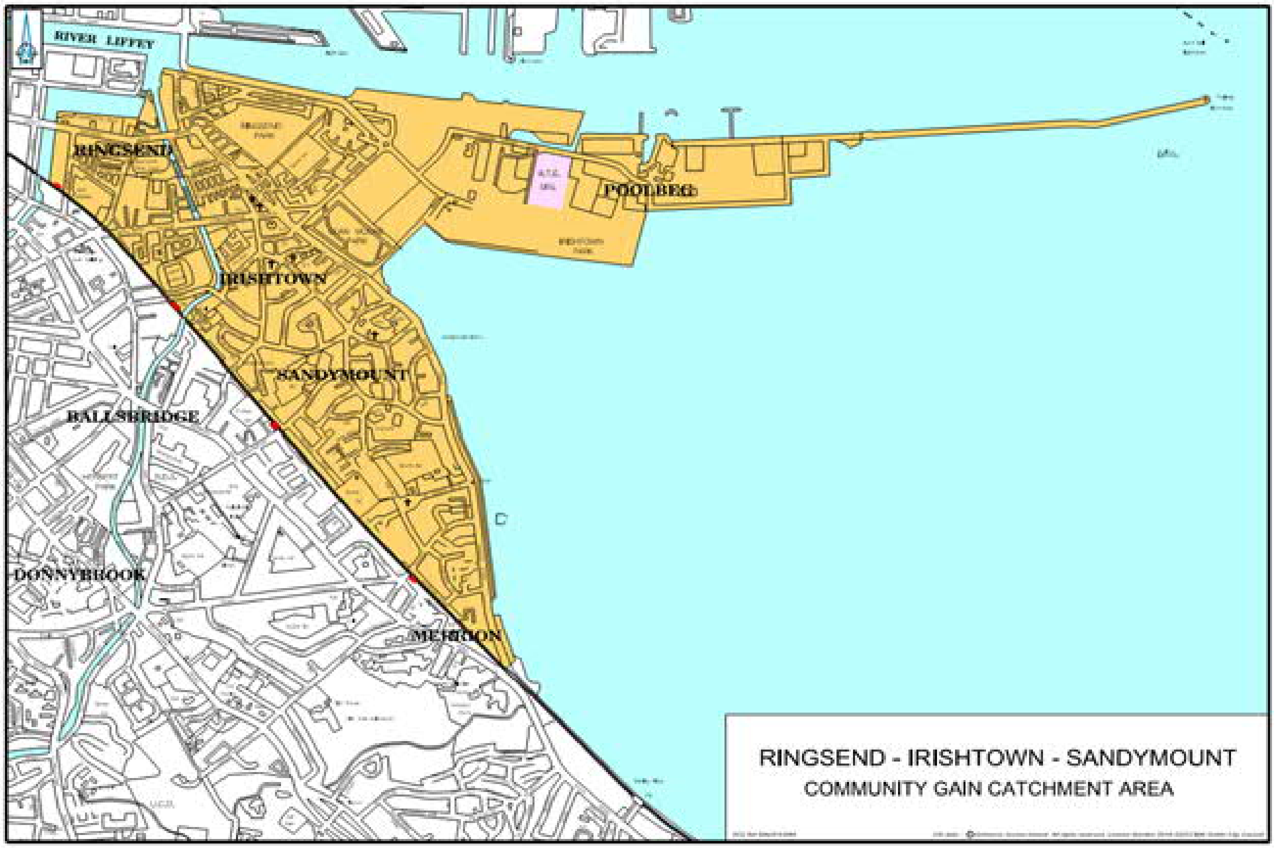


Figure 5-6 DWtE Community Gain Fund (Source: Dublin City Council, (2020), The Community Gain Liaison Committee (Source: *Online, Available at: http://www.dublincity.ie/cglc/community-gain-projects-grant-scheme (DCC, 2020)*))

Between 2016 and 2019, the DWtE Community Gain Fund provided €10.4 million of grand funding towards a variety of projects which support community-based clubs, groups, voluntary organisations, educational groups, individuals or businesses in the development of educational, environmental, community and recreational projects in the Irishtown, Ringsend and Sandymount areas.

5.5 Assessment of Impacts

5.5.1 Amenity and Local Communities

In regard to noise creation associated with the Facility, the Proposed Tonnage Increase will not result in any significant change to the local noise environment. Operational working hours and WtE plant operation will not change. An additional 20 WDVs movements is predicted per day, however these are not considered to result in a likely significant effect to the existing noise environment. In addition, all noise monitoring data from the WtE plant operations has indicated full compliance with noise limits. Therefore, the amenity of community facilities, open space, public right of ways or residential properties will not be compromised by noise as a result of the Proposed Tonnage Increase.

In regard to emissions to air associated with the Proposed Tonnage Increase will not result in any significant change to the local air quality environment. More specifically, air quality emission data has indicated emissions from the WtE stacks are expected to be well within the relevant ELV as defined in the IE Licence. Modelling also indicated that the air quality impacts (NO_2, PM_{10} and $PM_{2.5}$) from site-specific traffic (waste delivery and service vehicles) is not significant. Therefore, the amenity of community facilities, open space, public right of ways or residential properties will not be compromised by air quality as a result of the Proposed Tonnage Increase.

Traffic generation associated with the Proposed Increase Tonnage will not result in any significant change to the existing road network. An assessment of WDVs showed that their average carrying capacity was greater than forecasted in the original planning application. As such, forecasted traffic to the Facility is not likely to result in a significant effect on the existing road network within the study area during the AM and PM peak times under all scenarios. Therefore, the amenity of community facilities, open space, public right of ways or residential properties will not be compromised by traffic impacts as a result of the Proposed Tonnage Increase.

The Facility will also continue to support community-based clubs, groups, voluntary organisations, educational groups, individuals or businesses in the development of educational, environmental, community and recreational projects in the Irishtown, Ringsend and Sandymount areas through the DWtE Community Gain Fund, as per condition 3 of the initial planning permission. The Proposed Tonnage Increase at the Facility will also result in additional funding being provided to further support the DWtE Community Gain Fund (DCC, 2020).

Considering the range of air quality, noise and traffic effects which are dependent on the location of the receptors, the sensitivity of the affected local residents is assessed to be medium and the impact would be very low. Taking into account the results from the air quality, noise and traffic assessments, there are no residents or users of public rights of way, community facilities or businesses that would experience a significant effect on their amenity during operation of the Facility at an increased capacity of 690,000 tpa. Therefore, this would result in a permanent negligible (not significant) effect on amenity and local communities from a population and human health perspective.

5.5.2 Employment Opportunities

The existing workforce is considered sufficient to manage the new capacity levels at the Facility. As such, no new employment opportunities will be generated, nor will any positions be put at risk. Therefore, there is not expected to be any direct impacts on employment as a result of the Proposed Tonnage Increase.

The sensitivity of residents is assessed to be medium and the impact would be very low. Therefore, the influence of the Proposed Tonnage Increase on access to work and training during operation is assessed to have no effect on residents in the study area.

5.5.3 Human Health

This section summarises the impact of the Proposed Tonnage Increase on human health and well-being, structured by health determinants as set out in the 'HUDU Planning for Health: Rapid Health Impact Assessment Tool' (NHS, 2019).

5.5.3.1 Access to Open Space and Nature

Retaining secure, convenient and attractive open/green space can lead to more physical activity and reduce levels of heart disease, strokes and other ill-health problems that are associated with both sedentary occupations and stressful lifestyles. There is also a growing evidence base that suggests access to parks and open spaces and nature can help to maintain or improve mental health (NHS, 2019).

This assessment considers whether the air quality, noise and roads and traffic effects of the Proposed Tonnage Increase are likely to impact the character of open and natural spaces and whether they remain welcoming, safe and accessible for all. In regard to emissions, the Proposed Tonnage Increase will not result in any significant change to the local air quality environment. In regard to noise creation associated with the Facility, the Proposed Tonnage Increase will not result in any significant change to the local noise environment above the emissions limit value stated on the existing IE Licence. Similarly, traffic generation associated with the Proposed Tonnage Increase will not result in any significant change to the existing road network.

Therefore, it is expected that the Proposed Tonnage Increase will not impact upon the ability to access and enjoy existing open and natural spaces within the study area. As such, the existing provision of open and natural spaces is expected to remain welcoming, safe and accessible for all. Consequently, the impact of the Proposed Tonnage Increase on access to open space and nature as a determinant of human health and well-being is assessed to be neutral (0).

5.5.3.2 Air Quality, Noise and Neighbourhood Amenity

The quality of the local environment can have a significant impact on physical and mental health. Pollution caused by traffic and commercial activity can result in poor air quality, noise nuisance and vibration. Poor air quality is linked to incidence of chronic lung disease (chronic bronchitis or emphysema), heart conditions and asthma levels among children and young people. Noise pollution can have a detrimental impact on health resulting in sleep disturbance, cardiovascular and psycho-physiological effects. Good design and the separation of land uses can lessen noise impacts (NHS, 2019).

In regard to emissions, the Proposed Tonnage Increase will not result in any significant change to the local air quality environment (NO_2, PM10 and $PM_{2.5}$) as a result of the combined effects of stack emissions and road traffic emissions. More specifically, the Proposed Tonnage Increase only resulted in one receptor being predicted to experience a slight adverse increase in NO_2 concentrations; however, this did not exceed European standards or the upper Irish air quality thresholds. Similarly, the predicted changes in annual mean concentrations of PM_{10} and $PM_{2.5}$ were also considered to be not significant with no exceedances of the European standard or the upper or lower Irish air quality thresholds. Therefore, the Proposed Tonnage Increase is not predicted to lead to any exceedances of the European standard or the upper or lower Irish air quality thresholds.

Noise creation associated with the Proposed Tonnage Increase will not result in any change to the local noise environment. In addition, all noise monitoring data has indicated full compliance with noise limits. Therefore, local residents will not be exposed to noise annoyance and sleep disturbance as a result of the Proposed Tonnage Increase.

Traffic generation associated with the Proposed Increase Tonnage will not result in any significant change to the existing road network. An assessment of WDVs showed that their average carrying capacity was greater than forecasted in the original planning application. As such, forecasted traffic to the Facility is not likely to result in a significant effect on the existing road network within the study area during the AM and PM peak times under all scenarios. Therefore, levels of air and noise pollution are not expected to be compromised by traffic impacts as a result of the Proposed Tonnage Increase. Therefore, the impact of the Proposed Tonnage Increase on air quality, noise and neighbourhood amenity as a determinant of human health and well-being is assessed to be neutral (0).

5.5.3.3 Access to Work and Training

Employment and income are key determinants of health and wellbeing. Unemployment generally leads to poverty, illness and a reduction in personal and social esteem. Work is also seen to aid recovery from physical and mental illnesses

No direct impacts on employment or training opportunities are expected as a result of the operation of the Proposed Tonnage Increase. In addition, the Proposed Tonnage Increase is also not expected to lead to additional work via local procurement arrangements. Therefore, retaining the existing workforce at the Facility means the impact of the Proposed Tonnage Increase on access to work and training as a determinant of human health and well-being is assessed to be neutral (0).

5.5.3.4 Minimising the Use of Resources

The Facility accepts household, commercial and non-hazardous waste which is thermally treated at the facility. The main process building has two identical waste-to-energy lines, each with separate boilers and flue gas cleaning. The two lines supply steam to one high-voltage turbine/generator that is connected to the electrical grid. Therefore, the generation of energy from waste that would otherwise go to landfill or be exported offers an environmental solution to reduce waste and maximise recycling.

Increasing the capacity of the Facility from 600,000 tpa to 690,000 tpa is an intervention that seeks to further reduce waste going to landfill and exportation. Reducing or minimising waste, including disposal, as well as encouraging recycling at all levels can improve human health directly and indirectly by minimising environmental impact. Therefore, the impact of the Proposed Tonnage Increase on minimising the use of resources as a determinant of human health and well-being is assessed to be positive (+).

5.5.3.5 Climate Change

The Facility uses household, commercial and non-hazardous waste as a fuel in a modern, largely renewable, electricity generation process. Waste is fed into combustion chambers where it is combusted at high temperatures and reduced to 10 percent of its original volume. The heat generated from the combustion chambers heats up water in steel tubes that form the walls of the combustion chambers. The water is converted to steam and delivered to a turbine that continuously generates electricity.

Increasing the capacity of the Facility from 600,000 tpa to 690,000 tpa is an intervention that seeks to produce additional clean energy and reduce the amount of waste going to landfill. However, there are a variety of aggregated GHG emissions associated with the increased capacity at the Facility, including increased emissions from the combustion of waste, together with the reduced emissions avoided as a result of diverting waste from landfill and avoiding the need to generate electricity from the Combined Cycle Gas Turbine (CCGT) power station capacity in the absence of the Facility. When avoided emissions from waste disposal and displaced grid electricity are fully considered, the gross annual emissions associated with the Proposed Tonnage Increase decreased from 70,397 tonnes CO_2 equivalent (tCO_2e) to a net annual emission of 3,371 tCO_2e. However, this is not expected to have a significant effect as it does not contribute to more than 1% of Ireland's total emission target.

There is a clear link between climate change and health. Mitigating climate change is expected to reduce health inequalities as those in the poorest health are generally hit the hardest by the impacts of climate change. Whilst there is minor adverse increase in GHG emissions as a result of the Proposed Tonnage Increase, the impact of the Proposed Tonnage Increase in terms of climate change as a determinant of human health and well-being is assessed to be neutral (0).

5.5.4 Cumulative Impacts

The Proposed Tonnage Increase was also considered in combination with other consented, planned and reasonably foreseeable projects that could result in cumulative impacts on population and human health within the study area of influence. A planning search of such projects was made within a 5 km radius of the Facility over the previous 5-10 years was completed the findings of which are outlined in Chapter 2 Project Description, Table 2-1 and Appendix A2-1. The below identifies, for each type of effect, whether there are likely to be cumulative effects.

5.5.4.1 Amenity and Local Communities

Whilst the majority of planning applications listed in Table 2-1 and Appendix A2-1 will require construction activities, the Proposed Tonnage Increase does not involve any construction works or changes to the design or infrastructure. Therefore, there are no cumulative impacts associated with amenity and local communities during construction.

The assessment provided in Section 5.5.1 identified that the Proposed Tonnage Increase would result in a permanent negligible (not significant) effect on amenity and local communities from a population and human health perspective. This assessment considered the air quality, noise and traffic generation associated with the Proposed Tonnage Increase and the potential impacts on the amenity of community facilities, open space, public right of ways or residential properties during operation. As such, greater consideration as to the cumulative impacts associated with air quality and traffic are considered within the respective chapters where appropriate.

5.5.4.2 Employment Opportunities

Whilst the majority of planning applications listed in Table 2-1 and Appendix A2-1 will require a construction workforce, the Proposed Tonnage Increase does not involve any construction works or changes to the design or infrastructure. Therefore, there are no cumulative impacts associated with construction employment opportunities.

The assessment provided in Section 5.5.2 identified that the Proposed Tonnage Increase would lead to no new operational employment opportunities. Therefore, the cumulative impacts on operational employment opportunities are not expected to be significant.

5.5.4.3 Human Health

Whilst the majority of planning applications listed in Table 2-1 and Appendix A2-1 will require a construction workforce, the Proposed Tonnage Increase does not involve any construction works or changes to the design or infrastructure. Therefore, there no cumulative impacts associated with human health during construction.

The assessment provided in Section 5.5.3 identified that the Proposed Tonnage Increase would lead to no negative human health impacts during operations. As such, the Proposed Tonnage Increase will not contribute towards any cumulative impacts associated with human health during operation.

5.5.5 Mitigation and Monitoring

The assessed impacts on amenity and local communities and employment opportunities associated with increasing the capacity of the Facility from 600,000 tpa to 690,000 tpa are expected to be not significant. Similarly, the assessed impact on the relevant human health determinants associated with increasing the capacity of the Facility from 600,000 tpa to 690,000 tpa are expected to be neutral or positive. Therefore, no specific mitigation and monitoring measures are required. This said, the Facility will continue to provide funding for community-based clubs, groups, voluntary organisations, educational groups, individuals or businesses in the development of educational, environmental, community and recreational projects in the Irishtown, Ringsend and Sandymount areas through the DWtE Community Gain Fund, as per Planning condition 3 of the planning permission. The increase in capacity at the Facility will result in additional funding being provided to further support the DWtE Community Gain Fund.

5.6 Summary

As part of the assessment of impacts on population, the overall classification and significance of each effect has been assessed across the study area. A summary of the potential effects on population is identified in Table 5-11.

Table 5-11 Population Summary of Potential Effects

Description of Effect	Sensitivity of Receptor	Nature of Effect / Geographic Scale	Magnitude of Impact	Initial Classification of Effect (with embedded controls)	Additional Mitigation	Residual Effect Classification and Significance
Operation						
Amenity and Local	Medium	Permanent / Local	Low	Negligible	None	Negligible (not significant)
Employment Opportunities	Medium	Permanent / Local	Low	No Effect	None	No Effect (not significant)

As part of the assessment of impacts on human health, the overall classification each health determinant has been assessed across the study area. A summary of the potential effects on human health is identified in Table 5-12.

Table 5-12 Human Health Summary of Potential Effects

Health Determinant	Potential Health Impact	Mitigation	Residual Effect Classification
Operation			
Access to Open Space and Nature	Neutral (0)	None	Neutral (0)
Air Quality, Noise and Neighbourhood Amenity	Neutral (0)	None	Neutral (0)
Access to Work and Training	Neutral (0)	None	Neutral (0)
Minimising the Use of Resources	Positive (+)	None	Positive (+)
Climate Change	Positive (0)	None	Positive (0)

Chapter 06: Land and Soils

06

6. Land and Soils

6.1 Introduction

The EIA Scoping identified no pathway to sensitive land and soil receptors and therefore no likely significant effects from the Proposed Tonnage Increase. This chapter therefore focuses on the baseline land and soils environment only. The EIA Scoping Report is provided in Appendix A1-1.

6.2 Legislation and Guidance

The legislation and guidance applicable to the baseline is as follows:

- EIA Directive (EU, 2014);
- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)) (EU, 2018);
- European Union Water Framework Directive (WFD) (2000/60/EC) (as amended). The following legislation in Ireland governs the shape of the WFD characterisation, monitoring and status assessment programmes in terms of monitoring different water categories, determining the quality elements and undertaking characterisation and classification assessments:
  - European Communities (Water Policy) Regulations, 2003 (Statutory Instrument (S.I.) No. 722 of 2003) as amended;
  - European Communities Environmental Objectives (Surface Water) Regulations, 2009 ('S.I. No. 272 of 2009 as amended'), as amended in 2012 (by S.I. No. 327/2012), 2015 (by S.I. No. 386/2015) and 2019 (by S.I. No. 77/2019);
  - European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) as amended in 2011 (by S.I. No. 389 of 2011), 2012 (by S.I. No. 149 of 2012) and 2016 (by S.I. No. 366 of 2016);
- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017);
- 'Guidelines for Preparation of Soils, Geology, Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013); and
- 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland', containing Draft Interim Guideline Values (IGVs) for the Protection of Groundwater (EPA, 2003);

6.3 Methodology

The methodology for determining the land and soils baseline environment involved desktop review of the following information:

- EPA's Online Map Viewer[9];
- Geological Survey Ireland's (GSI) website for public viewer and groundwater maps[10];
- 'Annual Environmental Report for Dublin Waste To Energy Ltd.' (AER) (Heffernan, 2020);
- 'Attachment 4.8.3 Site Condition Report, Sub Section 4.8, IE Licence Application ID LA003577' (AECOM, 2019); and
- 'Dublin Waste to Energy Project, Environmental Impact Statement' (Eslam Engineering, 2006).

[9] https://gis.epa.ie/EPAMaps Accessed 15/07/2020
[10] GSI map viewer Accessed 15/07/2020

6.4 Baseline

6.4.1 Facility Footprint and Surrounding Area

As outlined in Section 2.3.2, Chapter 2 Project Description, the principal part of the Facility covers an area of approximately 5.5 ha (13.6 acres) in area of reclaimed land which was formally Dublin Bay Foreshore (AECOM, 2019). This was infilled between 1970 and 1976, the current coverage of the Facility comprises hardstanding and the main process building occupies approximately 2.6 ha of the area, with the remaining 2.9 ha consists of soft and hard landscaping and internal road infrastructure. Topography at the Facility has a very gentle slope of 1.5 m from north to south with the highest area to the north at approximately 5 m AOD.

The Facility is surrounded to the north, east and west by a mixture of industrial uses. Pigeon House Road and a landscaped area lies to the immediate north of the Facility; a disused hardstanding area to the south; Shellybanks Road, Alan Doyle Mechanic, Dublin Bay Power Plant and a waste management company to the immediate west; and Ringsend MWwTP to the east. Irishtown Nature Park is located to the southeast and a public footpath and shoreline of Dublin Bay is located to the south of the Facility.

Beyond the immediately surrounding land uses, the Facility is surrounded to the north by the Liffey Estuary Lower and Dublin Bay to the south and east. Dublin Port is located to the north of the Facility, across the Liffey Estuary Lower.

6.4.2 Geology

The geology underlying the Facility comprises of the following (AECOM, 2019):

- Made Ground: Areas of tarmacadam and concrete hardstanding and topsoil underlain with gravels, sands, silts and clays including fragments of brick, concrete, glass, timber and cinders. Thickness between 1.6 m and 5.6 m;
- Marine Deposits: loose to medium dense, sandy silt and slightly clayey/silty fine sand. Thickness between 0.3 m and 2.5 m;
- Glacial and Fluvioglacial Deposits: medium to dense, sandy gravel with shell fragments and occasional cobbles and boulders, occasional silty material. Thickness between 10.5 m and 13.3 m;
- Outwash/Glacio-Marine Clay Deposits: upper layer of silt with sand laminations with a thickness between 5.5 m and 6.4 m. The lower layer is described as stiff to very stiff dark grey or black slightly sandy clay with layers and laminations of silt and silty sand with a proven thickness between 15.4 m and 16.5 m; and
- Limestone Bedrock: dark grey, strong, mostly thinly bedded, fine grained limestones with interbedded shales. Localised weathered zones. Rock head depth between 36 m and 45 m below ground level (bgl).

GSI online geological mapping[4] indicates that the bedrock underlying the Facility and surrounding area consists of dark limestone and shale of the Lucan Formation of Dinantian age (early Carboniferous era). These rocks were originally deposited as sediments in a marine basin that opened during continental rifting.

6.4.3 Hydrogeology

The EPA map viewer shows that the Facility is underlain by the Dublin groundwater body (WFD code IE_EA_G_008) which is described by the EPA as a "*Poorly productive bedrock*". The WFD groundwater body Status 2013-2018 quality is classified as 'Good' and has been identified as 'Not At Risk' of failing its WFD objectives.

The closest mapped aquifer is found circa 1 km west and south the Facility and has been categorised by the GSI as "Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones", with groundwater vulnerability classified as 'Low'.

The 'Attachment 4.8.3 Site Condition Report' (AECOM, 2019) documents groundwater levels underlying the Facility at approximately 3 m to 4 m bgl. Shallow groundwater resides within the imported infill material and the level of shallow groundwater is thought to remain close to sea level and may exhibit tidal variation.

The local direction of groundwater flow assessed from groundwater elevations in shallow monitoring wells screened within the infill material, as being to the east, toward the coast. However, as groundwater levels are likely to be influenced by the tide, the shallow groundwater flow direction may vary (AECOM, 2019).

No mapped wells or spring were identified on the GSI map viewer within a 1 km radius of the Facility. While, there is no permitting system to govern well drilling and no requirement to register abstraction wells in Ireland with yields less than 25 m^3/d, due to the likely brackish conditions of groundwater, it is unlikely to be used for potable supply near the Facility (AECOM, 2019).

6.4.4 Ground Conditions

Groundwater is sampled from a monitoring well (GW1) located to the east of the main process building on an annual basis (Appendix A2-2). The groundwater is analysed for a range of parameters as stipulated in the Facility's IE Licence, including potassium, ammonia (as NH_4). The results of the March 2019 groundwater monitoring at GW1, as outlined in the AER (Heffernan, 2020), that were above the level of detection at the laboratory are summarised below (Table 6-1). Table 6-1 also includes the EPA's IGV for the protection of groundwater and Groundwater Threshold Values (GTV's) as set out in the European Communities Environmental Objectives (Groundwater) Regulations S.I, No. 366 2016, against which the groundwater is monitored.

Table 6-1 Groundwater Monitoring Results

Parameter	Groundwater Threshold Value (milligram/litre (mg/l))	Interim Guideline Value (mg/l)	Analytical Result from March 2019 sampling of GW1
Potassium	---	5	**26.4 mg/l**
Ammonia as NH_4	---	0.14	0.015 mg/l
Lead	0.0075	0.01	0.0041 mg/l
Manganese	---	0.05	0.0172 mg/l
Mercury	0.00075	0.001	0.0009 mg/L
Nickel	---	0.02	0.0021 mg/l
Vanadium*	---	---	0.115 mg/l
E. coli*	---	---	5.2 Most Probable Number (MPN)/100 millilitre (ml)
Coliforms*	---	---	25.6 MPN/100 ml

Source: City Analysts Limited 'Certificate of Analysis' (2019 groundwater monitoring results) (Annual Environmental Report, Dublin Waste to Energy (Heffernan, 2020)

As shown in Table 6-1, the parameters detected were below the available guideline values, with the exception of potassium, which was detected above the EPA's IGV for the protection of groundwater. The elevated levels of potassium could be associated with the proximity of the Facility location to Dublin Bay and the tidally influenced groundwater regime.

E. coli (25.6 MPN/100 ml) and Coliforms (5.2 MPN/100 ml) results are above set drinking water standards in Ireland. The acceptable limit for E. coli in drinking water in Ireland is 0 per 100 mls. Any detection of Total Coliforms in a drinking water sample is seen as an exceedance[11]. The results from the groundwater monitoring are likely due to Facility's close proximity to Dublin Bay and not from a source of contamination from the Facility itself. Total Coliforms include bacteria common in soil and groundwater and are therefore not diagnostic of contamination from faecal matter.

Previous investigations summarised in the 'Attachment 4.8.3 Site Condition Report' (AECOM, 2019) included:

- 2003 Geotech Specialists Limited (GSL) Site Investigation;
- 2005 RPS Site Investigation;
- 2005 RPS Soil Sampling;
- 2005 RPS Groundwater Sampling;
- 2005 GSL Site Investigation;
- 2006 ARUP Desk Study; and

[11] Drinking water parameters (Irish Water) Accessed 20/07/2020
* There is no GTV or IGV defined for Vanadium, E. coli or Coliforms.

- 2017 PM Group Soil Reusability Report.

Based on these reports AECOM summarised that local shallow hotspots consisting primarily of immobile petroleum hydrocarbons and poly aromatic hydrocarbons (PAHs) may exist at the Facility due to losses prior to the development of the Facility. Metals exceeded assessment criteria at several locations, most likely due to seawater mixing and due to the nature of the fill used during land reclamation.

Elevated concentrations of major ions, electrical conductivity and several metals including boron, arsenic and zinc are present primarily due the Facility's coastal setting.

No evidence of a separate hydrocarbon layer was noted in any of the groundwater wells sampled as part of the historic investigations listed above. Hydrocarbon droplets were noted at three sample locations during sampling prior to the development of the Facility.

During the development of the Facility between 0.5 m and 1.0 m of soil was removed across the Facility and stockpiled. However, deeper excavations were required in certain areas to meet design requirements. The stockpiled materials were sampled by PM Group in 2017 as part of a soil reusability investigation. The samples were screened against human health and environmental receptor criteria. All excavated materials were found to be suitable for reuse onsite under areas of hardstanding or if capped with soft landscape material with the exception of a small quantity of asbestos tiles recovered during excavations. The majority of the excavated soil was reused onsite. The excess material was disposed offsite as non-hazardous waste. The asbestos tiles were disposed of to a hazardous waste licenced facility for overseas disposal.

6.5 Summary

In summary:

- The Facility is surrounded to the north, east and west by a mixture of industrial uses. Beyond the immediately surrounding land uses, the Facility is surrounded to the north by the Liffey Estuary Lower and Dublin Bay to the south and east. Dublin Port is located to the north of the Facility, across the Liffey Estuary Lower;
- Soils underlying the Facility are associated with reclamation activities and the underlying bedrock is dark limestone and shale of the Lucan Formation of Dinantian age (early Carboniferous era);
- The Facility is underlain by the Dublin groundwater body, which is described as a "Poorly productive bedrock", with groundwater levels underlying the Facility at approximately 3 m to 4 m bgl;
- Recent data outlined in the Facility's AER shows that potassium was detected above the EPA's IGV for the protection of groundwater; however, the elevated levels of potassium seen could be as a result of the proximity of the location of the Facility to Dublin Bay; and
- As the EIA Scoping identified no pathway to sensitive land and soil receptors and therefore no likely significant effects from the Proposed Tonnage Increase, this chapter therefore focuses on the baseline land and soils environment only.

Chapter 07: Water

07

7. Water

7.1 Introduction

This chapter presents a summary of the baseline environment associated with the water. The EIA Scoping report (See Appendix A1-1) identified no likely significant effects to water resources from the Proposed Tonnage Increase; therefore, a detailed EIA assessment is not included.

7.2 Legislation and Guidance

The legislation and guidance applicable to the baseline is as follows:

- EIA Directive (EU, 2014);
- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)) (EU, 2018); and
- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017).

7.3 Methodology

The methodology for determining the water baseline environment involved desktop review of the following information:

- EPA's Online Map Viewer[12];
- GSI website for public viewer and groundwater maps[13];
- Flood information mapping[14];
- 'Site Condition Report, Sub Section 4.8, IE Licence Application ID LA003577' (AECOM, 2019);
- 'Quarterly Environmental Report's from 2018-2020' (DWTE 2018a-2020c); and
- 'Covanta, Dublin Waste to Energy Facility, Pigeon House Road, Dublin 4, (Licence Reg. No. W0232-01), Thermal Plume Surveys of August 1st and 12th 2019*'* (Irish Hydrodata, 2019).

7.4 Baseline

7.4.1 Facility Footprint and Surrounding Area

As outlined in Chapter 2 Project Description and Chapter 6 Land and Soils, the principal part of the Facility is located in an area of reclaimed land which was formally Dublin Bay Foreshore (AECOM, 2019). This was infilled between 1970 and 1976, the current coverage of the Facility comprises hardstanding and the main process building occupies approximately 2.6 ha of the area, with the remaining 2.9 ha consists of soft and hard landscaping and internal road infrastructure.

The Facility is surrounded to the north, east and west by a mixture of industrial uses. Beyond the immediately surrounding land uses, the Facility is surrounded to the north by the Liffey Estuary Lower and Dublin Bay to the south and east.

[12] https://gis.epa.ie/EPAMaps Accessed 16/07/2020
[13] GSI map viewer Accessed 16/07/2020
[14] OPW Flood Maps Accessed 16/07/2020

7.4.2 Surface Water Features

The 'Attachment 4.8.3 Site Condition Report' (AECOM, 2019) outlines that as the Facility is located on reclaimed, and essentially man-made land, there are no known streams or rivers located on the Facility.

The Facility is located within the Dodder_SC_010 Sub-Catchment of the Liffey and Dublin Bay Catchment (No.9), as defined under the WFD, which forms part of the Liffey and Dublin Bay Hydrometric Area (HA09)[15].

The Liffey Estuary Lower (WFD code IE_EA_090_0300) is a transitional water body located within 230 m north of the Facility. The River Dodder is located circa 1.5 km to the west of the Facility, with the River Tolka located circa 2 km to the north of the Facility.

The fully tidal estuarine area of Dublin Bay is located within 200 m south of the Facility.

7.4.3 Water Quality

The transitional waterbody WFD status 2013-2018 for the Liffey Estuary Lower, north of the Facility is listed as 'Unpolluted', The WFD chemical status of the Liffey Estuary Lower was classified as 'Good' for the 2010-2015 WFD period.

The river waterbody WFD status 2013-2018 for the River Dodder to the west of the Facility is categorised as 'Moderate'. The WFD chemical status of the River Dodder is classified as 'Good' for the 2010-2015 WFD period.

The Liffey Estuary Lower, River Dodder and the River Tolka have all been identified of being 'At Risk' of failing to meet their WFD objectives. The river waterbody WFD status 2013-2018 for the River Tolka is currently unassigned by the EPA.

The coastal waterbody WFD status 2013-2018 for Dublin Bay has been classified as 'Good' and is 'Not at Risk' of failing to meet its WFD objectives. However, there have been a number of pollution incidents reported to the EPA of untreated sewage from Ringsend MWwTP entering into rivers that flow into Dublin Bay.

7.4.4 Flood Risk

The Office of Public Works (OPW) flood map[16] for the area indicates that the Facility is not located in an area of prone to flooding. As identified in Chapter 16 Major Accidents and Disasters, the Facility elevation is not liable to flooding, and there are significant flood defences on the north and south side of the peninsula.

7.4.5 Designated Sites

The nearest European site to the Facility is the South Dublin Bay and River Tolka SPA (site code: 004024), part of which adjoins the Facility. This part of the SPA comprises a narrow strip of managed grassland, located between the Ringsend MWwTP to the north, and the scrubby hill comprising the Irishtown Nature Park to the south.

The next nearest European site to the Facility is the South Dublin Bay SAC (site code: 000210).

7.4.6 Hydrogeology

The hydrogeological regime beneath the Facility is described in Chapter 5 Land & Soils Section 6.4.3, with groundwater monitoring results discussed in Section 6.4.4.

7.4.7 Facility Drainage

The following subsections summarise the current drainage system at the Facility. There will be no change to the Facility drainage system outlined as a result of the Proposed Tonnage Increase.

7.4.7.1 Stormwater

A stormwater drainage network serving roofs, roads and parking areas conveys rainwater run-off by gravity from these areas to a 725 m^3 underground attenuation tank where it is stored for reuse on site, where possible. Overflow from the attenuation tank is discharged to the Ringsend MWwTP, when required. All surface water runoff passes

[15] https://www.catchments.ie/- Accessed 16/07/2020
[16] OPW Flood Maps- Accessed 16/07/2020

through a class 1 hydrocarbon interceptor prior to entering the attenuation tank. Prior to discharging to the MWwTP the discharge is tested as per IE Licence requirements. If the water in the attenuation tank is found to be unsuitable for the MWwTP it can be sent for disposal to an off-site licensed disposal facility.

The main process building is served by an isolated drainage system which acts as tertiary containment in the event of a spill within the building.

7.4.7.2 Sewerage and Process Water

Sanitary effluent is discharged to the adjacent Ringsend MWwTP. With the exception of cooling water, all process water is collected in the FGT System at the Facility, unless it is being used for humidification/cooling of the bottom ash outlet. Cooling water from the Facility is discharged to the Liffey Estuary Lower via emission point reference number SW-1.

7.4.8 Surface Water Abstraction

The Operator uses cooling water, which is abstracted from the Liffey Estuary Lower at Dublin Port, to condense steam from the turbine. The cooling water is dosed with very low levels of sodium hypochlorite to prevent biofouling and is discharged back to the Liffey Estuary Lower following use as outlined above. This leads to a slight increase in water temperature (generally 1-2 °C) close to the outfall. The water temperature is continuously monitored to ensure it remains compliant with IE Licence conditions.

There will be no change to the licensed surface water abstraction as a result of the Proposed Tonnage Increase.

7.4.9 Emissions to Water: Monitoring

Monitoring of cooling water discharge at emission point SW-1 takes place on a continuous basis for the following parameters stipulated in the Facility's IE Licence including flow, residual chlorine, temperature and pH. The IE Licence for the Facility and its subsequent Technical Amendments stipulate the following ELVs in relation to emissions to water:

- The temperature rise relative to intake must be less than 9 oC;
- No temperature value, calculated as an hourly average, shall exceed the emission limit value by more than 0.5^{o}C;
- The total residual chlorine (as HOCl) ELV is set as 0.5 mg/l and 0.2 mg/l (as 24-hour average); and
- The maximum volume of cooling water discharge emitted in one day cannot exceed 570, 000 m^3 (14, 040 m^3/hr).
- Monitoring data reported within the Facility's Quarterly Environmental Report's from 2018 and 2020 concluded that there have been no incidents (i.e. concentrations detected above the IE Licence ELVs) relating to cooling water discharges at SW-1 (DWTE, 2018-2020).

With the Proposed Tonnage Increase, the composition of cooling water produced at the Facility will remain within the IE Licence ELVs and the discharge monitoring will continue as outlined.

7.4.9.1 Thermal Survey

Two thermal surveys were previously carried out on April 20th (spring tide) and 24th (neap tide) 2018 to meet the licensing condition that required surveys to be carried out within 12 months of commencement of activity, by Irish Hydrodata Ltd:

> ***Condition 6.17:*** *The licensee shall undertake a thermal survey of the estuary upstream and downstream of the cooling water channel outfall within twelve months of commencement of activity. The licensee shall consult with the Agency on the timing, nature and extent of the survey (to include an assessment of the design and effectiveness of the cooling water discharge system in distributing the thermal load to the estuary, and the optimisation of the ratio between cooling water volume and temperature), and shall develop a survey program to the satisfaction of the Agency. The survey programme shall be submitted to the Agency in writing at least one month before the survey is to be carried out.*

Condition 5.8 requires that surveys be carried out between May 1st and October 30$^{th:}$

> ***Condition 5.8****: No emission or process cooling water shall cause, in the receiving water outside the mixing zone:*

(a) the temperature to exceed the unaffected temperature by more than 1.5°C, during the period 1st May to 30th October

Therefore, two additional thermal surveys were carried out on August 1st (spring tide) and August 12th (neap tide) 2019.

The results from the thermal surveys conducted in 2018 and 2019 show that the licence conditions were met at all stages of the tide. Given the consistency of results, Irish Hydrodata suggested no further surveys are required unless "*dramatic changes*" to the output of the plant, or to the topographical layout of the harbour itself that would change the river flows or cross-section occurred. The survey concluded that the thermal load is unlikely to change until the Facility commences the district heating project and once commissioned, another thermal survey would only then be required (Irish Hydrodata, 2019). Subsequent thermal survey will be conducted when required, as agreed with the EPA.

7.5 Summary

In summary:

- The Facility is surrounded to the north by the Liffey Estuary Lower and Dublin Bay to the south and east. Dublin Port is located to the north of the Facility, across the Liffey Estuary Lower;
- As the Facility is located on reclaimed, and essentially man-made land, there are no known streams or rivers located on the Facility and is not located in an area of prone to flooding;
- The Proposed Tonnage Increase will not result in a change to the existing drainage infrastructure and the licensed wastewater discharge and abstraction limits prescribed in the Facility's IE Licence;
- EIA Scoping identified no likely significant effects from the Proposed Tonnage Increase to sensitive water receivers. The water chapter therefore focuses on the baseline water environment only; and
- Recent data outlined in the Facility's 'Quarterly Environmental Report For Period' from Quarterly Environmental Report's from 2018 and 2020 indicates that there were no incidents relating to cooling water discharges at SW-1. The thermal survey results from 2018 and 2019 show that the licence conditions were met at all stages of the tide.

Chapter 08: Biodiversity

08

8. Biodiversity

8.1 Introduction

The EIA Scoping identified no likely significant effects from the Proposed Tonnage Increase on sensitive ecological receptors. This chapter therefore focuses on the baseline biodiversity environment only. The EIA Scoping Report is provided in Appendix A1-1.

8.2 Legislation and Guidance

The legislation and guidance applicable to the baseline is as follows:

EIA Directive (EU, 2014);

- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)); and
- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017).

8.3 Methodology

The methodology for determining the biodiversity baseline environment involved desktop review of the following information:

- EPA's Online Map Viewer[17];
- EPA's Catchment Maps[18];
- GSI website for public viewer and groundwater maps19;
- 'Annual Environmental Report for Dublin Waste To Energy Ltd.' (AER) (Heffernan, 2020);
- 'Certificate of Analysis' toxicity survey results (City Analysts Limited, 2019);
- 'Dublin Waste to Energy Water Discharge Biological Surveys' (AQUAFACT International Services Ltd, 2018); and
- 'Appropriate Assessment Screening Report, Industrial Emissions (IE) Licence (W0232-01) Review' (AECOM, 2019).

8.4 Baseline

8.4.1 Facility Footprint and Surrounding Area

The Facility is located on the Poolbeg Peninsula in Dublin Bay on the eastern side of Dublin City (Figure 1-1; Chapter 1 Introduction). The Facility is surrounded to the north, east and west by a mixture of industrial uses. Beyond the immediately surrounding land uses, the Facility is surrounded to the north by the Liffey Estuary Lower and Dublin Bay to the south and east. Dublin Port is located to the north of the Facility, across the Liffey Estuary Lower.

The nearby intertidal extents of Dublin Bay are designated as the South Dublin Bay SAC (site code 000210) and the South Dublin Bay and River Tolka SPA (site code 004024). Irishtown Nature Park is located to the southeast.

[17] https://gis.epa.ie/EPAMaps Accessed 17/07/2020
[18] https://gis.epa.ie/EPAMaps/Water Accessed 17/07/2020
[19] GSI map viewer Accessed 17/07/2020

8.4.2 Surface Water Features

Analysis of data from the EPA's web-based mapping application[17] indicates there are no surface water features within or directly adjacent to the Facility. The nearest surface water feature is the Liffey Estuary Lower transitional waterbody, located within 230 m to the north of the Facility. The Liffey Estuary is not designated as a European site; however, it is hydrologically connected to the South Dublin Bay SAC and South Dublin Bay and River Tolka SPA. The transitional waterbody WFD status 2013-2018 for the Liffey Estuary Lower north of the Facility is listed as 'Unpolluted'[18].

The fully tidal estuarine area of Dublin Bay is located within 200 m south of the Facility.

8.4.3 Designated Sites

8.4.3.1 European Designated Sites

As identified in the Appropriate Assessment (AA) Screening Report (AECOM, 2019), the nearest European site to the Facility is the South Dublin Bay and River Tolka SPA (site code: 004024) part of which adjoins the Facility (Figure 8-1). This part of the SPA comprises a narrow strip of managed grassland, located between the Ringsend MWwTP to the north, and Irishtown Nature Park to the south, which has local ecological significance (Eslam Engineering, 2006).This area, known to the Ringsend MWwTP (and in ecology reports relating to same) as '*the compensatory grassland*', was provided as a winter-feeding area for pale-bellied Brent goose *Branta bernicla hrota*, as a planning condition of the 1997 planning permission for the Dublin Bay Project extension to Ringsend MWwTP (AECOM, 2019).

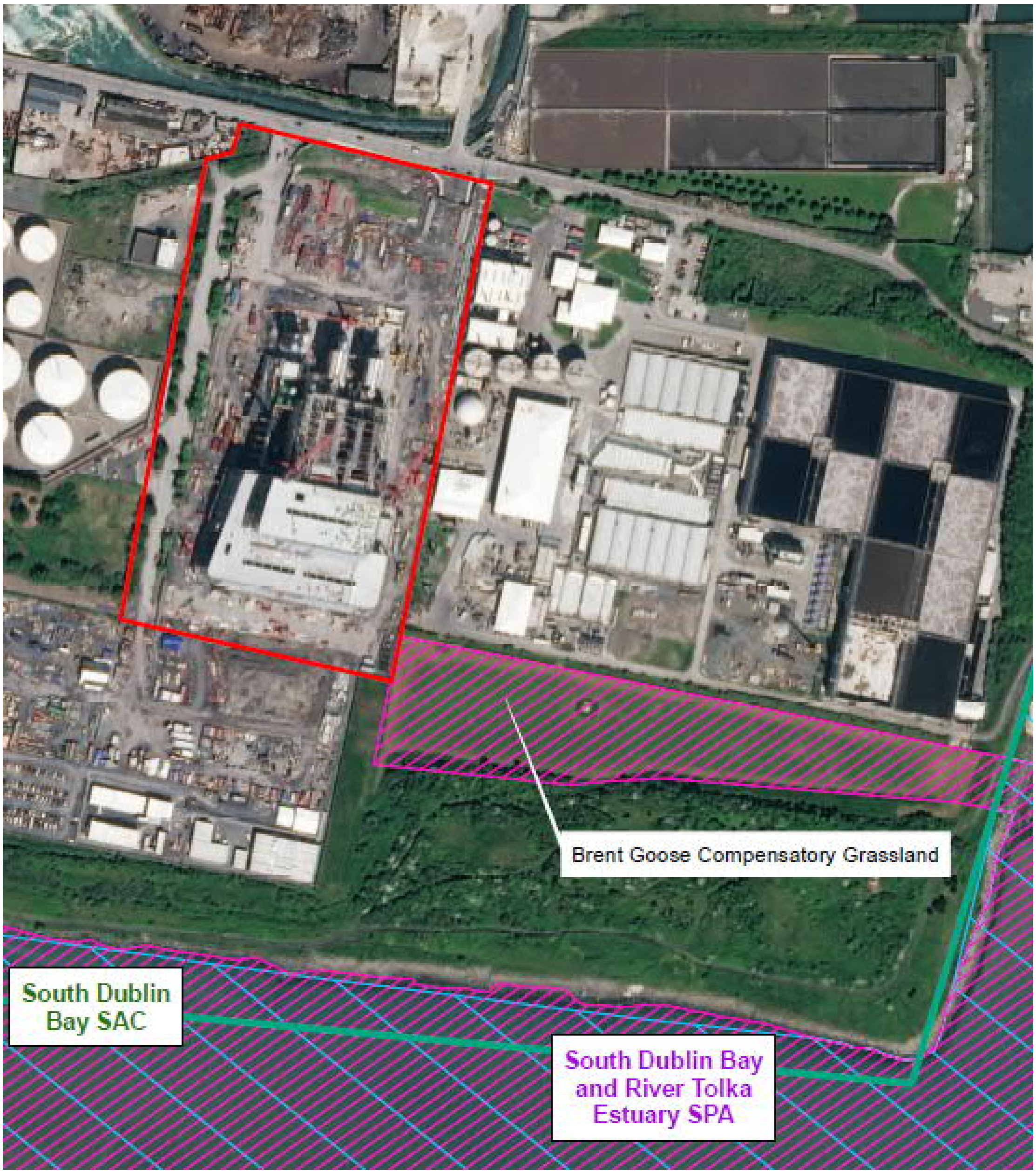


Figure 8-1 Map showing proximity of the Facility to South Dublin Bay Special Area of Conservation and South Dublin Bay and River Tolka Estuary Special Protection Area.

After the South Dublin Bay and River Tolka SPA, the next nearest European site to the Facility is the South Dublin Bay SAC (site code: 000210), which covers the area of fully tidal mudflat within Dublin Bay circa 100 m to the south of the Facility. The SAC is designated solely for QI mudflat habitat (AECOM, 2019).

The existing Facility adjoins the compensatory grassland in its south-eastern corner at which point the Facility is separated from the compensatory grassland by an existing (permanent) paladin boundary fence. Surveys from 2007 to 2014 found this area to hold significant Special Conservation Interest (SCI) feeding populations of pale-belied Brent goose, and occasionally other SCI waders such as curlew *Numenius arquata*, and black-tailed godwit *Limosa limosa* (AECOM, 2019).

There are a number of other European sites in wider Dublin Bay to the north and east. The nearest of these sites is the North Dublin Bay SAC (site code 000206) located 2.7 km north from the Facility (AECOM, 2019).

8.4.3.2 Other Ecological Sites

The South Dublin Bay proposed Natural Heritage Area (pNHA) (site code: 000210) is located circa 200 m to the south of the Facility.

North Dublin bay pNHA (site code: 000206) is located circa 1.4 km to the north of the Facility, with Dolphins, Dublin Docks pNHA located (site code: 000201) circa 250 m to the north east.

Grand Canal pNHA (code: 02104) is located circa 2 km to the east of the Facility and is of interest for aquatic habitats.

PNHA's have not been statutorily proposed or designated in Ireland but are sites of significance for wildlife and habitats.

8.4.3.3 Habitats and Flora

The Facility is located entirely on made ground. Satellite mapping available from Google maps indicates there are no significant semi-natural vegetated areas within the Facility (AECOM, 2019). There are a number of existing short 'defunct' treelines (i.e. with breaks) along each side of the Shellybanks Road, which partially screen the existing infrastructure from nearby roadways (AECOM, 2019).

There is also a wildflower meadow mound located at the front of the Facility as shown in Figure 8-2.

Figure 8-2 Wildflower Meadow Located at the Front of the Facility

8.4.4 Toxicity Survey

A toxicity survey was completed in 2018 and 2019 as per condition 6.16.1 and 6.16.2 of the IE Licence:

> ***Condition 6.16.1: "****The acute toxicity of the undiluted final effluent to at least four aquatic species from different trophic levels shall be determined by standardised and internationally accepted procedures and carried out by a competent laboratory. The name of the laboratory and the scope of testing to be undertaken shall be submitted, in writing, to the Agency, within three months of the date of commencement of licensed activity. Once the testing laboratory and the scope of testing have been agreed by the Agency, the Agency shall decide when this testing is to be carried out and copies of the complete reports shall be submitted by the licensee to the Agency".*

> ***Condition 6.16.2:* "***Having identified the most sensitive species outlined in Condition 6.16.1, subsequent compliance toxicity monitoring on the two most sensitive species shall be carried out by the laboratory identified in Condition 6.16.1 as per Schedule C: Control and Monitoring of this licence. The Agency shall decide when this testing is to be carried out and copies of the complete reports shall be submitted by the licensee to the Agency within six weeks of completion of the testing".*

As outlined in the Facility's 2019 AER, results were as expected for estuarine waters in the area and showed no adverse effects from toxicity on marine biota (Heffernan, 2020) (Table 8-1 and Table 8-2):

Table 8-1 Toxicity Survey Results (2019)

Parameter	Result	Units
96 h LC50 to *Oncorhynchus mykiss*	>18% giving <5.5 Toxic Units	%vol/vol
48 h EC50 to *Daphnia magna*	20% giving 5 Toxic Units	
Inhibitory effect to *Pseudokirchneriella subcapitata*	24% giving 4.1 Toxic Units	
Inhibitory effect to *Vibrio fischeri*	>45% giving <2.2 Toxic Units	

Source: City Analysts Limited 'Certificate of Analysis' (2019 Toxicity survey results)

Table 8-2 Toxicity chemistry suite

Parameter	Result	Units
Conductivity @ 20°C	4160.0	uS/cm @20°C
Dissolved Oxygen	11.96	mg/l O2
pH	7.96	pH Unit
Salinity	2.1	ppt

Source: City Analysts Limited, 'Certificate of Analysis' (2019 Toxicity survey results)

8.4.5 Biological Survey

A biological survey, including a fish and benthic survey, was completed by AQUAFACT International Services Ltd on 05th April 2018 as per Condition 6.16.3 of the IE Licence:

> ***Condition 6.16.3:* "***The licensee shall undertake a biological survey of the receiving water upstream and downstream of the cooling water outfall within twelve months of commencement of the waste activity and biennially thereafter. The licensee shall have regard to the Dublin City Council Biodiversity Plan in scoping the survey and shall consult with the Agency and the Eastern Regional Fisheries Board on the timing, nature and extent of the survey. The survey shall, as a minimum, include a fish diversity study".*

The aim of the survey was to assess the diversity and abundance of fish and benthic assemblages in the Liffey Estuary, focusing on the area adjacent to the Facility's heated water discharge (AQUAFACT, 2018), as shown on Figure 8-3.

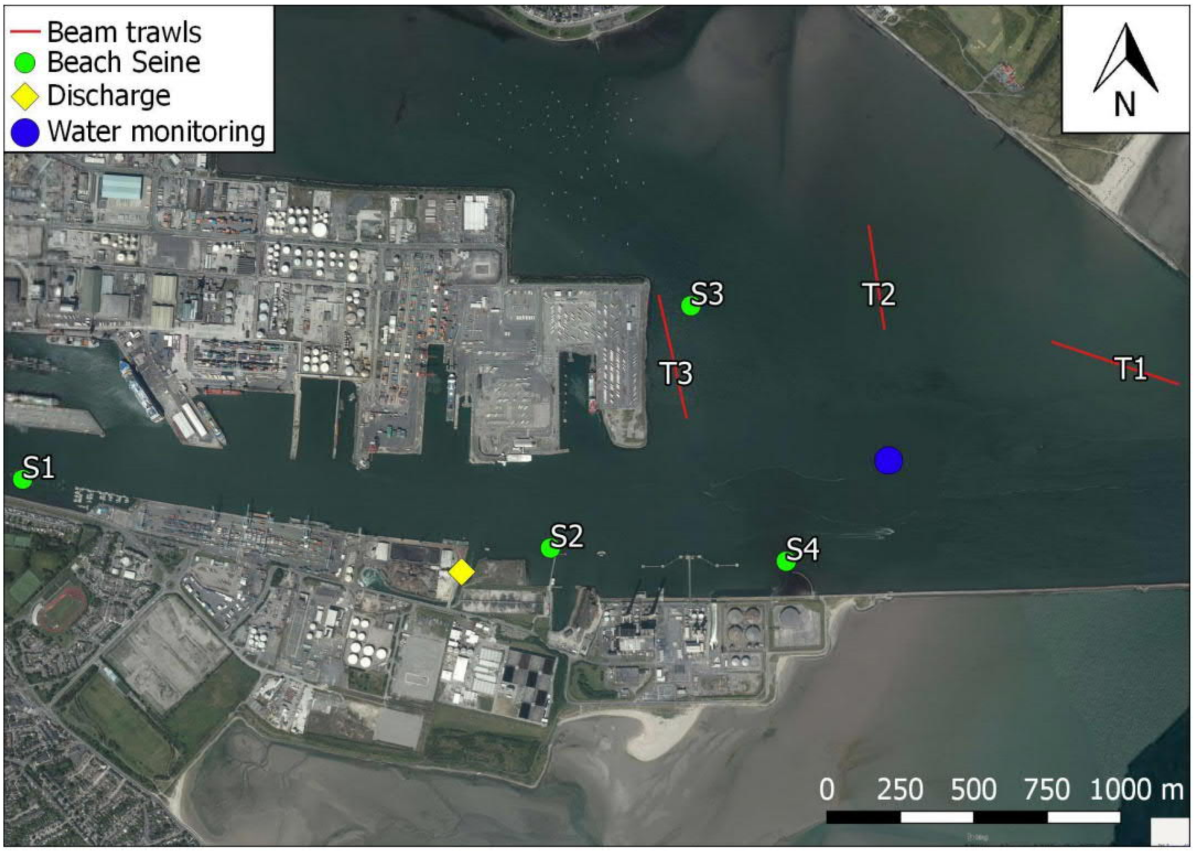


Figure 8-3 Fish Survey Station Locations (AQUAFACT, 2018)

Figure 8-3 Two fish species (common goby *Pomatoschistus microps* and plaice *Pleuronectes platessa*) were recorded in the 2018 biological survey, which is lower than the previous surveys in the area, conducted by Ecoserve in 2008, 2009 and by AQUAFACT in 2015 (AQUAFACT, 2018). It was determined that the decrease is likely due to low salinity caused by high freshwater input (AQUAFACT, 2018).

Overall it was concluded that:

"*The results from this fish survey although low are in line with past reports in that considering the level of modification and anthropogenic inputs, the Liffey estuary still supports a reasonable diversity of fish species. Future surveys should be later in the year when water levels in the Liffey are lower, ideally after a period of dry weather*" (AQUAFACT, 2018).

It was also determined that results from the benthic survey from four grab samples taken upstream and downstream of the cooling water discharge point, were all "*typical of organically enriched or physically disturbed habitats in areas of reduced salinity with relatively low species richness*" (AQUAFACT, 2018). They have all been assigned the biotope SS.SMu.VS.CapTubi (*Capitella* and *Tubificoides* spp.in reduced salinity infralittoral muddy sediment) and exhibit varying dominance of *Capitella sp* complex, Nematoda, *Tubificoides* spp. and *Malacoceros vulgaris* (AQUAFACT, 2018).

8.5 Summary

In summary:

- There are no significant semi-natural vegetated areas within the Facility area. There are a number of existing short 'defunct' treelines (i.e. with breaks) along each side of the Shellybanks Road and a wildflower meadow mound located at the front of the Facility;
- The nearest European sites to the Facility is the South Dublin Bay and River Tolka SPA and South Dublin SAC.

- Results from the toxicity survey carried out in 2018 and 2019, and a biological survey carried out in 2018, showed that all surveys were as expected for estuarine waters in the area and showed no sign of marine pollution; and
- As the EIA Scoping identified no pathway to sensitive biodiversity receptors and therefore no likely significant effects from the Proposed Tonnage Increase, this chapter therefore focuses on the baseline biodiversity environment only.

Chapter 09: Air Quality

09

9. Air Quality

9.1 Introduction

The Proposed Tonnage Increase will increase the level of emissions from the Facility's WtE plant stacks and increase the number of WDV accessing the Facility each day. Both of which have the potential to affect local air quality and the concentration of pollutants that nearby sensitive receptors are exposed to.

However, emissions from the WtE plant stacks with the Proposed Tonnage Increase in operation will remain below the limits set out with the Facility's existing IE Licence. Dispersion modelling of WtE plant stack emissions at the IE Licence limits has been undertaken, first in the original EIS submitted in 2006 (Eslam Engineering, 2006) and again in an updated assessment submitted to the EPA in 2019 (as provided in Appendix A9-1). Both assessments identified that the operation of the Facility at the IE Licence limits would not contribute to an exceedance of any air quality standards and would not have a significant effect on local air quality.

The Proposed Tonnage Increase will require 20 additional two-way WDV movements per average day. The Institute of Air Quality Management 'Land-use Planning and Development Control: Planning for Air Quality' (v1.2, Moorcroft and Barrowcliffe. et al., 2017) suggests that such an increase in vehicle movements is unlikely to contribute to a significant effect on local air quality, even in an area with existing poor air quality.

In light of the above, the Proposed Tonnage Increase alone will not have a significant effect on local air quality.

The remainder of this chapter quantifies the total pollutant concentrations experienced at nearby sensitive locations with the Proposed Tonnage increase in operation, as summarised in the sections below.

9.1.1 Emissions to Air from the Main Stacks

The proposed 15% increase in annual waste throughput does not involve the construction of any new physical infrastructure on the Facility and will not require any increase in (ELVs - concentrations and volumetric flows[20]) over and above those licensed in the Facility's IE Licence (WA0232-01).

The operating history of the Facility since commissioning in late 2017, based on stack emissions monitoring data, indicates that the Facility can operate comfortably within the IE Licence limit values:

- Flue gas volumetric flow well below the IE Licence limit of 275,000 Nm^3/hr; (average of 245,500 Nm^3/hr);
- Pollutant concentrations for NO2 (Nitrogen Dioxide), SO2 (Sulphur Dioxide), dust, HCl, and HF (Hydrogen Fluoride) significantly lower in concentration than the ELVs defined in the IE Licence;
- Concentrations of heavy metals and dioxins up to 2 to 3 orders of magnitude lower than the ELVs; and
- Comfortably meeting all temperature, residence time and excess oxygen levels defined in the IE Licence, indicative of excellent combustion conditions.

The impact of emissions from the main stacks was subject to detailed evaluation in 2006 prior to the grant of the original planning permission and also during the waste licensing process which resulted in the grant of the licence by the EPA in 2008.

The air quality impact assessment associated with releases to air from the main stacks at the IE Licence limits was updated using an up-to date version of the modelling software and also updated information with regard to the receiving environment, including more recent air quality monitoring data published by the EPA. The impact assessment is provided in Appendix A9-1 (dated June 2019) and concludes:

The modelling results with respect to emissions to air from the DWtE stacks indicate that the worst-case direct air quality impact is not significant with the process contribution for most parameters less than 5% of the relevant Environmental Assessment Levels (EALs). The predicted levels for some of the metals (Cd, As and V) are still well below the relevant EALs but are higher as a percentage of the EAL than other parameters. However, emission

[20] As described in Chapter 1 of this EIAR, the increase in waste capacity will also require a revision of the sites IE Licence. Consideration of updated definitions of Best Available Techniques (BAT) and BAT Conclusions for waste to energy facilities and whether a revision of the ELVs is deemed appropriate will be a matter for the EPA during the IE Licence revision process. No increase in ELV will be sought or granted during this process and consequently the impact assessment as described is based on the worst-case scenario with respect to emissions from the main stacks.

monitoring indicates emissions of these metals are very low and considerably below the relevant ELVs. Consequently, the metals impacts can again be considered to be not significant or imperceptible. The worst-case NO_2 process contribution is approximately 20% of the 1-hour average EAL.

9.1.2 Air Quality Impacts associated with Traffic to and from the Facility

The Proposed Tonnage Increase will lead to an increase in Heavy Goods Vehicle (HGV) movements on the public road network, on the approach to and from the Facility.

The TTA for the Proposed Tonnage Increase (AECOM, 2020), provides an analysis of the additional traffic anticipated in 2006 with respect to the Facility operations at a proposed waste throughput of 600,000 tpa compared to the actual traffic generated in 2018 after commencement of operation of the Facility. This analysis indicted that, as a result in changes to the WDV fleet, the actual number of WDV movements was 95 WDV trips per day (190 combined trips entering and exiting the Facility per day) compared to the 121 WDV trips per day (242 combined trips entering and exiting the Facility per day) anticipated in 2006 with a proportionately lower traffic impact on the local road network. The analysis continued to estimate the WDV trips required to accommodate an annual throughput of 690,000 tpa at 105 WDVs per day (210 combined trips entering and exiting the Facility per day). Therefore, the Proposed Tonnage Increase will increase HGV movements by 20 two-way movements per day (WDV accessing and leaving the Facility).

The assessment described in this chapter quantifies the air quality impact contribution of emissions associated with all WDV movements with the Facility operating at 690,000 tpa capacity against a baseline scenario where the WtE plant is operating at 600,000 tpa capacity, but with no WDV movements. In doing so, the assessment of the road traffic emissions contribution to impacts is conservative in that is considers all WDV trips associated with 690,000 tpa, and not the WDV trips associated with the 90,000 tpa capacity increase alone. Again, this is done using current dispersion modelling software, meteorological data, and baseline and traffic data.

This has the potential to increase emissions of the pollutants most commonly associated with road traffic (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$)), and the concentrations of those pollutants experienced by sensitive receptors located close to the roads used by the HGVs.

9.1.3 Odours

Odour impacts have not been considered in detail in this assessment. Current odour control measures incorporated into the facility's existing design will mitigate the odour emissions associated with the Capacity Increase. Therefore, the Proposed Capacity Increase would not increase the risk of odour emissions to the extent that there is the potential for a significant offsite effect. Key existing control measures are as follows:

- The delivery of potentially odorous waste material to the facility via sealed vehicles;
- The handling and storage of potentially odorous waste material within sealed internal areas only;
- Internal areas where potentially odorous waste material are handled and stored are operated under negative pressure
- ; and
- Waste air from these areas is added to the incineration process and potentially odorous compounds are destroyed during combustion.

The effectiveness of the existing odour control measures is demonstrated by the absence of external waste odours detected by AECOM staff during site visits undertaken during the assessment process and by the absence of verified odour-related complaints associated with the facility.

9.1.4 Combined Impacts

The combined air quality impacts provided in this chapter are the combined contribution of emissions associated with the WtE plant and emissions associated with the Facility's vehicle movements, as a result of the Proposed Tonnage Increase. The contribution of other local sources not related to the Facility are accounted for in the ambient background data used in the assessment and the baseline traffic flows modelled.

This air quality chapter therefore focuses on the following:

- The receiving baseline environment (existing baseline in 2017 (year of existing baseline traffic dataset and before the commencement of Facility operations), predicted future baseline in 2019 (year of future baseline traffic dataset) and baseline 2019 monitoring data published by the EPA (latest publicly available data with regard to the receiving environment));
- Predicted contribution from WtE plant stack emissions associated with the waste to energy plant in 2019 when operating at IE Licence limits (both 600,000 tpa and 690,000 tpa, as set out within the IE Licence);
- Predicted contribution from road traffic emissions associated with the waste to energy plant in 2019 when operating at 690,000 tpa;
- Combined impact of the road traffic emissions along with WtE plant stack emissions when the plant is operating at IE Licence limits in 2019, as reported in Appendix A9-1 for annual mean NO_2, PM_{10}, $PM_{2.5}$ and NO_x, and 24-hour PM_{10} only. Hourly mean NO_2 impacts from road traffic emissions have not been quantified. Instead reference is made to research which indicates that a risk of exceedance of the hourly air quality objective where the annual mean NO_2 concentration is less than 60µg/m^3 (Laxen and Marner, 2003) is low; and
- Cumulative assessment of air quality impacts with other nearby consented, planned and reasonably foreseeable projects.

9.2 Legislation and Guidance

The following relevant legislation has been complied and the following guidance has informed the air quality impact assessment:

- EU air quality legislation is provided within Clean Air for Europe (CAFE) Directive 2008/50/EC (as amended by Commission Directive (EU) 2015/1480), which came into force on 11 June 2008 (EU, 2008). This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new air quality objectives for particulate matter with an aerodynamic diameter of less than 2.5 µm ($PM_{2.5}$). The consolidated Directives include:
  - Directive 99/30/EC - the First Air Quality "Daughter" Directive - sets ambient limit values (LVs) for NO_2, oxides of nitrogen (NO_x), sulphur dioxide (SO_2), lead and particulate matter with an aerodynamic diameter of less than 10µm PM_{10} (EU, 2009).
  - Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient LVs for benzene and carbon monoxide (EU, 2000).
  - Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air (EU, 2002);
- The fourth daughter Directive was not included within the consolidation and is described as Directive 2004/107/EC (as amended by Regulation (EC) No 219/2009 and Directive (EU) 2015/1480). This sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable; and
- Directive 2008/50/EC legislation has been consolidated into Irish legislation through the Air Quality Standards Regulations (AQSR) 2011 (as amended by the Air Quality Standards (Amendment) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air (Amendment) Regulations 2016) (EPA, 2011). This legislation for the pollutants of concern is presented in Table 9-1. Environmental Protection United Kingdom (EPUK) and Institute of Air Quality Management (IAQM) guidance Land-Use Planning & Development Control: Planning for Air Quality Guidance on land-use planning and development control: Planning for air quality 2017 v1.2, (Moorcroft and Barrowcliffe. et al., 2017).

Table 9-1 Air Quality Standards (*Source: EPA, 2011*)

Pollutant	Averaging Period	Irish Air Quality Standard	Allowable Exceedances
Nitrogen dioxide (NO_2)	Annual mean	40 µg/m^3	None
	Hourly mean	200 µg/m^3	Not to be exceeded more than 18 times in a year
Particulate matter (PM_{10})	Annual mean	40 µg/m^3	None

Pollutant	Averaging Period	Irish Air Quality Standard	Allowable Exceedances
	Daily mean	50 µg/m^3	Not to be exceeded more than 35 times in a year
Fine particulate matter ($PM_{2.5}$)	Annual mean	25 µg/m^3	None
Oxides of nitrogen (NO_X)	Annual mean	30 µg/m^3	None

9.3 Methodology

9.3.1 Study Area

The air quality assessment has considered the location of likely worst-case impacts, focusing on locations in the vicinity of the Facility where traffic emissions and stack emissions contributions are greatest, where there is relevant sensitive exposure. Sensitive exposure includes existing human health receptors represented by residential properties in Ringsend, East Wall, Irishtown and Sandymount, and also includes the nearest ecological designations in each direction of the Facility, where they are located within 10 km.

The cumulative assessment considers developments within 5 km of the Facility. This includes consented, planned and reasonably foreseeable projects that could contribute to pollutant concentrations at receptors impacted upon by the Facility, and consented, planned and reasonably foreseeable projects that introduce new human health sensitive receptors into an area impacted upon by the Facility, including planned residential properties on the Poolbeg SDZ.

9.3.2 Road Traffic Emission Modelling Methodology

Traffic movements associated with the operation of the Facility following the Proposed Tonnage Increase will contribute to emissions of the pollutants most commonly associated with vehicle exhaust emissions.

The incomplete combustion of fuel in vehicle engines results in the presence of a variety of pollutants including hydrocarbons (HC), such as benzene, 1,3-butadiene, SO_2 and carbon monoxide (CO) in the exhaust emissions. However, it is the emission of NO_X, mainly in the form of nitric oxide (NO), which is then converted to NO_2 in the atmosphere, and particulate matter (PM_{10} and $PM_{2.5}$) in exhaust emissions, which are the main pollutants of concern, due to their association with adverse effects on human health.

Although SO_2, CO, benzene and 1,3-butadiene are present in motor vehicle exhaust emissions, detailed consideration of the associated impacts on local air quality is not considered relevant, because the concentrations of release and the number of vehicles involved are not likely to give rise to significant effects. In particular, the risks to achievement of the relevant air quality objectives for these specific parameters from the increase in capacity at the Facility from road traffic alone are considered negligible. Emissions of SO_2, CO, benzene and 1, 3-butadiene from road traffic are therefore not considered further within this assessment. The impacts on SO_2 and CO from the stacks have been assessed in Appendix A9-1.

The contribution of road traffic emissions has been quantified with reference to industry standard methods as set out in relevant guidance documents. Irish guidance on quantifying the effect and impact of road traffic emissions is published by Transport Infrastructure Ireland (TII)/National Roads Authority (NRA), 'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes', (NRA, 2011), guidance that is intended to inform the planning process for the construction and operation of new roads. This guidance document makes reference to the UK equivalent, the Design Manual for Roads and Bridges (Highways England, 2019), guidance again intended to inform the planning process for new strategic road schemes. The UK guidance refers to tools that are made available by both the UK Department of Environment and Rural Affairs (DEFRA) and the UK Department for Transport (DfT), on items including vehicle emission rate data and the conversion rates of vehicle exhaust emitted NO_X into NO_2. As previously outlined, the IAQM and EPUK have also published guidance on the assessment of local air quality impacts to inform the planning process (Moorcroft and Barrowcliffe. et al., 2017), which has also been referred to in this assessment.

9.3.2.1 Scenarios Assessed

The combined air quality assessment of road traffic emissions has been undertaken using ADMS-Roads, detailed dispersion modelling software to determine traffic derived pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$) at several sensitive receptors located within 200 m of the affected road network – the distance from a road within which a perceptible increase in pollutant concentration may occur (Highways England, 2019). All roads, for which traffic data was provided, located within 200 m of the modelled sensitive receptors were included in the local air quality assessment. The assessment has been undertaken for the following scenarios:

- 2017 Existing Baseline Scenario (2017 traffic data, 2017 meteorological data, 2017 vehicle emissions factors and 2017 backgrounds);
- 2019 Baseline Scenario (with the Facility in operation at 600,000 tpa[21]) (2019 baseline traffic data, 2017 meteorological data, 2017 vehicle emissions factors and 2019 backgrounds); and
- 2019 Operational Scenario (with the Facility in operation at 690,000 tpa[22]) (2019 baseline + Facility traffic data, 2017 meteorological data, 2017 vehicle emissions factors and 2019 backgrounds).

9.3.2.2 Road Traffic Emissions Modelling

This assessment has used the latest version of dispersion model software Atmospheric Dispersion Modelling (ADMS) ADMS-Roads (v5.0) (CERC, 2020) to quantify baseline and with-scheme pollution levels at selected receptors. ADMS-Roads is a modern dispersion model that has an extensive published track record of use in the Ireland and the UK for the assessment of local air quality impacts, including model validation and verification studies.

Details of general model conditions are provided in Table 9-2. Vehicle emission rates were calculated using the Emission Factor Toolkit (EFT) v9.0 (DEFRA, 2019a). Northern Ireland's vehicle fleet emission rates were chosen to provide a similar fleet composition to that of Ireland. Although the vehicle emission rates are based on the road traffic for the UK, this is considered to represent the best available source of data for the vehicle fleet. The outputs of this modelling protocol were estimates of the contribution from road traffic emissions to annual mean concentrations of NO_X, PM_{10} and $PM_{2.5}$ at the selected receptors. The pollutant concentrations were combined with background concentrations obtained from the EPA (See Section 9.3.2.7) and the NO_X converted to NO_2 to derive estimates of the total annual mean NO_2 concentration.

Table 9-2 General Atmospheric Dispersion Modelling - Roads Model Conditions

Variables	ADMS-Roads Model Input
Surface roughness at source	1.0
Minimum Monin-Obukhov length for stable conditions	30
Terrain types	Flat
Receptor location	X, Y and Z coordinates
Emissions	NO_X, PM_{10} and $PM_{2.5}$, based on the traffic data supplied
Emission factors	Emission Factor Toolkit (Version 9.0)
Meteorological data	Hourly sequential data from Dublin Airport in 2017 (to match baseline traffic dataset)
Emission profiles	24-hour annual average daily traffic flow data used, with no time varying emissions used
Model output	Long-term annual mean road contributions for NO_X, PM_{10} and $PM_{2.5}$

9.3.2.3 Conversion of NO_x to NO_2

The proportion of NO_2 in NO_X varies greatly with location and time according to a number of factors including the amount of oxidant available and the distance from the emission source. NO_X concentrations are expected to decline in future years due to falling emissions. Therefore, NO_2 concentration will not be limited as much by ozone and consequently it is likely that the NO_2/NO_X ratio will in the future increase.

[21] Noting that the traffic data used to inform this scenario does not include the Facility WDVs. Therefore, the 2019 baseline contribution from road traffic emissions are slightly underestimated.
[22] Noting that the traffic data used to inform this scenario includes all WDVs when operating at 690,000 tpa, not just the WDVs associated with the capacity increase of 90,000 tpa. Therefore, the 2019 operational contribution from road traffic emissions are slightly overestimated, as are the reported 2019 impacts.

In this study modelled NO_X values from road traffic emissions were converted to NO_2 using the 'NO_X to NO_2' calculator (V7.1) (DEFRA, 2019b), released in April 2019, and available at the Air Quality Archive. The year and region for which the modelling has been undertaken are specified and local factors, such as an appropriate factor of NO_X emitted as NO_2, are used in the calculation. As this calculator uses specific council's NO_x to NO_2, Belfast City Council in Northern Ireland has been used as it was thought to be the most representative of the urban area of Dublin.

9.3.2.4 Traffic Data

Traffic data in the form of Annual Average Daily Traffic (AADT) flows and number of Heavy-Duty Vehicles (HDV) (vehicles greater than 3.5t) were provided for the main roads near to the Facility by AECOM transportation consultants. Vehicle speeds were also provided by the AECOM transportation consultants but adjusted to represent slowing speeds at junctions and roundabouts.

Base year traffic data was supplied for 2017. As such, 2017 was selected as the existing baseline year, with 2017 meteorological data, monitoring data and vehicle emission factors applied to the model and referred to for this assessment. The 2019 Baseline Scenario considered within this assessment aims to represent conditions with the Facility in operation at 600,000 tpa. The 2019 Operational Scenario considered within this assessment aims to represent conditions with the Facility operating at 690,000 tpa, and the traffic used in this operational scenario includes all WDV movements associated with the delivery of 690,000 tpa. This is considered to represent a conservative approach, in that it accounts for all WDV movements associated with 690,000 tpa, not the proportion of WDV movements associated with the capacity increase alone. As summarised in Section 9.1.2, the capacity increase alone will lead to an increase of 20 additional combined trips entering and exiting the Facility per day. An increase of 20 WDV trips alone does not exceed the criteria given in guidance (Moorcroft and Barrowcliffe. et al., 2017) to suggest that road traffic emissions impacts could have a significant effect. Furthermore, the total traffic associated with a capacity of 690,000 is still below what was forecast and consented in 2006 during the original planning application process.

The 2019 baseline and 2019 operational scenarios are informed by 2017 vehicle emissions data, to account for any uncertainty in projected vehicle emissions improvement assumed within the DEFRA tool that emission rates were obtained from.

9.3.2.5 Meteorological Data

The meteorological dataset used in the assessment was recorded at the meteorological station at Dublin airport, in 2017, located approximately 10 km to the north west of the Facility. The meteorological site is considered to be representative of regional meteorological conditions and sufficient to satisfy the requirements of this assessment.

This wind rose demonstrates that the predominant wind direction is blowing from west to east, although the wind does blow from all directions on occasions throughout the year. Figure 9-1 provides a windroses based on wind speed and wind direction data gathered at Dublin Airport (2017).

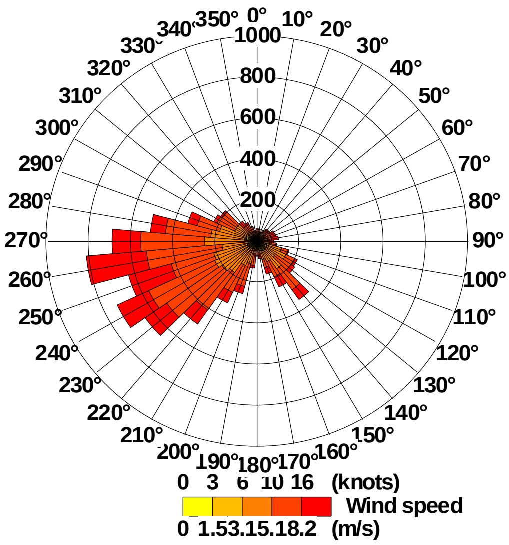


Figure 9-1 Dublin Airport Windrose Plot for 2017

9.3.2.6 Sensitive Receptors

There are a number of human health sensitive receptors located in the vicinity of the Facility that could be impacted by the Facility's associated vehicle movements on the public road network. Selected human health sensitive receptors are shown in and include residential properties at Ringsend, as well as potential future residential properties on the Poolbeg SDZ. In addition to the human health sensitive receptors, there are also a number of ecologically sensitive receptors nearby, which form part of the EU's Natura 2000 Network, that could be potentially impacted by emissions to air from the road traffic emissions. Selected locations that represent these ecological receptors are also shown on Figure 9-2.

Both ecological and residential modelled receptors have remained the same as the receptors modelled in the assessment reported as Appendix A9-1 and were selected to represent areas of worst-case impacts in close proximity to roads used by the Facility traffic and/or the WtE plant stacks.

9.3.2.7 Modelled Background Concentrations

Background pollutant concentrations were sourced from EPA Monitoring undertaken at background locations in Zone A, in 2019 (EPA, 2019a). The backgrounds used are presented in Table 9- and represent the average of all Zone A monitoring sites for each pollutant in 2017 (for the 2017 baseline scenario) and 2019 (for the 2019 baseline and 2019 operational scenarios), with the exception of annual mean NO_x. The annual mean NO_x background used is based on NO_x monitoring in 2017 and 2019 at those sites that are less likely to be influenced by road traffic emissions, to better represent the ecological receptors, due to the distance they are from the nearest main roads. These background concentrations, which include contributions from non-Facility sources, are added to the modelled contribution from the Facility to provide total pollutant concentrations at the sensitive receptor locations considered.

Table 9-3 Monitored Annual Mean Background Pollutant Concentrations (µg/m^3) in 2017 and 2019

Pollutant	2017	2019
NO_2	20.8	27.1
NO_x	23.2	27.8
PM_{10}	12.4	14.5
$PM_{2.5}$	7.5	9.2

Note that more monitoring locations were in operation in 2019 than in 2017. The average concentrations reported in 2019 are higher than concentrations in 2017 partly because of an increase in concentrations at the majority of individual monitoring sites, but also because the additional monitoring stations active in 2019 recorded higher concentrations than the 2017 average.

9.3.2.8 Model Verification

When using modelling techniques to predict air quality impacts from road traffic, it is necessary to make a comparison between the modelling results and available roadside monitoring data, to validate the performance of the model. The accuracy of the opening year modelling results is relative to the accuracy of the base year results, therefore greater confidence can be placed in the opening year concentrations if good agreement is found for the base year.

Modelling results are subject to systematic and random error; such errors arise due to many factors, such as uncertainty in the traffic data and the composition of the vehicle fleet, and uncertainty in the meteorological dataset. This can be considered by factoring the modelled results against monitoring data.

Although the EPA undertakes diffusion tube monitoring within the vicinity of the roads model within 2018 (See Section 9.4.2), unfortunately due to a lack of information on exact locations of these diffusion tubes they were not able to be used within the verification process. Therefore, a nominal correction factor for road NO_X of 2.5 was applied to the whole of the study area, based on professional judgement gained from previous road traffic assessments, to reduce the risk of under-prediction of effects. This provides a representative and robust model adjustment.

9.3.3 Stack Emission Modelling Methodology

To predict the contribution from stack emissions associated with the Facility, the methodology and results set out in Appendix A9-1 have been used. This modelling was undertaken by AECOM in 2018 to show the contribution of the Facility operating at its IE Licence limits to pollutant concentrations at sensitive locations in the vicinity of the Facility. It is known that emissions associated with the current facility operating at 600,000 tpa fall well below those IE Licence limits. It is anticipated that following the capacity increase and operating at 690,000 tpa, emissions will remain below those IE Licence limits. The results from the stack emissions modelling have therefore been added to the 2019 baseline scenario and 2019 operational scenario, as both represent the Facility operating conservatively at the IE Licence limits. For the 2019 operational scenario, stack emissions have been combined with the modelling results for the road traffic emissions assessment to provide an overall Process Contribution (PC) of the Facility operating at 690,000 tpa. The main parts of the stack model methodology are set out below:

- The latest version ADMS-5 in 2018 was used, using ADMS's coastline feature;
- The stack height was modelled at 105 m AD;
- The contribution of the Facility's stack emissions to pollutant concentrations were quantified, at the permitted IE Licence limits (maximum ELVs and maximum flue gas flow rate) in 2018; and
- Three years (2015-2017) of meteorological data from Dublin airport was used within the modelling as well as one year (2018) of site-specific meteorological data from the Facility.

9.3.4 Assessment of Significant Impacts

The impact of emissions and whether it is significant or not has been determined following guidance published jointly by the IAQM and EPUK (Guidance on land-use planning and development control: Planning for air quality 2017 v1.2, Moorcroft and Barrowcliffe. et al., 2017). The assessment does not define a graduating scale of human health receptor sensitivity. Instead, human health receptors are considered either sensitive or not, depending on the period of time for which they are exposed to emissions.

The absolute magnitude of pollutant concentrations in the baseline scenario, in relation to the Air Quality Standards, is described and this is used to consider the risk of the Air Quality Standard values being exceeded.

For a change in annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$, of a given magnitude, IAQM and EPUK have published recommendations for describing the impacts at individual receptors, as set out in Table 9-4.

Table 9-4 Description of Road Traffic Assessment Impacts

Long term average concentration at receptor in assessment year	% change in concentration relative to Air Quality Assessment Level				
	<1 (Imperceptible)	1-2 (Very Low)	2-5 (Low)	6-10 (Medium)	>10 (Large)
75% or less of AQAL	Imperceptible	Imperceptible	Imperceptible	Slight	Moderate
76% - 94% of AQAL	Imperceptible	Imperceptible	Slight	Moderate	Moderate
95% - 102% of AQAL	Imperceptible	Slight	Moderate	Moderate	Significant
103% - 109% of AQAL	Imperceptible	Moderate	Moderate	Significant	Significant
110% or more of AQAL	Imperceptible	Moderate	Significant	Significant	Significant

The terminology used in Table 9-4 has been adapted from the EPUK/IAQM guidance in order to maintain consistency with the EPA's EIAR draft guidance (EPA, 2017). 'Significant' is used instead of Substantial and 'Imperceptible' instead of Negligible.

The EPUK/IAQM guidance includes seven explanatory notes to accompany the terminology for the effect descriptors. In particular, it is noted that the descriptors are for individual receptors only and that overall significance is determined using professional judgement. Additionally, it is also noted that it is unwise to ascribe too much accuracy to incremental changes or background concentrations, this is especially important when total concentrations are close to the objective value. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the objective value, rather than being exactly equal to it.

A change in predicted annual mean concentrations of NO_2 or PM_{10} of less than 0.5% (0.2 $\mu g/m^3$) is considered to be imperceptible. A change (impact) that is imperceptible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant. Likewise, a change in predicted annual mean concentrations of $PM_{2.5}$ of less than 0.5% (0.12 $\mu g/m^3$) is also considered to be imperceptible.

Additionally, the EPUK/IAQM guidance also includes the potential for slight air quality impacts as a result of changes in pollutant concentrations between 2% and 5% of relevant air quality standards. For annual average nitrogen dioxide concentrations, this relates to changes in concentrations ranging from 0.6 – 2.1 $\mu g/m^3$. In practice, changes in concentration of this magnitude, and in particular changes at the lower end of this band are likely to be very difficult to distinguish through any post operational monitoring regime due to the number of sources of nitrogen dioxide in an urban environment and the inter annual effects of varying meteorological conditions. In the overall evaluation of significance, the potential for significant air quality impacts within this band will therefore be considered in this context.

Changes in concentration of more than 5% (moderate and significant, the two highest bands) are considered to be of a magnitude which is far more likely to be discernible and as such carry additional weight within the overall evaluation of significance for air quality.

Figure 9-2 Air Quality Sensitive Receptors

9.4 Baseline

9.4.1 Existing Air Quality – Continuous Monitors

Monitoring of NO_2, NO_X and PM_{10} has been undertaken for several periods at the DCC Recycling Centre, Sean Moore Road, Ringsend, Dublin 4 using a continuous analyser. This data is summarised in Table 9-5. The Sean Moore Road site monitoring location could be described as roadside, as it is located adjacent to Sean Moore Road (R131) and the concentrations measured directly influenced by the vehicles' emissions from road traffic movements on that road. There is no monitoring of $PM_{2.5}$ in the vicinity of the Facility, other than outlined in Table 9-5.

Table 9-5 EPA Pollutant Monitoring Data at Sean Moore Road (2009 – 2011, 2017, 2018 and 2019), µg/m^3

Pollutant	Averaging Period	Air Quality Limit Value	Years					
			2009	2010	2011	2017	2018	2019
NO_2	Annual	40	27.7	30.4	28.1	21.9	27.0	24.3
NO_x	Annual	30[1]	56.6	58.0	50.0	54.3	50.3	45.0
PM_{10}	Annual	40	17.7	23.0	17.8	13.4	19.6	18.8
$PM_{2.5}$	Annual	25	-	-	-	-	7.0	9.7

[1] Air Quality Limit Value relating to designated ecological sites. The monitoring station on Sean Moore Road is not within a designated ecological site.

There is no significant variation in the trend of monitoring data gathered at the Sean Moore Road site, between 2009 and 2019.

Any suggestion of a reduction in pollutants associated with road traffic emissions (NO_X, NO_2, PM_{10} and $PM_{2.5}$) can potentially be attributed to improvements in vehicles emissions technology that has occurred to some extent over the years, and the evolution of that technology into the local vehicle fleet. However, the effect of such improvements on concentrations of NO_X, NO_2, PM_{10} and $PM_{2.5}$ is partially offset by the year on year increase in vehicle movements on the local road network, due to general growth and vehicle movements associated with nearby developments.

9.4.2 Existing Air Quality – Diffusion Tubes

As explained in Section 9.3.2.8, there is some passive diffusion tube monitoring undertaken around the study area, although the precise location of monitoring is unclear. There are 5 diffusion tubes located around the study area which have measured concentrations of annual mean NO_2 over a two-year period from 2016 to 2017 (EPA, 2019b). The results of these five diffusion tubes are presented in Table 9-6.

Table 9-6 Monitored Annual Mean Background Pollutant Concentrations (µg/m^3) in 2016-2017

ID	Location	Classification Type	Data Capture (%)	Concentration (µg/m^3) 2016-2017
12	North Wall Quay 4, D1	Urban Traffic	70	37.2
13	Pigeon House Road, D4	Suburban Background	100	24.3
14	Sean Moore Road, D4	Suburban Traffic	100	20.2
15	Ringsend Fitzwilliam Street, D4	Suburban Traffic	80	29.2
16	York Street, D4	Suburban Background	90	18.4

9.4.3 Modelled 2017 Baseline – Residential Receptors

Predicted annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the selected receptors are listed in Table 9-7. These represent the background pollutant contribution, plus the contribution from the baseline traffic movements, to provide total pollutant concentrations. As seen in Table 9-7, all receptors for all pollutants were below their respective Irish air quality objective, including daily PM_{10} exceedances.

Table 9-7 Predicted Existing Baseline Concentrations (2017) for Residential Receptors

Receptor ID	Annual Mean Concentration (µg/m³)		
	NO_2	PM_{10}	$PM_{2.5}$
R1	27.4	13.4 (1)	8.1
R2	26.3	13.2 (1)	8.0
R3	27.5	13.4 (1)	8.1
R4	27.4	13.5 (1)	8.2
R5	25.1	13.0 (1)	7.9
R6	26.4	13.1 (1)	7.9
R7	23.2	12.8 (1)	7.7
R8	21.5	12.5 (1)	7.6
R9	20.9	12.4 (1)	7.5
R10	24.0	12.9 (1)	7.8
R11	23.2	12.7 (1)	7.7
R12	22.7	12.7 (1)	7.7
R13	26.0	13.3 (1)	8.0
R14	25.6	13.2 (1)	8.0
R15	25.1	13.1 (1)	7.9
R16	29.0	13.5 (1)	8.2
R17	22.9	12.7 (1)	7.7
R18	21.2	12.5 (1)	7.5
R19	20.9	12.4 (1)	7.5
R20	20.9	12.4 (1)	7.5

Numbers in brackets for PM_{10} results show the number of daily PM_{10} daily exceedances, which should not exceed 35 days

9.4.4 Modelled 2017 Baseline – Ecological Receptors

Predicted annual mean concentrations of NO_x at the selected sensitive ecological receptors are listed in Table 9-8. As seen in Table 9-8, all receptors are below the Irish air quality standard of 30 microgram (µg)/m³ in the 2017 Baseline scenario, with the majority contribution from background sources.

Table 9-8 Predicted Existing Baseline Concentrations (2017) for Ecological Receptors

Receptor ID	Annual Mean Concentration (µg/m³) NO_x
E1	23.8
E2	23.5
E3	23.5
E4	23.3
E5	23.3
E6	23.2
E7	23.2
E8	23.2

9.5 Assessment of Impacts

The following sub-sections provide the predicted air quality statistics for the pollutants considered in this assessment for both road traffic and stack emission sources. As described in Section 9.3.1.4, the operational scenario concentrations and change in concentration reported in this section are conservative, in that the assessment considers the contribution of road traffic emissions of all WDVs associated with 690,000 tpa, not just the WDVs associated with the 90,000 tpa capacity increase. 2019 Baseline and 2019 Operational scenario concentrations are also conservative, in that they assume stack emissions are at the IE Licence limits. In reality, emissions are and will be well below those IE Licence limits in the 2019 Baseline and 2019 Operational scenarios respectively.

9.5.1 Impact on NO_2 Concentrations

Predicted NO_2 road traffic impacts at the selected sensitive receptors for the 2019 Baseline and 2019 Operational scenarios are provided in Table 9-9 as well as the change in concentration between the two scenarios.

Table 9-9 Predicted 2019 Baseline and Operational Scenario NO_2 Concentrations

ID	2019 Baseline Scenario[1] (µg/m^3)	Contribution from WtE vehicle emissions at 690,000 tpa[2](µg/m^3)	Contribution from WtE stack emissions at 690,000 tpa[3] (µg/m^3)	Combined Contribution from stack and road emissions at 690,000 tpa (µg/m^3)	2019 Operational Scenario (2019) (µg/m^3)
R1	34.9	+0.1	+<0.1	+0.1	35.0
R2	33.8	+0.2	+<0.1	+0.2	34.0
R3	34.9	+0.3	+<0.1	+0.3	35.2
R4	34.9	+0.3	+<0.1	+0.3	35.2
R5	32.6	+0.4	+<0.1	+0.4	33.0
R6	33.9	+0.8	+<0.1	+0.8	34.7
R7	29.1	+0.1	+<0.1	+0.1	29.2
R8	28.8	+<0.1	+<0.1	+<0.1	28.8
R9	27.8	+<0.1	+<0.1	+<0.1	27.8
R10	31.1	+<0.1	+<0.1	+<0.1	31.1
R11	30.5	+<0.1	+<0.1	+<0.1	30.5
R12	30.1	+<0.1	+<0.1	+<0.1	30.1
R13	33.2	+<0.1	+<0.1	+<0.1	33.2
R14	32.9	+0.2	+<0.1	+0.2	33.1
R15	32.2	+0.2	+<0.1	+0.2	32.4
R16	36.1	+0.2	+<0.1	+0.2	36.3
R17	29.9	+0.1	+<0.1	+0.1	30.0
R18	28.5	+<0.1	+<0.1	+<0.1	28.5
R19	27.5	+<0.1	+<0.1	+<0.1	27.5
R20	27.7	+<0.1	+<0.1	+<0.1	27.7

[1] Background concentrations + Baseline traffic flows + stack emissions at 600,000 tpa

[2] Contribution from emissions associated with all WDV movements operating at 690,000 tpa

[3] No additional contribution from stack emissions as they will remain below the IE Licence emissions limits even with the capacity increase in operation

For both the 2019 Baseline and Operational scenarios, all annual mean concentrations are below the 40 µg/m^3 air quality objective for NO_2. The highest concentrations were predicted at R16 (2019 Baseline: 36.1 µg/m^3, 2019 Operational: 36.3 µg/m^3), which was also the case within the existing baseline scenario. The largest change in magnitude between the two scenarios occurs at R6 which has a change of +0.8 µg/m^3. Annual mean NO_2

concentrations at the anticipated future residential properties on the Poolbeg SDZ (R5 – R8) are well below the air quality standard and not considered at risk of an exceedance.

The air quality assessment reported in the 2006 EIS provided annual mean NO_2 impacts that accounted for less than 10% of the annual mean Irish standard and total concentrations of around 77% of the Standard. This assessment also predicts impacts of up to 5% of the annual mean standard with total concentrations accounting for 70-90% of the Standard. The operation of the Facility with the Proposed Tonnage Increase will not cause an impact on NO_2 concentrations that are greater than those reported in the 2006 EIS.

In this assessment and in accordance with the IAQM guidance (Moorcroft and Barrowcliffe. et al., 2017), all but one receptor have an imperceptible/negligible change in annual mean concentrations of NO_2. At the majority, this is due to operational concentrations at receptors being less than 75% of the Irish standard in the operational scenario and/or combined impacts accounting for less than 2% of the standard. For receptor R6, which has an operational NO_2 concentration of between 76% and 94% of the standard and an impact greater than 2% of the standard (but less than 6%), the change is slight adverse. R6 is located along South Bank Road and represents future residential development (as seen in).

As all annual mean concentrations are below 60µg/m^3, it can be concluded that it is unlikely that there would be an exceedance of the 1-hour NO_2 air quality objective (Laxen and Marner (2003), so this is classed as not significant.

9.5.2 Impact on PM_{10} Concentrations

Predicted PM_{10} road traffic impacts at the selected sensitive receptors for the 2019 Baseline and 2019 Operational scenarios are provided in Table 9-10 as well as the change in concentration between the two scenarios.

Table 9-10 Predicted Baseline and Operational PM_{10} Concentrations (2019)

ID	2019 Baseline Scenario (µg/m^3)[1,2]	Contribution from WtE vehicle emissions at 690,000 tpa (µg/m^3)[3]	Contribution from WtE stack emissions at 690,000 tpa (µg/m^3)[4]	Combined Contribution from stack and road emissions at 690,000 tpa	2019 Operational Scenario (2019) (µg/m^3)[1]
R1	15.6 (1)	+<0.1	+<0.1	+<0.1	15.6 (1)
R2	15.4 (1)	+<0.1	+<0.1	+<0.1	15.4 (1)
R3	15.6 (1)	+<0.1	+<0.1	+<0.1	15.6 (1)
R4	15.7 (1)	+<0.1	+<0.1	+<0.1	15.7 (1)
R5	15.2 (1)	+0.1	+<0.1	+0.1	15.3 (1)
R6	15.3 (1)	+0.1	+<0.1	+0.1	15.4 (1)
R7	14.7 (1)	+<0.1	+<0.1	+<0.1	14.7 (1)
R8	14.6 (1)	+<0.1	+<0.1	+<0.1	14.6 (1)
R9	14.5 (1)	+<0.1	+<0.1	+<0.1	14.5 (1)
R10	15.0 (1)	+<0.1	+<0.1	+<0.1	15.0 (1)
R11	14.9 (1)	+<0.1	+<0.1	+<0.1	14.9 (1)
R12	14.9 (1)	+<0.1	+<0.1	+<0.1	14.9 (1)
R13	15.5 (1)	+<0.1	+<0.1	+<0.1	15.5 (1)
R14	15.4 (1)	+<0.1	+<0.1	+<0.1	15.4 (1)
R15	15.2 (1)	+<0.1	+<0.1	+<0.1	15.2 (1)
R16	15.6 (1)	+<0.1	+<0.1	+<0.1	15.6 (1)
R17	14.8 (1)	+<0.1	+<0.1	+<0.1	14.8 (1)
R18	14.6 (1)	+<0.1	+<0.1	+<0.1	14.6 (1)
R19	14.5 (1)	+<0.1	+<0.1	+<0.1	14.5 (1)
R20	14.5 (1)	+<0.1	+<0.1	+<0.1	14.5 (1)

Numbers in brackets for PM_{10} results show the number of daily PM_{10} daily exceedances, which should not exceed 35 days

[2] Background concentrations + Baseline traffic flows + stack emissions at 600,000 tpa

[3] Contribution from emissions associated with WDV movements operating at 690,000 tpa

[4] No additional contribution from stack emissions as they will remain below the IE Licence Emissions Limits even with the capacity increase in operation

For both the 2019 Baseline and 2019 Operational scenarios, all annual mean concentrations are below the 40µg/m³ Irish air quality standard for PM_{10}. There is no change in the number of PM_{10} daily exceedances between the baseline and operational scenarios or between these scenarios and the existing baseline. The highest concentrations were predicted at receptor R4 (2019 Baseline: 15.7µg/m³, 2019 Operational: 15.7µg/m³). These receptors are along Pigeon House Road, which is one of the adjoining roads from the Facility access. Annual mean PM_{10} concentrations at the anticipated future residential properties on the Poolbeg SDZ (R5 – R8) are well below the air quality standard and not considered at risk of an exceedance.

The air quality assessment reported in the 2006 EIS provided annual mean PM_{10} impacts that accounted for less than 1% of the annual mean Irish standard and total concentrations of around 76% of the Standard. This assessment also predicts impacts of less than 1% of the annual mean standard with total concentrations accounting for 36-39% of the Standard. Total PM_{10} concentrations are lower than in 2006 predominantly due to lower background PM_{10} concentrations. The operation of the Facility with the capacity increase will not cause an impact on PM_{10} concentrations that are greater than those reported in the 2006 EIS.

In this assessment, all receptors had a change in magnitude of PM_{10} between the two scenarios of less than 1% of the Irish standard (<0.4 µg/m³) and in line with guidance these changes are classed as not significant.

9.5.3 Impact on $PM_{2.5}$ Concentrations

Predicted $PM_{2.5}$ road traffic impacts at the selected sensitive receptors for the 2019 Baseline and 2019 Operational scenarios are provided in Table 9-11 as well as the change in concentration between the two scenarios.

Table 9-11 Predicted Baseline and Operational $PM_{2.5}$ Concentrations (2019)

ID	2019 Baseline Scenario (µg/m³)[1]	Contribution from WtE vehicle emissions at 690,000 tpa (µg/m³)[2]	Contribution from WtE stack emissions at 690,000 tpa (µg/m³)[3]	Combined Contribution from stack and road emissions at 690,000 tpa	2019 Operational Scenario (2019) (µg/m³)
R1	9.9	+<0.1	+<0.1	+<0.1	9.9
R2	9.8	+<0.1	+<0.1	+<0.1	9.8
R3	9.9	+<0.1	+<0.1	+<0.1	9.9
R4	10.0	+<0.1	+<0.1	+<0.1	10.0
R5	9.7	+<0.1	+<0.1	+<0.1	9.7
R6	9.7	+0.1	+<0.1	+0.1	9.8
R7	9.3	+<0.1	+<0.1	+<0.1	9.3
R8	9.3	+<0.1	+<0.1	+<0.1	9.3
R9	9.2	+<0.1	+<0.1	+<0.1	9.2
R10	9.5	+<0.1	+<0.1	+<0.1	9.5
R11	9.5	+<0.1	+<0.1	+<0.1	9.5
R12	9.5	+<0.1	+<0.1	+<0.1	9.5
R13	9.8	+<0.1	+<0.1	+<0.1	9.8
R14	9.8	+<0.1	+<0.1	+<0.1	9.8
R15	9.6	+<0.1	+<0.1	+<0.1	9.6
R16	9.9	+<0.1	+<0.1	+<0.1	9.9
R17	9.4	+<0.1	+<0.1	+<0.1	9.4
R18	9.2	+<0.1	+<0.1	+<0.1	9.2
R19	9.2	+<0.1	+<0.1	+<0.1	9.2
R20	9.2	+<0.1	+<0.1	+<0.1	9.2

[1] Background concentrations + Baseline traffic flows + stack emissions at 600,000 tpa

[2] Contribution from emissions associated with WDV movements operating at 690,000 tpa

[3] No additional contribution from WtE plant stack emissions as they will remain below the IE Licence limits even with the capacity increase in operation

For both the 2019 Baseline and 2019 Operational scenarios, all annual mean concentrations are below the 25 µg/m^3 Irish air quality standard for $PM_{2.5}$. The highest concentrations were predicted at R4 (Baseline scenario: 10.0 µg/m^3, Operational scenario: 10.0 µg/m^3) which is also the case within the existing baseline scenario. Annual mean $PM_{2.5}$ concentrations at the anticipated future residential properties on the Poolbeg SDZ (R5 – R8) are well below the air quality standard and not considered at risk of an exceedance.

The air quality assessment reported in the 2006 EIS provided annual mean $PM_{2.5}$ impacts that accounted for around 1% of the annual mean Irish standard and total concentrations of around 43% of the Standard. This assessment also predicts impacts of around 1% of the annual mean standard with total concentrations accounting for 37-40% of the Standard. Total $PM_{2.5}$ concentrations are lower than in 2006 predominantly due to lower background $PM_{2.5}$ concentrations. The operation of the Facility with the Proposed Tonnage Increase will not cause an impact on $PM_{2.5}$ concentrations that are greater than those reported in the 2006 EIS.

In this assessment, all receptors had a change in magnitude between the Baseline and Operational scenarios of less than 1% of the objective (<0.25 µg/m^3) and in line with guidance these changes are classed as not significant.

9.5.4 Impact on Ecological Receptors (NO_x Impacts)

Predicted NO_x road traffic impacts at the selected sensitive receptors for the 2019 Baseline and 2019 Operational scenarios are provided in Table 9-12 as well as the change in concentration between the two scenarios.

Table 9-12 Predicted Baseline and Operational NO_x Concentrations (2019) at Ecological Receptors

ID	2019 Baseline Scenario (µg/m^3)[1]	Contribution from WtE vehicle emissions at 690,000 tpa (µg/m^3)[2]	Contribution from WtE stack emissions at 690,000 tpa (µg/m^3)[3]	Combined Contribution from stack and road emissions at 690,000 tpa	2019 Operational Scenario (2019) (µg/m^3)
E1	28.3	+0.1	+<0.1	+0.1	28.4
E2	28.6	+0.1	+<0.1	+0.1	28.7
E3	29.5	+<0.1	+<0.1	+<0.1	29.5
E4	27.9	+0.1	+<0.1	+0.1	28.0
E5	28.4	+<0.1	+<0.1	+<0.1	28.4
E6	28.2	+<0.1	+<0.1	+<0.1	28.2
E7	28.4	+<0.1	+<0.1	+<0.1	28.4
E8	27.9	+<0.1	+<0.1	+<0.1	27.9

[1] Background concentrations + Baseline traffic flows + stack emissions at 600,000 tpa

[2] Contribution from emissions associated with WDV movements operating at 690,000 tpa

[3] No additional contribution from WtE plant stack emissions as they will remain below the IE Licence limits even with the capacity increase in operation

For both the 2019 Baseline and 2019 Operational scenarios, all annual mean concentrations are below the 30 µg/m^3 air quality standard, with the greatest contribution from baseline sources (see Table 9-6), rather than the increase in emissions due to the Facility and Proposed Tonnage Increase itself. The highest concentrations were predicted at receptor E3 (Baseline: 29.5 µg/m^3, Operational Scenario: 29.5 µg/m^3) in both scenarios. It should be noted that it is not uncommon to see annual mean NO_x concentrations close to or in excess of the air quality standard for that pollutant in urban environments.

The air quality assessment reported in the 2006 EIS provides annual mean NO_x impacts associated with the Facility operating at 600,000 tpa, which accounted for 12% of the annual mean air quality standard and total concentrations of around 78% of the Standard. This assessment predicts impacts associated with the capacity increase of less than 1% of the annual mean air quality standard with total concentrations accounting for 93-98%. The difference in total concentrations between the 2006 EIS and this assessment are predominantly due to differences in background concentrations. The NO_x background in the 2006 EIS were sourced from NO_2 data whereas this assessment has based its NO_x background concentrations on measured NO_x data gathered by the EPA (see Section 9.4.2). Therefore, although the reported total concentrations within this assessment are greater than those reported in the 2006 EIS, the contribution from the Facility with the Proposed Tonnage Increase will not cause an impact on NO_x concentrations that are greater than those reported in the 2006 EIS.

In this assessment, the impact of up to 0.1 µg/m^3 reported would account for less than 1% of the Irish air quality standard (30 µg/m^3) and would not be considered significant.

9.5.5 Cumulative Impacts

The Proposed Tonnage Increase also has the potential to impact in combination with other consented, planned and reasonably foreseeable projects that could result in cumulative impacts on air quality within the study area of influence. The traffic data used to inform the air quality assessment is inherently cumulative and includes traffic flows associated with such development in the future baseline and future operational scenarios (Chapter 13 Roads and Traffic).

Cumulative impacts can also occur in combination with consented, planned and reasonably foreseeable projects that include an industrial emissions source. However, EPA guidance (EPA, 2017) states that a cumulative assessment of industrial source emissions is only required where impacts are >5% of an air quality standard. In this instance, the Proposed Tonnage Increase has an impact that is <5% of the air quality standards and therefore no cumulative industrial sources have been included in the dispersion modelling assessment.

For information, details on the consented, planned and reasonably foreseeable projects located with 5 km of the Facility are provided in Chapter 2 Project Description and Appendix A2-1.

9.5.6 Mitigation and Monitoring

Inherent environmental controls that reduce air quality impacts include the 100 m high stacks and the operation of the Facility in line with the performance and emissions parameters set out in the IE Licence. Modelling has confirmed that the implementation of these inherent controls is sufficient to ensure significant air quality effects do not occur with the Proposed Tonnage Increase. As such, no additional measures are considered to be required.

9.6 Summary

In summary:

- The Proposed Tonnage Increase will increase emissions associated with WtE plant on the Facility itself and WDVs on the local road network. However, with the increase, plant emissions will remain below the Emissions Limits set out in the Facility's existing IE Licence. The contribution of emissions at the IE Licence limits have already been quantified (Appendix A9-1) and this has demonstrated no exceedance of an air quality standard or an effect that is significant. Furthermore, the Proposed Tonnage Increase is expected to increase WDVs by no more than 20 two-way movements per average day. Guidance suggests that such an increase would not contribute to a significant air quality effect. In light of this, it is determined that the Proposed Tonnage Increase would not have a significant effect on local air quality alone;
- This assessment has therefore quantified the air quality impact of the Proposed Tonnage Increase at the Facility. It has quantified the contribution of emissions from road traffic associated with the Facility operating at 690,000 tpa on annual mean concentrations of NO2, NOx, PM10 and PM2.5, and the impact of the WtE plant stack emissions operating at 690,000 tpa on the same pollutants. Modelling was undertaken following appropriate guidance and using dispersion modelling software accepted by the EPA;
- The contribution from the stack emissions associated with the Facility were sourced from an assessment previously undertaken by AECOM and provided in this document as Appendix A9-1. The results of the stack emissions modelling have been combined with the results from the road traffic modelling to provide an estimate of total impacts associated with the Proposed Tonnage Increase;
- The contribution of road traffic emissions impacts is based on the total WDV movements associated with operation at 690,000 tpa, and not the additional 90,000 tpa associated with the tonnage increase alone. The contribution of stack emissions impacts to both 2019 baseline and operational scenarios is based on the Facility operating to the limits set by the EPA in the Facility's existing IE Licence. The Facility currently operates at 600,000 tpa with emissions less than those currently licenced and emissions will remain below the IE Licence limits with the Proposed Tonnage Increase to 690,000 tpa. Modelling at the IE Licence limits therefore provides a worst-case estimate of WtE plant stack emissions and total pollutant concentrations;

- The assessment has quantified pollutant concentrations and impacts at a number of human health sensitive and ecologically sensitive receptors in the vicinity of the Facility, with the aim of capturing the worst-case impact at a receptor in each direction from the Facility. Impacts on human health receptors peak at +0.8 µg/m3 for NO2 and 0.1 µg/m3 for PM10 and PM2.5 at receptor R8. With the Proposed Tonnage Increase in operation, total pollutant concentrations and the magnitude of change are such that impacts are classed as imperceptible/negligible the majority of locations and slight adverse at one. In line with the guidance referred to in this assessment, the reported magnitude of impacts at locations where total pollutant concentrations are so far below the air quality standards does not constitute an effect that is significant;
- Total annual mean NOx concentrations are shown to below the air quality standard for that pollutant in the existing baseline, 2019 baseline and 2019 operational scenarios. Concentrations are close to the standard, which is common at ecological sites within or near to large cities or conurbations. This is due to elevated background conditions. The impact of the Proposed Tonnage Increase to annual mean NOx concentrations peak at 0.1 µg/m3 at receptors E1, E2 and E4. An impact of less than 1% of that standard does not constitute an effect that is considered significant;
- Overall, the operation of the Proposed Tonnage Increase at the Facility will not cause an exceedance of an air quality standard, increase concentrations to put an air quality standard at risk of an exceedance, or worsen an existing exceedance, to an extent that would be considered significant; and
- The air quality assessment is inherently cumulative in that it is informed by traffic data that accounts for growth in traffic flows as a result of consented, planned and reasonably foreseeable projects. Due to the limited impacts associated with the Proposed Tonnage Increase, cumulative impacts associated with industrial source emissions are not considered to be significant.

Chapter 10: Climate

10

10. Climate

10.1 Introduction

This chapter of the EIAR reports on the findings of an assessment of the likely significant effects on climate change as a result of Proposed Tonnage Increase at the Facility located on the Poolbeg Peninsula in Dublin Harbour.

In line with Institute of Environmental Management and Assessment (IEMA) guidance (IEMA, 2017 and IEMA, 2020) consideration has been given within this EIAR to the following aspects of climate change assessment:

- Lifecycle GHG impact assessment – the impact of GHG emissions arising from the Scheme on the climate during the lifecycle stages within the scope of the assessment (see Section 10.5).

Climate change resilience (CCR) and in-combination climate change impact (ICCI) assessments have both been excluded from this EIAR as the Proposed Tonnage Increase does not require any construction or change to the current Facility area. The operational processes and structures will not be altered due to the increase in capacity as the footprint of the Facility will remain the same. The building and infrastructure of the Facility will not change, so it is not anticipated that there will be any change in the resilience to climate change during operations as a result of the increased operating capacity. As there will be no change to the physical environment, the existing risks will remain the same resilience to climate change despite the increase in capacity.

The potential for effects on a single receptor (Type 1 effects) and the combined cumulative climate change effects (Type 2 effects) of the Proposed Tonnage Increase with other projects are also considered in this chapter.

10.2 Legislation and Planning Policy

10.2.1 International

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994, and the Kyoto Protocol which came into force in 2005. For the purposes of the EU burden sharing agreement under Article 4 of the Kyoto Protocol, in June 1998 Ireland agreed to limit the net growth of the six GHGs under the Kyoto Protocol to 13% above the 1990 level over the period 2008 to 2012. The Kyoto Protocol (World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI), 2012) was amended in 2012 to include a 7th mandatory GHG (nitrogen trifluoride; NF_3).

Irelands Climate Action and Low Carbon Development (Amendment) Bill (2020) commits Ireland to move to a climate resilient and climate neutral economy by 2050 with a target of 7% average yearly reduction in overall greenhouse gas emissions over the next decade, and to achieving net zero emissions by 2050. The Bill commits Ireland to 5-year carbon budgets to outline the progress achieved from the introduction of the Bill.

A UNFCCC (Paris 2015), a new global agreement was reached to address climate change. The Paris Agreement aims to:

- hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C;
- increase the ability to adapt to the adverse impacts of climate change and foster climate resilience and low GHG emissions development in a manner that does not threaten food production; and
- make finance flows consistent with a pathway towards low GHG emissions and climate-resilient development.

Acknowledging they will not reach their emission reduction targets held by the Kyoto Protocol, Ireland have committed to contribute to the mitigation aspects of the Paris Agreement "*via the Nationally Determined Contributions (NDC) tabled by the EU on behalf of Member States which commits to a 40% reduction in EU-wide emissions by 2030 compared to 1990*" (Department of Communications, Climate Action & Environment, 2020a).

In 2019, the Carbon Brief (Carbon Brief, 2019) predicted Ireland will miss domestic and EU targets as "*failure to decarbonise difficult sectors, such as dairy farming and road transport, have left it with the third highest per-capita emissions of any member state (…) and the one expected to miss by the widest margin*". Ireland will have to purchase allocations from other nations or using international credits or risk facing fines until it reaches emissions targets. The Department of Communications, Climate Action & Environment highlights the shortfall towards emissions targets "*reflects both our reduced investment capacity over the period of the economic downturn, as well as the fact that the target itself was misinformed and not consistent with what was achievable on an EU wide cost-effective basis"* (Department of Communications, Climate Action & Environment, 2020b).

10.2.2National

Climate Action and Low Carbon Development Act (2015)

The Climate Action and Low Carbon Development Act was passed in 2015 and established a framework to develop the national transition of Ireland towards a low carbon economy (Government of Ireland, 2015). It also highlighted the role it would take in contributing to collective action to tackle climate change under the UNFCCC and the EU Intergovernmental Panel on Climate Change (IPCC) objective of reducing greenhouse gases by 80 - 95% by 2050 compared to 1990. The Act includes efforts towards:

i. *the reduction of greenhouse gas emissions, and*

ii. *adaptation to the effects of climate change in the State.*

The Climate Action and Low Carbon Development Act (2015) binds the Minister to:

iii. *the preparation of a national mitigation plan,*

iv. *the preparation of a national adaptation framework, and*

v. *compliance with any existing obligation of the State under the law of the European Union or any international agreement referred to in section 2.*

Climate Ireland (MaREI, UCC, ICHEC, 2020) is being designed and developed by the Centre for Marine and Renewable Energy (MaREI) at University College Cork (UCC) and the Irish Centre for High End Computer (ICHEC) at the National University of Ireland, Galway and as part of the EPA-funded project A Climate Information Platform for Ireland (ICIP). The aim of Climate Ireland is to provide information for climate adaption planning by integrating scientific research, policy making and adaptation practice for the purposes of enhancing adaptation decision making in Ireland.

National Adaptation Framework (NAF) Planning for a Climate Resilient Ireland (2018) (Department of Communication, Climate Action & Environment, 2018) was developed under the Climate Action and Low Carbon Development Act 2015. The Act provides that the Minister must consult with the Climate Change Advisory Council when developing a NAF. The aim of the NAF is to provide a strategy "*for the application of different sectors and by local authorities in order to reduce the vulnerability of the State to the negative effects of climate change and to avail of any positive effects that may occur*".

Climate Action Plan 2019

Irelands Climate Action Plan (2019) has outlined past emissions trends, Ireland's targets up to 2030 and Ireland's Ambition for 2050. The Plan highlights a decarbonisation pathway to 2030 which would be consistent with the adoption of a net zero target in Ireland by 2050 and highlights the action to "*evaluate the changes required to adopt a more ambitious commitment of net zero greenhouse gas emissions by 2050*" (Government of Ireland, 2019).

Coalition Programme for Government (2020)

The government in Ireland took office June 2020 and is made up of a coalition between Fianna Fáil, Fine Gael and the Green Party. The government released a Coalition Programme (Irelands Coalition Government, 2020) outlining their visions for Ireland and sets goals; including a plan for the recovery after COVID 19. The programme highlights emission reduction targets within aviation, transportation and tourism, in line with the Paris Agreement.

Included in the Programme is the Green New Deal, which highlights an ambitious average 7% reduction in overall GHG emissions from 2021 – 2030 (a 51% reduction over the decade) and to achieving net zero emissions by 2050. The government commits to introducing a Climate Action Amendment Bill (2020) within 100 days of government which will:

- Set a target to decarbonise the economy by 2050 at the latest;
- Make the adoption of five-year carbon budgets, setting maximum emissions by sector, a legal requirement;

- Establish the Climate Action Council on an independent statutory footing and ensure greater gender balance and increased scientific expertise in its membership; and
- Ban the sale of new and the importation of second-hand petrol and diesel cars from 2030.

10.2.3Local

Dublin City Council Climate Change Action Plan (2019 – 2024)

Dublin's four local authorities (DCC, DLRCC, FCC and SDCC), have joined together to develop a Climate Change Action Plan (CCAP) (DCC, 2019) as a collaborative response to the impact that climate change has on the Dublin Region. Dublin has experienced increases in heavy rainfall, extreme flooding, its first Status Red warning for snow in February 2018, contrasted with one of its hottest summers during June and July of the same year. The CCAPs concentrate on the following five areas: Energy and Buildings, Transport, Flood Resilience, Nature-Based Solutions and Resource Management. The overall targets for County Dublin are:

- A 33% improvement in the Council's energy efficiency by 2020;
- A 40% reduction in the Council's greenhouse gas emissions by 2030;
- To make Dublin a climate resilient region, by reducing the impacts of future climate change-related events; and
- To actively engage and inform citizens on climate change.

The commitments "*will be integrated into the decision making for planning, policies and operational processes within local authorities by providing staff with the training and tools required to make informed choices*" (DCC, 2019).

10.2.4Further National and Local Context

10.2.4.1 Waste

The Dublin City Baseline Report (2016) (Codema, 2018) highlights total emissions from landfills in Dublin Region estimated at 52,700 tCO_2eq, in which methane made up 85% of total CO_2eq emissions from landfills. The EPA highlights emissions from the waste sector are projected to decrease by 33.6% between 2019 and 2030 to 0.59 Mt CO_2eq. Figure 10-1 shows the WEM scenario, based on a scenario where an additional 350,000 t of waste per year requires landfill management, projected to have an impact of increasing emissions by approximately 1.2 Mt CO2eq over the 2019-2030 projected period. The EU Directive 2018/850 (2018) highlights landfill restrictions should be strengthened to make them better reflect the EU's ambition to move to a circular economy (EU, 2018).

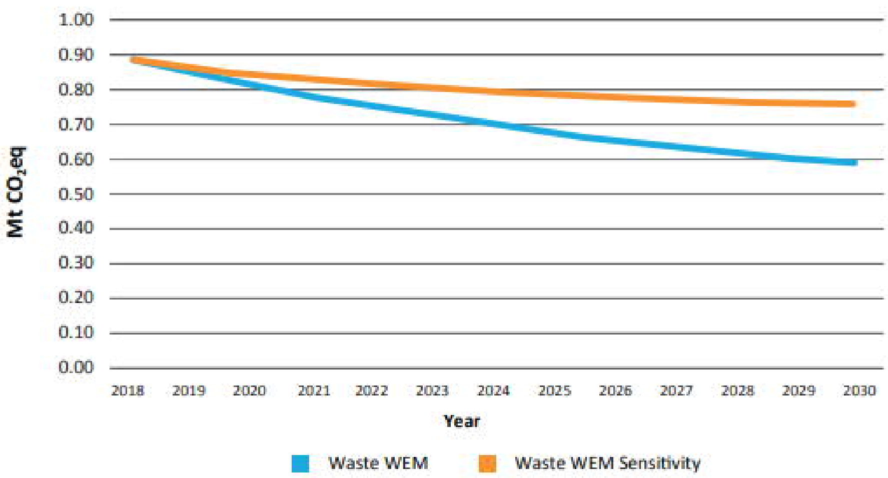


Figure 10-1 GHG Emission Projections from the Waste Sector under the With Existing Measures Scenario, Including a Sensitivity Assessment (Source: EPA, 2020).

Energy:

The EPA Ireland GHG Emission Projections (2020) (EPA, 2020a) highlights that Energy Industries were responsible for 17.4% of Ireland's GHG emissions in 2018 and have decreased by 39.2% between 2001 and 2018. Projections in (Figure 10-2) below, show emissions from Energy Industries decreasing by approximately 18% between 2019 and 2030 to 8.7 Mt CO_2eq under the WEM scenario and approximately 34.2% to 7.0 Mt CO_2eq under the With Additional Measures (WAM) scenario.

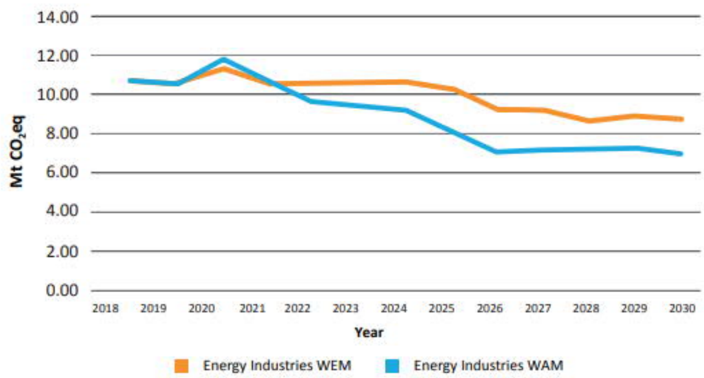


Figure 10-2 GHG Emissions Projections from the Energy Industries Sector under the With Existing Measures and With Additional Measures scenario out to 2030 (Source: EPA, 2020).

The Dublin Local Authorities (DLA) merged as part of the Dublin City Council Climate Change Action Plan, have produced 'A Strategy Towards Climate Change Action Plans for The Dublin Local Authorities' (Codema, n.d.). This highlights the Covenant of Mayors for Climate and Energy, a voluntary initiative where its signatories commit to reducing the CO_2 emissions in their territories by 40% by 2030, contributing to the net zero target by 2050. Within this report the DLA have produced a set of targets to achieve the reduction in emissions, which span across 7 key sectors: Citizen & Stakeholder Engagement; Planning; Energy; Transport; Water; Waste; and, Ecosystems and Biodiversity.

10.3 Methodology

The GHG assessment of the Proposed Tonnage Increase includes an assessment of two scenarios; the baseline and the Proposed Tonnage Increase. The baseline scenario is a 'Do Nothing' scenario where the Proposed Tonnage Increase is not progressed, and the Facility continues to operate at 600,000 tpa. Under the do-nothing scenario the Facility will continue to operate at the stated capacity and emit a net 215,129 tpa of CO_{2Eq}[23]. The alternative scenario is a 'Do Something' scenario associated with the delivery of the Proposed Tonnage Increase, which includes the operation of the Facility plant at 690,000 tpa. Under the do-something scenario, the net CO_{2eq} from the Facility will increase and is quantified and contextualised in the following sections.

10.3.1Study Area

The GHG study area includes all emissions from within the application boundary area arising from the operation of the Proposed Tonnage Increase. It also includes emissions arising from offsite activities which are related to the onsite activities associated with the Proposed Tonnage Increase, such as transport, treatment of materials and waste disposal.

10.3.2Sensitive Receptors

The identified receptor for GHG emissions is the global climate. As the effects of GHGs are not geographically constrained, all development has the potential to result in a cumulative effect on GHGs. Therefore, for the purpose of the GHGs impact assessment, the global climate is used as the receptor. To assess the impact of the Proposed Tonnage Increase on this receptor, Ireland's carbon budgets have been used as a proxy for the global climate.

10.3.3GHG Calculation Methodology

No additional construction will be required to expand the operational capacity of the Proposed Tonnage Increase and as a result there will be no construction effects on the climate associated with the increase in output. Only emissions from the operation of the Proposed Tonnage Increase are required to be assessed, including the transportation of materials and waste disposal emissions.

[23] Estimated for 2019

The climate chapter should be read in conjunction with the TTA Report (AECOM, 2020) and Chapter 3 Waste Management chapter of this EIAR, where transportation of materials and waste disposal methods have been discussed.

Where specific activity data has been made available, expected GHGs arising from the operational activities of the Proposed Tonnage Increase have been quantified using a calculation-based methodology as per the following equation as stated in the Defra emissions factors guidance (DEFRA, 2020):

GHG emissions = activity data x emissions conversion factor

Emission factors and calculation methods have been sourced from publicly available sources, such as Sustainable Energy Authority of Ireland (SEAI), EPA, DEFRA, IPCC, and the Bath University ICE (2019). Additional emissions factors where required have been taken from Simapro lifecycle assessment software, which is based on the EcoInvent Life Cycle Assessment (LCA) database.

Irelands Greenhouse Gas Emission Projection Report (2020) highlights "*for the 2020 emissions projections, fuel price data (that is used as input for the ESRI I3E model) were sourced from the UK Department for Business, Energy and Industrial Strategy (BEIS) 2018 publication*" (EPA, 2020b).

The potential impacts of the Proposed Tonnage Increase on the climate during operation are calculated in line with the GHG Protocol (WRI & WBCSD, 2004) and presented in Table 10-1. GHG 'hot spots' (i.e. sources and activities likely to generate the largest amount of GHG emissions) have been identified as part of the assessment and enabling priority areas for mitigation to be targeted. This approach is consistent with the principles set out in IEMA guidance.

In line with the GHG Protocol (WRI & WBCSD, 2004), when defining potential impacts, the seven Kyoto Protocol GHGs have been considered, specifically:

- carbon dioxide (CO_2);
- methane (CH_4);
- nitrous oxide (N_2O);
- sulphur hexafluoride (SF_6);
- hydrofluorocarbons (HFCs);
- perfluorocarbons (PFCs); and
- nitrogen trifluoride (NF_3).

These gases are broadly referred to in this report under an encompassing definition of 'GHGs', with the unit of tCO_2e . Where data has not been available, a qualitative approach to addressing GHG impacts has been followed, in line with the IEMA guidance (IEMA, 2017).

Waste derived fuel contains both biogenic and non-biogenic forms of carbon. According to the GHG Protocol (WRI & WBCSD, 2011) CO_2 emissions associated from biogenic sources (emission from combusting from biomass) shall not be included in the inventory.

Emissions arising from combustion of waste and the associated displacements and offsets from landfill and alternative energy generation were calculated using UK DEFRA's Energy recovery for residual waste: A carbon-based modelling approach (2014) (DEFRA, 2014).

The EPA publish an annual National Inventory Report for GHG emissions and climate change. The 2020 National Inventory Report (EPA, 2020c), Section ES.2 (Summary of National Emission and Removal-related Trends) highlights:

> "*In 2018, total emissions of greenhouse gases including indirect emissions from solvent use (without LULUCF) in Ireland were 60,934.54 kt CO2 equivalent, which is 9.9 per cent higher than emissions in 1990*".
>
> "*The total for 2018 is 13.2 per cent lower than the peak of 70,221.21 kt CO_2 equivalent in 2001 when emissions reached a maximum following a period of unprecedented economic growth"* (page 2).

> "*Ireland's first waste to energy MSW incinerator commenced operation in 2011 and another commenced in 2017, emissions from these plants are reported under Public Electricity and Heat Production"* (Table 3.2 Emissions from Energy 1990-2018).

The figures taken from Table 3.2 (Emissions from Energy 1990 – 2018), highlight the total emission produced from Public Electricity and Heat Production in 2018 was 10,108,900 tCO_2e.

The SEAI produces the annual emission factors for Ireland. Throughout this report, the SEAI emission factors have been primarily used for the assessment and the UK DEFRA 2020 emission factors have been used to fill gaps in Ireland specific emission factor availability.

Table 10-1 summarises the primary GHG emission sources relevant to the Proposed Tonnage Increase**.**

Table 10-1 Potential Sources of GHG Emissions Relevant to the Proposed Tonnage Increase

Lifecycle Stage	Activity	Primary Emissions Sources
Operation	Operation of the Proposed Tonnage Increase	Operational energy use in buildings (e.g. fuel for start-up generators) Combustion of waste derived fuel used to produce energy
	Transportation of fuel	Transporting residual waste to the Facility
	Disposal and transportation of operational waste	Disposal of process by-products Fuel consumption for transportation of waste
	Avoided emissions	Avoided emissions through waste combustion and energy generation over current waste disposal practices The equivalent energy generation from the grid has been considered should the plant not exist

The DEFRA Energy Recovery for Residual Waste (DEFRA, 2014) modelling approach highlights the

> "*The energy from waste plant will generate energy which substitutes for energy that would otherwise need to be generated by a conventional gas-fired power station (CCGT), thereby saving the fossil carbon dioxide that would have been released by that power station*".

The aggregated operational GHG emissions for the Proposed Tonnage Increase take into account direct emissions from the combustion of waste. The emissions avoided as a result of diverting waste from landfill and avoiding the need to generate electricity from a CCGT power station capacity that would be needed in the absence of the Facility are included in the assessment. This approach is consistent with the Defra Energy Recovery for Residual Waste (2014) modelling approach.

10.3.4 Decommissioning

Decommissioning has been scoped out of the assessment as the Facility is already in operation. Any future decommissioning would require a separate planning application, at which point any likely significant effects will be assessed, therefore decommissioning has been excluded from the assessment.

10.3.5 GHG Significance Criteria

As per IEMA guidance (IEMA, 2017), all GHG emissions are classed as significant as all emissions contribute to climate change. The rationale for classification is as follows:

- any additional GHG impacts could compromise the Ireland's ability to reduce its GHGs and therefore the ability to meet its carbon budgets;
- the extreme importance of limiting global warming to at least below 2°C this century. Additionally, a recent report by the IPCC highlighted the importance of limiting global warming below 1.5°C (IPCC, 2018); and
- a disruption to global climate is already having diverse and wide-ranging impacts to the environment, society, economic and natural resources. Known effects of climate change include increased frequency and duration of extreme weather events, temperature changes, rainfall and flooding, and sea level rise and ocean

acidification. These effects are largely accepted to be negative, profound, global, likely, long-term to permanent, and are transboundary and cumulative from many global actions.

There are no specific criteria for determining the significance of GHG emissions for EIAR. The IEMA guidance on GHG in EIAR states that *'any GHG emissions or reductions from a project might be considered to be significant'* (IEMA, 2017).

IEMA recommends contextualising projects against sectoral, local or national carbon budgets to assess the impact of a project. The Proposed Tonnage Increase has been contextualised in terms of Irelands national carbon budget and carbon targets. The level of significance of project-related emissions has been determined using the matrix in Table 10-2.

Table 10-2 Significance of Effects for GHGs Impact Assessment

		Sensitivity of Receptor
		High
Magnitude of Change	**Low**	Minor adverse significance
	High	Major adverse significance

As such, the National Emissions Inventories for Ireland, as compiled by the EPA, have been used as a proxy for the level of effect of GHG emissions as a result of the Scheme on the global climate. The most recent Annual national GHG Emission reported for Ireland is 60,935,000 tCO_2e for 2018 (SEAI, 2020a).

Currently there are no National carbon budgets for Ireland. The Climate Action (Amendment) Bill (2020) highlights that a strategy will be developed and submitted for approval, which shall be known as a National Long-Term Climate Strategy. The first Strategy shall be published for the period 2021 to 2035 and will determine the national carbon budget.

In the absence of a National Carbon Budget, and to supplement the use of the National Emissions Inventory from 2019 (detailing emissions for 2018), the GHG emissions arising from the Proposed Tonnage Increase will also be expressed as a percentage of the Ireland wide public electricity and heat production emissions for 2018: 10,108,900 tCO2e, to provide context at a country level.

In GHG accounting, it is common practice to consider exclusion of emission sources that are <1% of a given emissions inventory on the basis of a 'de minimis' contribution. The publicly available specification (PAS) 2050 (2011) Specification (IFC, 2011) allows emissions sources of <1% contribution to be excluded from emission inventories, and these inventories to still be considered complete for verification purposes. This would therefore suggest that a development with emissions of <1% of Ireland's national inventory would be minimal in its contribution to the wider national GHG emissions.

To put the impact from estimated annual GHG emissions from the project into further context a reporting threshold of 25,000 tCO_2e per annum used by the International Finance Corporation (IFC) for projects that it contributes funding to has also been used to determine the magnitude of the impact (EirGrid, 2019). Therefore, emissions of <25,000 tCO_2e as a result of a development might also be considered to be of low magnitude.

In the absence of specific criteria for defining the significance of GHG emissions, the IEMA guidance suggests that professional judgement should be used to contextualise the GHG impact. The approaches outlined above have therefore been adopted to assess the magnitude of the GHG impact associated with the Proposed Tonnage Increase and the associated criteria are outlined in Table 10-3.

Table 10-3 Magnitude Criteria for the Lifecycle GHG Impact Assessment

Magnitude	Magnitude Criteria
High	Annual GHG emissions represent equal to or more than 1% of the relevant annual National Carbon Budget or are more than 25,000 tCO_2e in any year.
Low	Annual GHG emissions represent less than 1% of the relevant annual National Carbon Budget and are less than 25,000 tCO_2e in any year.

10.3.6 Limitations and Assumptions

Maximum parameters have been adopted where information relating to the climate impact is missing, as a worst case. As a result, some data is not available to provide a fully quantified assessment of the GHGs from the operation of the Proposed Tonnage Increase. Accordingly, some industry estimates have been used.

General assumptions relating to the assessment undertaken are listed below:

- The baseline scenario calculations are based upon the 2019 operations of the existing Facility supplemented by information in the 2006 EIS (Eslam Engineering, 2006) and the EIA Scoping Report (AECOM, 2019), with the Facility operating at a throughput of 600,000 t of waste per annum;
- For the purposes of this assessment, the calorific value of the waste is assumed to be consistent for the baseline and the Proposed Tonnage Increase, however it should be noted that in reality the increased throughput of waste has been proposed as a result of a decrease in calorific value. By using the same calorific value throughout, the worst-case scenario has been assessed;
- Displaced emissions resulting from the diversion of waste to the Facility were calculated using average waste disposal methods in Ireland;
- Standard assumptions for waste to energy combustion were used according to the Defra (2014) methodology, except in the following cases where more specific data was available:
  - the proportion of carbon in the waste derived fuel was assumed to be 47%, with a non-biogenic fraction of 47% in accordance with 2019 waste data provided (DEFRA EfW Carbon Modelling approach);
  - methane release from landfill (to inform offsets) was calculated assuming a 68% methane capture rate and a 10% methane oxidization rate in accordance with 2019 waste data provided;
  - typical efficiency of a combined gas turbine, used to calculate electricity generation requirements in the absence of the Facility, was assumed to be 350 $kgCO_2$/MWh, in accordance with EirGrid data (Government of Ireland, 2020);
  - transport of waste to the Facility was assumed to come from a maximum distance of 110 km, reflective of the furthest distance from the Facility (Haggardstown);
  - commuter travel was assumed to be 10 km, nominal values in the absence of data;
- For transport of by-products, it is assumed APCR goes to Norway for reuse, while IBA, ferrous and non-ferrous metals assumed to be recycled in Ireland according to the details presented in Chapter 2 Project Description.
- The operational hours per annum is assumed to be 8,387 in accordance with 2019 data;
- The operational design life of the Proposed Tonnage Increase is assumed to be 30 years; and
- Decommissioning activities are not assumed to be necessary as the Facility is already in operation. The Facility has a lifetime of 60 years, therefore, when decommissioned, it will be subject to a separate planning application and EIAR which will assess climate risks.

10.4 Baseline

The baseline scenario was determined using the activities from the Facility at the current operating capacity of 600,000tpa[24]; reflecting a scenario in which the Proposed Tonnage Increase to 690,000 tpa does not go ahead.

It is noted that a further increase in capacity and emissions at the Facility will require a revision of the Facility IE Licence. However, this revision will not involve a request for permission for the emission of any increased GHGs as the Facility will operate within its existing IE Licence limits.

The GHGs that are associated with the baseline scenario have been calculated using the methodology described in Section 10.4. The annual baseline emissions associated with the Facility currently are presented in Table 10-4.

[24] Note that calculations are based upon 2019 data,

Table 10-4 Annual Baseline Emissions Associated with the Facility (operating under 600,000 tpa)

Lifecycle Stage	Project Activity / Emissions Source	Emissions (TCO_2E)	% Emissions
Operations Stage	Generator energy usage (during downtime)	2,786.65	1%
	Fuel usage on-site (including non-biogenic emission from RDF combustion)	484,890.47	94%
	Plant waste transport	2,611.09	1%
	Plant waste disposal	533.81	0%
	Worker commute	22.82	0%
	Materials usage	1,058.24	0%
	RDF and other material transport	24,384.91	5%
	Total	516,287.99	

10.5 Assessment of Impacts

The impact of the Facility may include the increase of GHG's in the atmosphere, contributing to climate change and global warming. The global climate has been identified as the receptor for the purposes of the GHGs assessment. The sensitivity of the climate to GHG emissions is considered to be high.

GHG emission impacts of the Proposed Tonnage Increase are presented within this section. The results refer to the emissions that will arise from the Proposed Tonnage Increase, i.e. the additional 90,000 tpa capacity only, and do not consider the impact of the proportion of the plant that is already operational.

10.5.1GHG Avoidance Due to Proposed Tonnage Increase

The Proposed Tonnage Increase will increase the Facility's electricity output. The heat produced from the process is be used to generate electricity, of which approximately 62-63 MW is exported to the national grid with the increased capacity.

The Waste Action Plan 2020 – 2025 (Government of Ireland, 2020) highlights "*according to EPA figures, 23% of MSW was disposed to landfill in 2017 down from 41% in 2012*". In addition to this, the Waste Framework Directive has been amended to require that by 2035 no more than 10% of MSW goes to landfill.

The waste used at the facility might otherwise have been disposed of in landfill. When biomass materials such as wood and paper are allowed to decay naturally in a landfill, methane is released into the atmosphere. When biomass is burned efficiently and in a controlled manner (such as within the Proposed Tonnage Increase) the complete combustion results in the emission of CO_2 rather than methane. Due to the lower global warming potential of CO_2 as compared to methane, incineration can lead to lower carbon equivalent emissions.

The total operational emissions associated with burning the waste to energy are potentially reduced by the avoidance of the waste entering standard disposal methods. The EPA National Waste Statistics Report (2020) highlight "*the Landfill Directive sets a limit on the quantity of biodegradable municipal waste going to landfill; by 2020, it must be reduced to 35% of the total quantity (by weight) of biodegradable municipal waste produced in 1995*". Ireland is on track to meet this target. The final amendment to the EU Directive 2018/850 adds 'Member States shall take the necessary measures to ensure that by 2035 the amount of municipal waste landfilled is reduced to 10 % or less of the total amount of municipal waste generated (by weight)'.

In Ireland the average waste disposal methods are approximately (EPA, 2017):

- 32% energy recovery;
- 31% recycled;

- 22% landfilled;
- 9% composted;
- 4% other recovery; and
- 2% unmanaged waste.

Additionally, there is potential that some of the operational wastes can be processed to extract metals. Bottom ash collected from the facility is sent off site where metal is recovered for recycling and ash is put to beneficial reuse. This would reduce the waste volumes entering landfill but also provide metals for recycling. Fly ash collected in the air pollution control equipment is put into silos and removed from the Facility in sealed containers by a licensed contractor. Emissions avoided through the recycling of these metals, i.e., by avoiding making the equivalent amount of metal from virgin materials, amounts to 21,182.03 tCO_2e for every 90,000 t of waste.

Additional renewable electricity generated from the Proposed Tonnage Increase will also displace emissions associated with other generated fossil fuel sources of grid electricity. Using the SEIA Emission Factors (SEAI, 2020b) and the SEIA emissions factor for grid electricity in Ireland. Through future implementation of a proposed district heating, excess heat can be put to use in the local area. The existing Facility has been designed to link to a district heating scheme and should a local scheme be implemented; the majority of heat could be sourced from the Facility. According to the Dublin City Sustainable Energy Action plan 2010 – 2020 (DCC, 2010), district heating has the potential to reduce primary energy demand in buildings by 30%, and a heat network could see CO2e abatement of 12,500 tCO_2e per year across Dublin City.

10.5.2GHG Impacts

In order to assess the magnitude of the climate change impacts through GHGs associated with the Proposed Tonnage Increase, the GHGs that would be associated with the project activities have been calculated and listed in Table 10-5.

Table 10-5 Gross Operational GHG Emissions Based on 90,000 tonnes of Waste Per Annum.

Lifecycle Stage	Project Activity/ Emissions Source	Emissions (tco_2e)	% of Project Emissions
Operations Stage	Electricity usage (during downtime)	418	1%
	Fuel usage on-site (including non-biogenic emission from WtE combustion)	68,041	93%
	Plant waste transport	391.67	0%
	Plant waste disposal	80.08	0%
	Worker commute	-	0%
	Materials usage	158.74	0%
	RDF and other material transport	3,803.80	5%
ANNUAL		**72,893.31**	
TOTAL (30 Years)		**2,186,799**	

Table 10-6 Breakdown of Net GHG emissions from the Increased Operation Proposed Tonnage Increase (based on 90,000 tonnes of waste per year)

GHG Source	tonnes of CO_2e
Direct emission of fossil carbon dioxide from combustion of waste	68,041
Direct emissions from other Facility activities	4,852
Avoided emission of methane in landfill gas	44,536
Avoided emissions of fossil carbon dioxide from CCGT power station	18,299
Avoided emissions from landfill, net of offset electricity generation as a result of landfill gas recovery	4,192
Total net GHG emissions per year	**5,866.52**

The gross annual emissions from the Facility is increased by 72,893 tCO_2e. When the avoided emissions from waste disposal and displaced grid electricity are considered, the net annual increase in emission is reduced to 5,866.52 tCO_2e with the capacity at 690,00 tpa. This does not include the addition savings arising from by-product metal recycling and potential district heating presented in Section 10.7.

No new mitigation monitoring is required based on the assessment presented in Section 10.5.2, the Operator will however continue to undertake the following to minimise the generation of GHGs from the Facility with the Proposed Tonnage Increase:

- Implement alternative waste disposal methods with reduced GHGs impacts (e.g. reuse and recycling) for both Facility waste and by-products.

Emissions from the operation of the Facility, including electricity and fuel usage, plant waste transport and disposal, materials usage and RDF materials transport, do not contribute to more than 1% of Ireland's total emissions inventory. The total emissions arising from the Proposed Tonnage Increase of 90,000 tpa as presented in Table 10-6 amount to <0.035% of the 2018 National Emissions Inventory, and 0.21% of the total emissions arising from the Ireland wide public electricity and heat production emissions for 2018, highlighting that emissions from the Proposed Tonnage Increase are not significant.

For further context, the emissions are less than 25,000 tCO_2e per year, therefore under both criteria, when accounting for emissions arising from combustion of waste alongside the displaced emissions associated with diversion from landfill and alternative energy generation, according to the IEMA methodology, the magnitude of effects during operation is considered 'low' with the significance of effects being considered as 'minor adverse'.

10.5.3Cumulative Impacts

By comparing the impact against national and sectoral budgets our assessment is inherently cumulative. The global atmosphere is the receptor for climate change impacts and as such it has a significant ability for holding GHG emissions. Nevertheless, as stated by IEMA, all GHG emissions are considered significant and therefore will contribute to climate change. While the impact of any individual scheme may be limited, it is the cumulative impact of many schemes over time that have a significant impact on climate change.

10.6 Summary

In summary:

The total annual baseline emissions associated with the Facility will increase by 72,893.31 tCO_2e;

- 93% of the total GHG emissions from the Proposed Tonnage Increase would be associated with the operational fuel usage on site;
- 5% of the total GHG emissions from the Proposed Tonnage Increase would be associated with RDF and other material transport;
- There will be no increase in worker commuting emissions associated with the increase in capacity; and
- The estimated avoided emissions from landfill, net of offset electricity generation as a result of landfill gas recovery will be 5,866.52 tCO2e.

Chapter 11: Noise and Vibration

11

11. Noise and Vibration

11.1 Introduction

The EIA Scoping did not identify any likely significant effects associated with noise and vibration from the Proposed Tonnage Increase. This chapter therefore focuses on the baseline noise environment only. The EIA Scoping Report is provided in Appendix A1-1.

11.2 Legislation and Guidance

The legislation and guidance applicable to the baseline is as follows:

EIA Directive (EU, 2014);

- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)) (EU, 2018); and
- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017).

11.3 Methodology

The methodology for determining the noise and vibration baseline environment involved desktop review of the following information:

- 'Dublin Waste to Energy, Annual Environmental Noise Monitoring Report – 2020' (Altum Scientific, 2020); and
- 'Waste Licence for a Non-Hazardous Waste Incinerator/Waste-to-Energy Facility', W0232-01 (EPA, 2008).

11.4 Baseline

11.4.1 Facility Footprint and the Surrounding Area

The Facility is centrally located on Poolbeg Peninsula on the east side of Dublin City and is industrial in character. The Facility is surrounded to the north, east and west by a mixture of industrial uses including the ESB and Ringsend MWwTP located to the east and All Away Waste and Dublin Bay Power Station located to the west.

The existing noise climate in the study area is influenced by waste delivery trucks, Facility traffic and general plant operation (Altum Scientific, 2020).

11.4.2 Noise Monitoring

As per condition 6.2 of the IE Licence, noise monitoring is carried out at the Facility (EPA, 2008):

> ***Condition 6.2:*** *"The licensee shall carry out a noise survey of the site operations within three months after the commencement of the licensed activity, followed by quarterly monitoring intervals for a period of three years, and then biannually thereafter. The survey programme shall be submitted to the Agency in writing prior to the surveys being carried out. The survey programme shall be in accordance with Schedule C: Control & Monitoring, of this licence or as otherwise agreed by the Agency. A record of the survey results shall be available for inspection by any authorised persons of the Agency, at all reasonable times and a summary report of this record shall be included as part of the AER."*

As per condition 4.3 of the IE Licence, noise sources from the Facility shall not give rise to sound pressure levels (Leq,T) measured at noise sensitive locations which exceed the limit value(s) outlined in Table 11-1.

Table 11-1 Noise Limits as outlined in Industrial Emissions Licence

Daytime dB(A) L_{Aeq} (30 min)	Night-time dB(A) L_{Aeq} (30 min)
55	45

Source: IEL W0232-01, Section B.4, page 35

11.4.2.1 Noise Monitoring January 2020

The most recent noise monitoring was carried out by Altum Scientific in January 2020 at the following locations:

- N1 Rehab Institute;
- N2 Seafort Avenue;
- N3 Beach Avenue;
- N4 Leukos Road;
- N5 Pigeon House Road;
- N6 Walkway (Irishtown Nature Reserve);
- N7 western Facility boundary;
- N8 northern Site Facility boundary;
- N9 eastern Site Facility boundary; and
- N10 southern Site Facility boundary.

Noise sensitive locations N1, N2, N3, N4 and N5 represent residential receptors. Non-residential receptor N6 is situated close to the walkaway in Irishtown Natural Reserve at the distance of 700 m from the urban background noise sources. N7, N8, N9 and N10 represent site boundary locations (Atlum Scientific, 2020)

Analysis of noise monitoring data from January and February 2020, and assessment of sound levels at the noise-sensitive locations have demonstrated compliance with the limits specified within condition 6.2 of the IE Licence (Altum Scientific, 2020). The monitoring results showed local residual noise is the major factor affecting noise levels recorded at noise-sensitive locations represented by residential receptors (N1, N2, N3, N4 and N5). High L_{AF10} and relatively low L_{AF90} values of noise levels indicate the significant impact of Dublin traffic on recorded noise levels.

As outlined in the 'Dublin Waste to Energy, Annual Environmental Noise Monitoring Report-2020', as it was not possible to assess the contribution of the Facility to noise levels at sensitive receptors due to high level of residual noise, extrapolating of noise levels from results obtained at Facility boundary location was carried out for all noise-sensitive locations. Calculation of the predicted specific noise levels (Table 11-4 and Table 11-5) demonstrated that noise levels from the Facility were below day and night-time IE Licence limits. Actual noise levels from the Facility for all noise-sensitive receptors were found to be "*far below*" calculated levels (Altum Scientific, 2020).

A summary of daytime and night time noise monitoring results are outlined in Table 11-2 and Table 11-3, with results from the calculated predicted noise levels from the Facility outlined in Table 11-4 and Table 11-5.

Table 11-2 Daytime Survey Noise Monitoring Results (January 2020)

Monitoring Location	No	Measurement start time	L_{Aeq} (30 min) dB	L_{AF90} (30 min) dB)	L_{AF10} (30 min) dB	Tones*	Impulsive noise **
N1 Rehab Institute	1	20/02/2020 10.46	74	56	78	-	-
	2	20/01/2020 11.16	74	56	78	-	-
	3	20/01/2020 11.46	73	53	78	-	-
	Total:		*74*	*54*	*78*	-	-
N2 Seafort Avenue	1	20/01/2020 12.36	60	40	58	-	-

Monitoring Location	No	Measurement start time	L_{Aeq} (30 min) dB	L_{AF90} (30 min) dB)	L_{AF10} (30 min) dB	Tones*	Impulsive noise **
	2	20/01/2020 13.06	60	45	61	-	-
	3	20/01/2020 13.36	60	42	58	-	-
	Total:		*60*	*42*	*59*	-	
N3 Beach Avenue	1	23/01/2020 13:33	56	45	59	-	-
	2	23/01/2020 14:03	55	45	58	-	-
	3	23/01/2020 14:33	55	45	58	-	-
	Total:		*55*	*45*	*58*	-	
N4 Leukos Road	1	23/01/2020 15:33	66	67	69	-	-
	2	23/01/2020 16:03	68	61	68	-	-
	3	23/01/2020 16:33	65	60	68	-	-
	Total:		*66*	*61*	*68*		
N5 Pigeon House Road	1	20/01/2020 14:20	63	58	64	-	-
	2	20/01/2020 14:50	63	58	64	-	-
	3	20/01/2020 15:20	63	59	64	-	-
	Total:		*63*	*58*	*64*		
N6 Walkway (Irishtown Nature Reserve)	1	22/01/2020 11:06	49	45	50	-	-
	2	22/01/2020 11:36	49	46	50	-	-
	3	22/01/2020 12:06	50	45	51	-	-
	Total:		*49*	*45*	*50*		
N7 Western Site Boundary	1	27/01/2020 08:59	59	51	58	-	-
	2	27/01/2020 09:29	58	52	59	-	-
	3	27/01/2020 09:59	58	54	60	-	-
	Total:		*58*	*52*	*60*		
N8 Northern Site Boundary	1	27/01/2020 10:41	62	58	64	-	-
	2	27/01/2020 11:11	61	56	64	-	-
	3	27/01/2020 11:41	61	55	64	-	-
	Total		*61*	*59*	*62*		
N9 Eastern Site Boundary	1	27/01/2020 12:17	60	59	61	-	-
	2	27/01/2020 12:47	60	59	62	-	-

Monitoring Location	No	Measurement start time	L_{Aeq} (30 min) dB	L_{AF90} (30 min) dB)	L_{AF10} (30 min) dB	Tones*	Impulsive noise **
	4	27/01/2020 13:17	62	58	63	-	-
	Total		*61*	*59*	*62*		
N10 Southern Site Boundary	1	27/01/2020 13:53	54	45	57	-	-
	2	27/01/2020 14:23	47	44	49	-	-
	3	27/01/2020 14:53	58	46	53	-	-
	Total		*55*	*45*	*58*		

Source: Altum Scientific. (2020). Dublin Waste to Energy, Annual Environmental Noise Monitoring Report – 2020

Table 11-3 Night-time survey noise monitoring results (January and February 2020)

Monitoring Location	No	Measurement start time	L_{Aeq} (30 min) dB	L_{AF90} (30 min) dB)	L_{AF10} (30 min) dB	Tones*	Impulsive noise **
N1 Rehab Institute	1	16/01/2020 23:01	68	44	73	-	-
	2	16/01/2020 23:31	66	42	70	-	-
	Total:		*67*	*42*	*71*	-	-
N2 Seafort Avenue	1	17/01/2020 00:09	52	35	56	-	-
	2	17/01/2020 00:39	49	34	48	-	-
	Total:		*51*	*35*	*53*	-	
N3 Beach Avenue	1	17/01/2020 01:19	42	33	41	-	-
	2	17/01/2020 01:49	40	33	38	-	-
	Total:		41	33	39	-	
N4 Leukos Road	1	20/01/2020 23:00	51	43	54	-	-
	2	20/01/2020 23:30	49	43	51	-	-
	Total:		*50*	*43*	*53*		
N5 Pigeon House Road	1	21/01/2020 00:05	48	44	51	-	-
	2	21/01/2020 00:35	56	50	58	-	-
	Total:		*54*	*45*	*56*		
N6 Walkway (Irishtown Nature Reserve)	1	21/01/2020 01:30	37	34	40	-	-
	2	21/01/2020 02:00	37	34	40	-	-
	Total:		*37*	*34*	*40*		
N7 Western Site Boundary	1	27/02/2020 00:30	49	46	51	-	-
	2	27/02/2020 01:00	49	46	50	-	-

Monitoring Location	No	Measurement start time	L_{Aeq} (30 min) dB	L_{AF90} (30 min) dB)	L_{AF10} (30 min) dB	Tones*	Impulsive noise **
	Total:		*49*	*46*	*50*		
N8 Northern Site Boundary	1	27/02/2020 01:36	52	51	53	-	-
	2	27/02/2020 02:06	52	50	53	-	-
	Total		*52*	*50*	*53*		
N9 Eastern Site Boundary	1	28/01/2020 00:07	58	57	59	-	-
	2	28/01/2020 00:37	58	57	59	-	-
	Total		*58*	*57*	*59*		
N10 Southern Site Boundary	1	26/02/2020 23:23	44	42	45	-	-
	2	26/02/2020 23:53	43	42	44	-	-
	Total		*43*	*42*	*45*		

Source: Altum Scientific. (2020). Dublin Waste to Energy, Annual Environmental Noise Monitoring Report – 2020

Table 11-4 Daytime – calculated predicted noise levels at noise sensitive locations

Noise Sensitive Location	Distance from Facility (m)	Measurement No.	Reference Sound level (L_{Aeq}) (30 min dB	Calculated predicted noise level dB L_{Aeq} (30 min)	Emissions limit dB L_{Aeq} (30 min)
N1 Rehab Institute	850	1 2 3	54 47 58	17 10 21	55
N2 Seafort Avenue	930	1 2 3	54 47 58	16 9 20	55
N3 Beach Avenue	1000	1 2 3	54 47 58	16 9 20	55
N4 Leukos Road	900	1 2 3	56 58 58	18 20 20	55
N5 Pigeon House Road	920	1 2 3	56 58 58	18 20 20	55
N6 Walkway (Irishtown Nature Reserve)	220	1 2 3	54 47 58	29 22 33	55

Source: Altum Scientific. (2020). Dublin Waste to Energy, Annual Environmental Noise Monitoring Report – 2020

Table 11-5 Night-time – calculated predicted noise levels at noise sensitive locations

Noise Sensitive Location	Distance from Facility (m)	Measurement No.	Reference Sound level (LAeq) (30 min dB	Calculated predicted noise level dB LAeq (30 min)	Emissions limit dB LAeq (30 min)
N1 Rehab Institute	850	1 2	44 43	7 6	45
N2 Seafort Avenue	930	1 2	44 43	6 5	45
N3 Beach Avenue	1000	1 2	44 43	6 5	45

Noise Sensitive Location	Distance from Facility (m)	Measurement No.	Reference Sound level (LAeq) (30 min dB	Calculated predicted noise level dB LAeq (30 min)	Emissions limit dB LAeq (30 min)
N4 Leukos Road	900	1	49	11	45
		2	49	11	
N5 Pigeon House Road	920	1	49	11	45
		2	49	11	
N6 Walkway (Irishtown Nature Reserve)	220	1	44	19	45
		2	43	18	

Source: Altum Scientific. (2020). Dublin Waste to Energy, Annual Environmental Noise Monitoring Report – 2020

11.5 Summary

In summary:

- The existing noise climate is influenced by waste delivery trucks, Facility traffic and general plant operation.
- Noise monitoring carried out in January 2020 by Altum Scientific concluded that daytime and night-time noise levels at noise monitoring locations surrounding the Facility were within the allowable limits of the IE Licence;
- As the EIA Scoping did not identify any likely significant effects associated with noise and vibration from the Proposed Tonnage Increase, this chapter therefore focuses on the baseline noise environment only; and
- The Proposed Tonnage Increase will not result in a change to the existing noise climate and the licensed noise limits prescribed in the Facility's IE Licence.

Chapter 12: Landscape

12

12. Landscape and Visual

12.1 Introduction

As the Proposed Tonnage Increase does not involve change to the physical structure of the Facility and would involve a small increase in the volume of WDV's travelling to and from the Facility only, no likely significant effects to landscape and the visual amenity of the area were identified during the EIA scoping. The EIA Scoping Report is provided in Appendix A1-1. This chapter therefore focuses on the baseline landscape only as per the EPA requirements outlined in Chapter 1 Introduction.

12.2 Legislation and Guidance

The legislation and guidance applicable to the baseline is as follows:

- EIA Directive (EU, 2014);
- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)) (EU, 2018); and
- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017).

12.3 Methodology

The methodology for determining the landscape baseline environment involved desktop review of the following information:

- EPA's Online Map Viewer25;
- 'Dublin City Development Plan' 2016-2022 (DCC, 2016); and
- 'Dublin Waste to Energy Project, Environmental Impact Statement' (Eslam Engineering, 2006).

12.4 Baseline

12.4.1 Facility Footprint and Surrounding Area

The Facility is centrally located on Poolbeg Peninsula on the east side of Dublin City. The peninsula, which lies within the Dublin Docklands, is an area of reclaimed land extending eastwards into Dublin Bay from Ringsend. The Poolbeg Peninsula is industrial in character. The Facility is surrounded to the north, east and west by a mixture of industrial uses.

The DCDP 2016-2022 refers to the landscape of the County as "*Dublin's setting on the River Liffey, with the Dublin mountains to the south, Howth peninsula to the north, and also the amenities and wildlife of Dublin Bay, is a unique one, and it is critical to retain existing key landscapes and open spaces which offer so much to the city in terms of amenity and character*" (DCC, 2016).

Within Dublin city, there are outstanding landscapes of national importance including:

- National Special Amenity Area at North Bull Island;
- Views northward to the National Special Amenity Area at Howth Head; and
- Phoenix Park.

[25] https://gis.epa.ie/EPAMaps Accessed 15/07/2020

12.4.2 Landscape Character

There are no designated landscape character areas within the city administrative areas. The DCDP contains an objective on landscape character in the County:

Objective GIO6: "*To prepare a Landscape Character Assessment (LCA) for Dublin city during the lifetime of the plan in accordance with the National Landscape Strategy and forthcoming national methodology"* (DCC, 2016).

As the Facility is located on reclaimed land as a result of infilling and flood protection, the landscape character of the area is dominated by the presence of Dublin Bay, the enclosing coastal landscape of Dublin City, and the industrial infrastructure of the Poolbeg peninsula.

The lands surrounding the Facility have been described as being of significant visual interest due their setting on a coastal peninsula, with the views over surrounding Dublin Bay and Dublin City (Eslam Engineering, 2006). However, the lands where the Facility is located is considered to be of low landscape sensitivity, dominated by industrial use. The principal industrial activities on the peninsula consist of power generation and utilities infrastructure, storage and port facilities.

The Poolbeg SDZ is located to south and west of the Facility, which provides for between circa 3,500 additional residential units on the lands, and 80,000 – 100,000 sqm of commercial floorspace however this has not been commenced at time of writing.

12.4.3 Visual Character

Previous landscape assessment (Eslam Engineering, 2006) outlines that despite the industrial character of the land use surrounding the Facility, the wider Poolbeg peninsula has a strong visual presence within Dublin Bay and its immediate coastal landscape.

The closest residential areas to the Facility are at Ringsend, Irishtown and Sandymount located between 1 and 2 km east and south of the Facility. Clontarf is situated 2 km directly north of the Facility.

The DCDP 2016-2022 contains an indicative 'Key Views and Prospects' map which shows there are no protected views or prospects located close to the Facility.

12.5 Summary

In summary:

- As the Proposed Tonnage Increase does not involve change to the physical structure of the Facility and would involve a small increase in the volume of WDV's travelling to and from the Facility only, no likely significant effects to landscape and the visual amenity of the area were identified during the EIA scoping. The focus of the chapter was therefore on the baseline landscape surrounding the Facility only; and

- The landscape and visual character of the surrounding area of the Facility is defined by long term established industrial use, comprising buildings and associated infrastructure situated on the Poolbeg peninsula to the east of Dublin City; Dublin Bay; Dublin City centre and surrounding residential development and suburbs along the coast and further inland.

Chapter 13: Roads and Traffic

13

13. Roads and Traffic

13.1 Introduction

The Proposed Tonnage Increase will require an increase to the current volume of WDV's travelling to and from the Facility. This chapter therefore presents an assessment of the potential impact to the road network from the increase in operational traffic from 600,000 to 690,000 tpa, in accordance with the requirements of the relevant legislation and guidance on preparation and content of EIARs.

This chapter should be read in conjunction with the TTA (AECOM, 2020) which accompanies the Proposed Tonnage Increase planning application. The TTA presents a comprehensive review of the traffic and transportation impacts associated with the Proposed Tonnage Increase, which have informed the production of this EIAR roads and traffic chapter.

13.2 Legislation and Guidance

The following lists the legislation and guidance of relevance and used to inform the roads and traffic assessment:

- 'Traffic and Transport Assessment Guidelines' (TII, 2014); and
- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017)

13.3 Methodology

The methodology for this roads and traffic assessment is as follows:

- Establish the baseline by assessing the current traffic levels on the local road network surrounding the Facility. The following surveys were conducted:
  - Junction Turning Count (JTC) Surveys;
  - Queue Length Surveys; and
  - Automatic Traffic Count Surveys.
- Determine the average trip generation rate of WDVs to and from the Facility;
- Conduct desktop review of publicly available and client provided data:
  - Data of trip generation of WDVs from October 2017 to July 2018 (source the Operator);
  - 'Dublin Waste to Energy Facility, Traffic Impact Assessment' (ILTP Consulting, 2006);
  - 'Dublin Waste to Energy Facility, Environmental Impact Statement, Chapter 7 – Traffic (Eslam Engineering, 2006);
  - 'Dublin City Development Plan 2016-2022' (DCC, 2016); and
  - 'Dublin Port Masterplan 2040 Reviewed 2018' (Dublin Port Company, 2018).
- Determine the future trip generation rate of WDVs to and from the Facility based on the proposed increased annual waste treatment capacity of 690,000 t; and
- Assess the traffic impact and likely significant effects of the Proposed Tonnage Increase on the AM and PM local road network.

13.3.1 Study Area

The map in Figure 13-1 illustrates the location of the Facility and the existing road network in close proximity to the Facility as well as the existing access into the Facility.

The extent of the study area for the roads and traffic assessment was assessed by using the threshold approach, as set out in the TII Guidelines (TII, 2014), for establishing the area of influence of a development. In general, the study area should include all road links and associated junctions where traffic to and from a development may be expected to exceed 10% of the existing traffic movements, or 5% in congested or other sensitive locations.

Figure 13-1 Existing Network Surrounding the Facility (*Source: Google Earth*)

13.3.2 Determination of the Facilities Vehicle Trip Generation Rates

The trip generation of the Facility has been calculated using two methods (AECOM, 2020). The WDV trip generation has been calculated based on the Facility's delivery records provided by the Operator for traffic and waste tonnage received at the Facility over a ten-month period from October 2017 to July 2018. It should be noted that 2020 traffic surveys were not considered appropriate, given the reduction in background traffic due to Covid-19. The 2017 and 2018 surveys are considered recent counts, as required by TII 'Traffic and Transport Assessment Guidelines', with growth rates applied to allow for a reflective analysis of the future year scenarios.

Other vehicle types that may access the Facility including RWVs; services vehicles; and staff and visitor vehicles have been calculated by traffic surveys undertaken at the Facilities accesses in 2018.

13.3.3 Determination of Existing Traffic Conditions

To inform the roads and traffic assessment, traffic surveys were undertaken both in 2017 and 2018. The 2017 traffic survey were undertaken prior to the opening of the Facility, to ensure that the existing traffic network was captured accurately. The 2018 traffic surveys were undertaken after the opening of the Facility, to provide an independent assessment of the Facility's trip generation and trip distribution. As previously mentioned, 2020 traffic surveys were not considered appropriate, given the reduction in background traffic due to Covid-19. The 2017 and 2018 surveys are considered recent counts, as required by TII 'Traffic and Transport Assessment Guidelines' (TII, 2014), with growth rates applied to allow for a reflective analysis of the future year scenarios.

13.3.3.1 2017 Junction Turning Counts/Queue Length Survey Locations

The 2017 traffic count surveys were undertaken at relevant key selected junctions and links surrounding the Facility.

The surveys were conducted on Tuesday 4 April 2017 during a weekday when schools were in operation. The Facility was nearing completion at the time, undertaking its final fit out. Therefore, the April 2017 traffic counts exclude any Facility trips. The counts were carried out for a 24-hour time period. These are detailed below and illustrated in the map in Figure 13-2.

Figure 13-2 Traffic Survey Locations (Source: AECOM, 2020)

JTCs and Queue Lengths were measured at seven key junctions within the road network on Tuesday, 4 April 2017. These locations are as follows:

1. South Lotts Road / Ringsend Road / South Dock Road / Bridge Street Junction;
2. R131 East Link Road / R801 North Wall Quay / R 131 East Wall Road Roundabout Junction;
3. Sean Moore Road / Pigeon House Road / R131 East Link Road / Southbank Road Roundabout Junction;
4. Beach Road /Cranfield Place / Sean Moore Road Signal Controlled Junction;
5. Sean Moore Road / Church Avenue / Beach Road Signal Controlled Junction;
6. Irishtown Road / Londonbridge Road / Church Avenue Signal Controlled Junction; and
7. South Bank Road / Whitebank Road Priority Junction.

AM and PM peak hour traffic flow diagrams are provided in the TTA report (AECOM, 2020) which accompanies this application.

13.3.3.2 2018 Traffic Surveys

JTCs and video surveys were undertaken at the Facility access junctions and Sean Moore Road on Tuesday, 2 October 2018. These are set out in Figure 13-3 and are as follows:

1. Pigeon House Road / Waste to Energy WDV Access;
2. Shellybanks Road / Waste to Energy Staff Access; and
3. Sean Moore Road / Pigeon House Road / R131 East Link Road / Southbank Road Roundabout Junction.

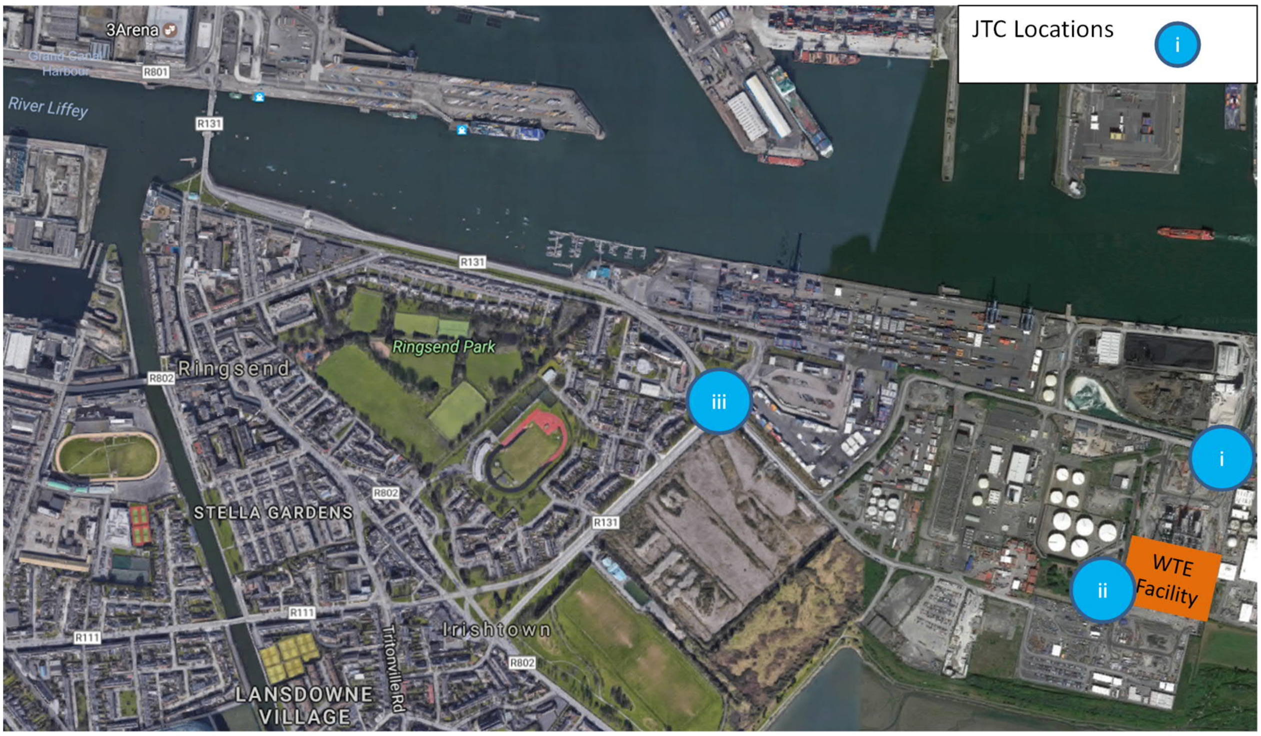


Figure 13-3 2018 Junction Turning Counts (Source: AECOM, 2020)

The 2018 traffic surveys were undertaken when the Facility was fully operational. It provided detailed information on the following:

- An hourly breakdown of the trips generated by the Facility;
- Size of the WDVs;
- Trip Distribution of the WDVs;
- Existing Trip Generation rate of service vehicles, in particular the AM and PM peaks; and
- Existing Trip Generation rate of staff and visitor vehicles, in particular the AM and PM peaks.

13.4 Baseline

13.4.1 Existing Road Network

Details of the existing road network within the study area are detailed in the following subsections. At the time of writing, a temporary road closure was in place on the Pigeon House Road, west of the Sean Moore Road junction, for a trial period of six months, as a temporary Covid-19 scheme.

13.4.1.1 R131 Regional Road

The R131 is a regional road that is approximately 5 km in length. It begins in Drumcondra and continues in a south east direction down through East Wall Road and the East Link Toll Bridge and terminates at the Sean Moore Road/Beach Road junction. The R131 in the vicinity of the Facility is wide and has a toll located along it. There is a footpath on one side of the road; two sides travelling over the bridge. This footpath is narrow in places but is in good condition. See photos in Figure 13-4 below.

Figure 13-4 R131 Regional Road

13.4.1.2 Pigeon House Road

Pigeon House Road is a single carriageway road approximately 6 m in width. The road on approach to the Facility has a footpath on both sides. This footpath is narrow in places. There are no pedestrian crossing facilities along the road. There are no cycle facilities in place along the road. See photos in Figure 13-5.

Figure 13-5 Pigeon House Road

13.4.1.3 South Bank Road/White Bank Road

The South Bank Road and the White Bank Road are wide distributor roads that provide access for employees and Heavy Goods Vehicles (HGV) vehicles into and out of the Poolbeg Peninsula. As shown in the photos in Figure 13-6, footpath provision along the road is narrow behind existing concrete blocks.

Figure 13-6 South Bank Road and White Bank Road (Source: AECOM, 2020)

13.4.1.4 Sean Moore Road

The Sean Moore Road is a wide single lane two-way operating road. There are footpaths on both sides of the road; these are wide and in good condition, as illustrated in Figure 13-7.

Figure 13-7 Sean Moore Road (Source: AECOM, 2020)

13.4.2Facility’s Operations Overview

The Facility became operational in summer 2017. The current operational hours for the Facility are 24 hours a day, seven days a week. However, the Facility has a licence to only accept WDVs Monday to Saturday from 08:00 to 22:00.

As outlined in Chapter 2, waste generated at the Facility (except IBA and APCR) is removed between the hours of 08.00 to 18.30 Monday to Friday (inclusive) and 08.00 to 14.00 on Saturdays. In accordance with the conditions of the sites IE licence, IBA and APCR is permitted for removal at any time if destined for ships within the Dublin Port area. DWtE is currently assessing other ports and outlets on the island of Ireland to ensure optimum and sustainable logistics for export. Any change to transport and export arrangements of IBA and APCR will be subject to agreement with the EPA.

Waste is transferred to the Facility by WDVs. There are two types of WDVs; Refuse Collection Vehicle (RCVs) and Bulk Transfer Vehicles (BTVs). RCVs are typically rigid trucks with between three and four axles, while BTVs are typically five-axle articulated vehicles.

Other vehicle types that may access the Facility include: RWVs; services vehicles; and staff and visitor vehicles. RWVs, which are typically between four and five axle trucks, access the Facility to collect residual solid waste residues, which are brought to off-site locations. Service vehicles include cars, Light Goods Vehicles (LGVs) and HGVs. Staff and visitor vehicles include cars, taxis, LGVs and bicycles.

The Facility is accessed via South Bank Road and Pigeon House Road. There are currently two accesses into the Facility. One access is located off Shellybanks Road, which provides access for staff and visitors to the Facility. The second access is via Pigeon House Road. The service access provides for all WDVs, RWVs and service vehicles to the Facility. This is illustrated in Figure 13-8 below.

There are currently 35 parking spaces available for staff parking.

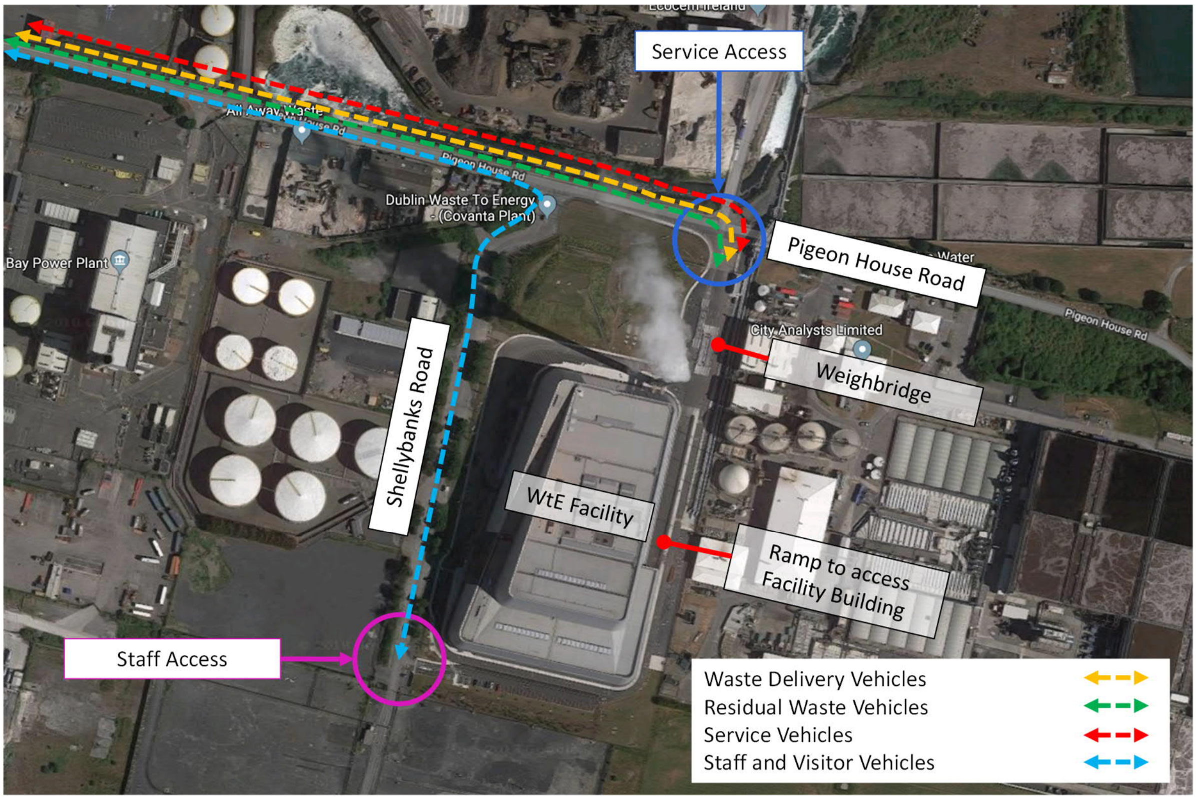


Figure 13-8 Existing Access into the Facility (Source: AECOM, 2020)

Figure 13-9 shows the existing service access to the Facility. The first photo shows the existing access on Pigeon House Road, while the second photo shows WDVs waiting at the weighbridge and the ramp to access the Facility building. All vehicles entering and exiting the facility are recorded and weighed to determine the number of vehicles and tonnage of WDV or RWV entering and exiting the Facility.

Figure 13-9 Service Access (Source: AECOM, 2020)

13.4.3 Current Trip Generation

Based on the TTA (AECOM, 2020), the baseline trip generation is summarised as follows:

- **WDVs:** WDVs are the largest proportion of trips to the Facility. The existing monthly delivery of waste is catered for by an average of 95 WDVs per day (190 combined trips arriving and departing the Facility per day);
- **RWVs.** An average of five (four APCR vehicle and one IBA vehicle) RWVs per day are required to transport waste residue from the Facility;

- **Service vehicles.** Service vehicles include cars, LGVs and HGVs accessing the Facility via the service access. There was a total of 55 Passenger Car Units (PCUs) arrivals and 37 PCUs departures from the service access; and

- **Staff and visitor vehicles.** The total number of vehicles entering the staff access consists of 28 arrivals 23 trips by car, one taxi, and one LGV and three by bike. Of the 34 departures, there were 29 by car, 1 taxi, and one LGV and three by bike.

13.5 Assessment of Impacts

13.5.1Trip Generation and Distribution

This section sets out the assessment the potential impacts to the road network from the increase in traffic due to the Proposed Tonnage Increase.

13.5.1.1 Waste Delivery Vehicles

Figure 13-10 illustrates the monthly waste tonnage that the Facility accepted between October 2017 and July 2018 and shows that on average the Facility accepted 52,722 t of waste per month.

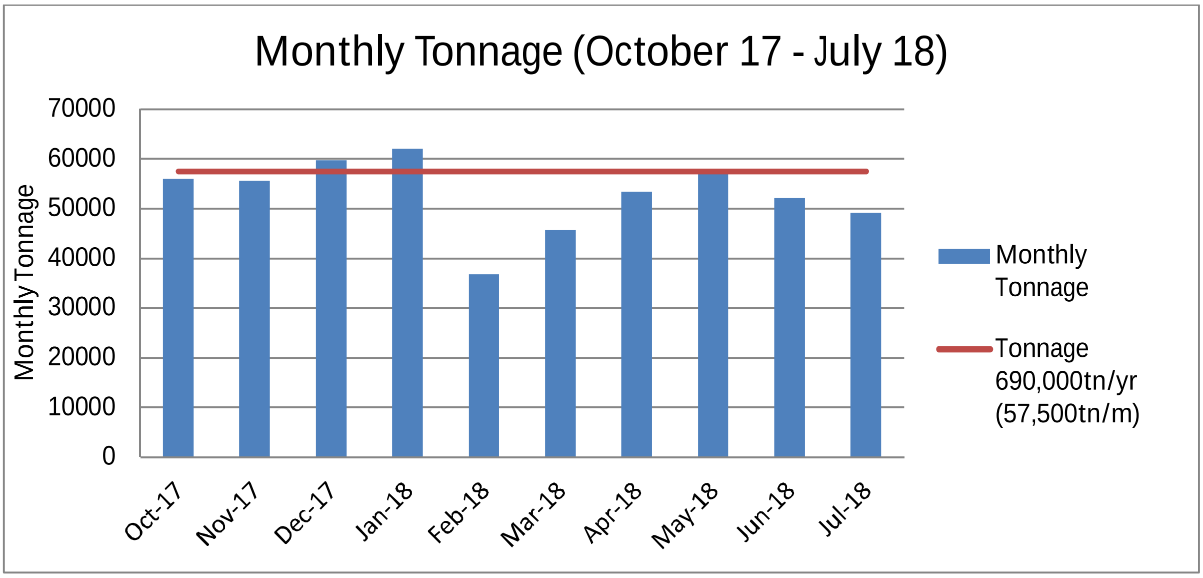


Figure 13-10 Operational Monthly Tonnage (Source: AECOM, 2020)

There were three out of the ten months assessed, where the Facility surpassed, or came close to, the 57,500 to monthly benchmark associated with the proposed 690,000 tpa waste capacity. These months were December 2017 (59,624 t), January 2018 (62,013 t) and May 2018 (57,360 t), with an average of 59,666 t of waste per month. Therefore, these three months, where tonnage accepted was highest, have been used to assess the likely significant effects on traffic for the Facility's proposal to accept 690,000 t of waste per year as the upper end scenario.

Table 13-1 summarises the assessment of these three highest months and indicates that the average volume of waste delivered (59,666 t per month) was 2,166 t greater than the 57,500 t monthly benchmark associated with the Proposed Tonnage Increase. On average, the Facility accepted this level of waste at a trip generation rate of 105 WDVs per day (210 combined trips arriving and departing the Facility per day).

Table 13-1 Combined December 17, January 18 and May 18 Monthly Average (Worst Case Scenario)

Item	Statistic	Unit
Average Monthly Tonnage	59,666 tonnes	Tonnes
Average Monthly WDVs	2,647	Number
Average Number of Operational Monthly Days	25	Number

Item	Statistic	Unit
Average Tonnes Per Day	2,355	Tonnes
Average WDVs Per Day	105	Number
Average Tonnes Per WDV	22	Tonnes
Average Daily Trips (combined arriving and departing the Facility)	210	Number

Source: Dublin Waste to Energy Facility, Traffic and Transport Assessment (AECOM, 2020)

Therefore, the upper end scenario trip generation rate associated with the proposal to increase the Facility's waste tonnage capacity from 600,000 tpa to 690,000 tpa is 105 WDV trips per day (210 combined trips arriving and departing the Facility per day), as set out in Table 13-2.

Table 13-2 Proposed Average Daily WDV (Worst Case Scenario)

	Daily Total (07:00 – 22:00)		Average Per Hour	
	Vehicle	Passenger Car Units	Vehicle	Passenger Car Units
Arrival	105	315	7	21
Departure	105	315	7	21
Total	**210**	**630**	**14**	**42**

Source: Dublin Waste to Energy Facility, Traffic and Transport Assessment (AECOM, 2020)

The number of WDVs trips is predicted to increase from 95 to 105 WDVs per day (210 combined trips arriving and departing the Facility per day).

13.5.1.2 Residual Waste Vehicles

To assess the trip generation rate associated with the Proposed Tonnage Increase in annual waste treatment capacity from 600,000 tpa to 690,000 tpa, it is assumed that there will be an associated increase of 15% in waste residue treatment requirements from the Facility.

13.5.1.2.1 Air Pollution Control Residue Waste Vehicles

APCRs are trucked in sealed containers to a site off on the North Quays where it awaits shipping. Currently, an average of four RWVs per day (eight combined trips arriving and departing the Facility per day) are required to transport this waste to the North Quay. Therefore, with an increase of 15% of waste deliveries, it is forecast that there will be a 15% increase in RWVs, i.e. APCR waste will increase from four to five loads per day with the 15% increase in waste delivery. A worst-case assessment has been assumed by applying the RWV trips during the peak traffic periods, i.e. three RWVs arriving and departing during the AM Peak and two RWVs arriving and departing during the AM and PM peak, as set out in Table 13-3 and detailed in the TTA (AECOM, 2020).

Table 13-3 Proposed Air Pollution Control Residue Waste Vehicles (Worst Case Scenario)

Vehicle Type	Daily Total (07:00 – 22:00)				AM Peak (08:00 – 09:00)				PM Peak (17:00 – 18:00)			
	Arrivals		Departures		Arrivals		Departures		Arrivals		Departures	
HGV	Vehs	PCU	Vehs	PCU	Vehs	PCU	Vehs	PCU	Vehs	PCU	Vehs	PCU
	5	15	5	15	3	9	3	9	2	6	2	6

Source: Dublin Waste to Energy Facility, Traffic and Transport Assessment (AECOM, 2020)

13.5.1.2.2 Incinerator Bottom Ash Residual Waste Vehicles

Five trucks are brought specifically to the Facility to remove the IBA to a docking location approximately 300 m north of the Facility's access, on the south docks, from where it is shipped abroad. The Facility currently undertakes this operation six times per month. Therefore, with an increase of 15% of waste deliveries, it is forecast that there will be a 15% increase in the frequency of this operation, i.e. IBA waste removal will increase from 6 days to 7 days a month.

With five trucks brought onsite, seven times per month, this equates to approximately one IBA RWV per day. A worst-case assessment has been assumed by applying the RWV trips during the peak traffic periods i.e. all the RWVs arriving during the AM peak, and all the RWVs departing during the PM peak, as set out in Table 13-4 and detailed in the TTA (AECOM, 2020).

Table 13-4 Proposed Bottom Ash Waste Residual Vehicles (Worst Case Scenario)

Vehicle Type	12 Hours				AM Peak (08:00 – 09:00)[26]				PM Peak (17:00 – 18:00)[27]			
	Arrivals		Departures		Arrivals		Departures		Arrivals		Departures	
	Vehs	PCU	Vehs	PCU	Vehs	PCU	Vehs	PCU	Vehs	PCU	Vehs	PCU
HGV	5	15	5	15	5	15	0	0	0	0	5	15

Source: Dublin Waste to Energy Facility, Traffic and Transport Assessment (AECOM, 2020)

Both the APCR and IBA removal arrangements are currently under evaluation by the Facility to reduce RWV trip generation further. For the purposes of this chapter the evaluation undertaken above has been conducted based on the worst-case scenario from the existing RWV removal arrangements. The number of WDVs trips is predicted to increase from 4 to 5 RWVs per day.

13.5.1.3 Service Vehicles

There will be no additional service vehicles generated by the Facility as a result of the increase of the Facility's waste tonnage capacity from 600,000 tonnes to 690,000 tonnes per year. The trip generation rate by the Facility will remain the same as was counted in the 2018 traffic surveys and set out in Section 13.4.

13.5.1.4 Staff Vehicle

A 12-hour traffic survey was undertaken at the existing staff entrance on the Shellybanks Road in October 2018. A full breakdown of the vehicles, arriving and departing the staff access is provided in the TTA Report.

There will be no additional staff or visitor vehicles generated by the Facility due to the increase of the Facility's waste tonnage capacity from 600,000 tonnes to 690,000 tonnes per year. The trip generation rate by the Facility will remain the same as was counted in the 2018 traffic surveys and set out in Section 13.4.

13.5.1.5 Total Forecast Trip Generators

The TII 'Guidelines for Traffic and Transport Assessments' states the following; "*The assessment will need to identify the development trip impacts during the peak periods for the local network*" (TII, 2014).Therefore, an assessment has been made on the total combined AM and PM Facility trip generation, based on the previous sections, and is set out in Table 13-5. The full trip generation for all the Facility's trips is provided in the TTA (AECOM, 2020).

Table 13-5 Forecast AM and PM Trip Generation

Vehicle Type	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	Arrivals (PCUs)	Departures (PCUs)	Arrivals (PCUs)	Departures (PCUs)
WDV (HGV)	21	21	21	21
Air Pollution Control Residue RWV (HGV)	9	9	6	6
Bottom Ash RWV (HGV)	15	0	0	15
Service Vehicles (HGV)	0	0	0	3
Service Vehicles (LGV)	3	3	2	1

[26] It has been assumed that all the five HGVs arrive to the Facility during the AM peak hour for a worst-case assessment
[27] It has been assumed that all the five HGVs depart the Facility during the PM peak hour for a worst-case assessment

Vehicle Type	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	Arrivals (PCUs)	Departures (PCUs)	Arrivals (PCUs)	Departures (PCUs)
Staff (LGV)	2	3	0	6
Total	**50**	**36**	**29**	**52**

Source: Dublin Waste to Energy Facility, Traffic and Transport Assessment (AECOM, 2020)

It can be seen from above that the total number of vehicle movements generated by the Facility will be 50 arrivals and 36 departures in the AM peak hour (two-way total of 86 PCU movements), and 29 arrivals and 52 departures in the PM peak hour (two-way total of 81 PCU movements).

13.5.1.6 Trip Distribution

The WDV trips generated by the Facility have been distributed as per their existing distribution. All other trips by the Facility have been distributed on the surrounding road network using the existing proportional turning splits on the surrounding road network.

The traffic generated by the Facility in the AM and PM peak hour is shown in the traffic flow diagrams provided in the TTA Report respectively (AECOM, 2020).

13.5.1.7 Traffic Growth

NRA PAG Unit 5.5 (published by TII) (NRA, 2011) sets out growth rates for forecasting future year traffic. It is noted that in respect of Dublin City, the growth during the period 2006-2025 is set at 0.2% per year for medium growth, staying at 0.2% per year from 2026 onwards (LV rates used).

The assessment years used for this transport assessment are as follows:

- 2021 Opening Year;
- 2026 Future Year; and
- 2036 Horizon Year.

Application of the above growth rates results in 0.8% growth from 2017 to 2021, 1.8% total growth from 2017 to 2026, and 3.8% growth from 2017 to 2036.

13.5.2 Vehicle Trip Impact and Junction Capacity

13.5.2.1 Vehicular Percentage Impact

The TII 'Guidelines for Transport Assessments' state that the thresholds for junction analysis in Transport Assessments are as follows (TII, 2014):

"Traffic to and from the development exceeds 10% of the existing two-way traffic flow on the adjoining highway."

"Traffic to and from the development exceeds 5% of the existing two-way traffic flow on the adjoining highway, where traffic congestion exists or will exist within the assessment period or in other sensitive locations".

The total trips associated with the Facility have been reviewed against the 2017 base flows (undertaken prior to the Facility opening) on the local road network, and the resulting percentage impact is shown in Table 13-6.The total trips for the Facility (i.e. if the Facility was approved to treat up to 690,000 tpa) has been assessed for an onerous assessment.

Table 13-6 Percentage Impacts

Junction	Traffic Flows	AM Peak (08:00 – 09:00)	PM Peak (17:00 – 18:00)
1 South Lotts Road/Ringsend Road/Bridge Street Junction	Base Flows at Junction	1593	1404
	Development	0	0
	% Impact	0%	0%
	Base Flows at Junction	2913	2456

Junction	Traffic Flows	AM Peak (08:00 – 09:00)	PM Peak (17:00 – 18:00)
2 R131/R801 Roundabout Junction	Development	84	78
	% Impact	2.9%	3.2%
3 R131/Pigeon House Road/Sean Moore Road Roundabout Junction	Base Flows at Junction	2,337	1,884
	Development	86	81
	% Impact	3.7%	4.3%
4 Beach Road/Cranfield Place/Sean Moore Road Junction	Base Flows at Junction	2194	1519
	Development	2	3
	% Impact	0.1%	0.2%
5. Sean Moore Road/Church Avenue/Beach Road Junction	Base Flows at Junction	1318	1,067
	Development	0	0
	% Impact	0%	0%
6. Irishtown Road/Londonbridge Road/Church Avenue Junction	Base Flows at Junction	1086	1042
	Development	0	3
	% Impact	0%	0.9%
7. South Bank Road/Whitebank Road Junction	Base Flows at Junction	297	294
	Development	86	81
	% Impact	28.9%	27.4%

Source: Dublin Waste to Energy Facility, Traffic and Transport Assessment (AECOM, 2020)

Table 13-6 demonstrates that the increase in traffic volumes at all junctions, except for the South Bank Road / Whitebank Road junction, during the peak hours are below the 5% threshold and therefore no further analysis of the junction is required on the basis of TII's assessment guidelines[28].

The Facility's total traffic impact (i.e. if the development was approved to treat up to 690,000 tpa) upon the South Bank Road / White Bank Road junction is above 5% during the AM and PM peak scenarios. Therefore, this junction was subsequently assessed in greater detail and is discussed in the following sections.

13.5.2.1.1 Scenario Testing

This section presents the impact analysis to identify the potential effects of the proposal upon the operation of the South Bank Road / Whitebank Road junction.

Analysis has been undertaken for the following scenarios:

- 2021 Opening Year: Without and With Proposed Tonnage Increase;
- 2026 Opening Year (+ 5 years): Without and With Proposed Tonnage Increase; and
- 2036 Opening Year (+ 15 years): Without and With Proposed Tonnage Increase.

The impact of the proposal on the existing 3-arm T-junction is analysed below in Table 13-7.

The industry standard junction modelling package Junctions 9 was used to model the existing priority junction (PICADY). The results of the analysis package are expressed in terms of Ratio of Flow to Capacity (RFC) and Queue Lengths (vehicles). An RFC value of 0.85 is generally regarded as the practical limit for approach roads at a junction. Junctions operating below this threshold will operate efficiently and within capacity.

[28] The increase in traffic volumes refers to the traffic generated by the entire future development (with a waste capacity of 690,000 tpa) during the AM and PM peaks compared to the existing background AM and PM network traffic. The 5% threshold for assessment follows TII's Traffic and Transport Assessment Guidelines.

Table 13-7 Impact on T-junction (South Bank Road / White Bank Road)

Assessment Year	Peak Period	Junction Arm and Link	With + Development	
			Ratio of Flow to Capacity	Mean Max Que
2021 (Opening Year)	Weekday AM Peak Hour	White Bank Road (Left Turn Lane)	0.01	0
		White Bank Road (Right Turn Lane)	0.21	0.3
		South Bank Road (Right Turn)	0.01	0
	Weekday PM Peak Hour	White Bank Road (Left Turn Lane)	0.01	0
		White Bank Road (Right Turn Lane)	0.25	0.3
		South Bank Road (Right Turn)	0	0
2026 (Opening Year + 5)	Weekday AM Peak Hour	White Bank Road (Left Turn Lane)	0.01	0
		White Bank Road (Right Turn Lane)	0.21	0.3
		South Bank Road (Right Turn)	0.01	0
	Weekday PM Peak Hour	White Bank Road (Left Turn Lane)	0.01	0
		White Bank Road (Right Turn Lane)	0.25	0.3
		South Bank Road (Right Turn)	0	0
2036 (Opening Year + 15)	Weekday AM Peak Hour	White Bank Road (Left Turn Lane)	0.01	0
		White Bank Road (Right Turn Lane)	0.21	0.3
		South Bank Road (Right Turn)	0.01	0
	Weekday PM Peak Hour	White Bank Road (Left Turn Lane)	0.01	0
		White Bank Road (Right Turn Lane)	0.25	0.3
		South Bank Road (Right Turn)	0	0

Source: Dublin Waste to Energy Facility, Traffic and Transport Assessment (AECOM, 2020)

The results of the traffic analysis demonstrate that the existing road network junctions will continue to operate well within capacity limits with the Proposed Tonnage Increase applied for the opening year and the future horizon years.

13.5.3Impact Significance on Local Road Network

Based on the above sections, the Proposed Tonnage Increase is not likely to result in a significant effect on the local road network.

13.5.4Cumulative Impacts

The impact assessment of roads and traffic is inherently cumulative in areas of the assessment as:

- Committed and permitted developments in the immediate vicinity of the study area have been incorporated within the analysis through the application of TII's Growth Factors within the baseline traffic flows;
- The traffic impact from the Former Irish Glass Bottle & Fabrizia Sites, Poolbeg West has been included within the analysis which results in a more robust traffic analysis of the proposed developments impact on the surrounding road network;
- The trip generation associated with the Proposed Tonnage Increase has been calculated in terms of the maximum number of additional vehicular movements for the overall duration of the development; and
- The junction modelling analysis has assessed the traffic conditions during the busiest times of the day for local traffic (i.e. peak AM and PM hours).

13.6 Summary

The assessment of impacts to roads and traffic as a result of the Proposed Tonnage Increased are summarised as follows:

- This chapter, through traffic analysis demonstrates that the forecasted traffic to the Facility will not have a significant effect on the existing road network within the study area during the opening year and future year scenarios during the AM and PM peak times; and
- AM and PM peak Facility traffic is forecasted to be less than 5% of the existing AM and PM network traffic, in particular on the R131 (East Link Bridge) and the local road junctions in Irishtown and Ringsend (Sean Moore Road). While the Facility has a larger traffic impact on the junctions on the South Bank Road and Pigeon House Road, the traffic analysis demonstrates that the existing junctions will continue to operate well within capacity limits during the opening year and future year scenarios.

Chapter 14: Cultural Heritage

14

14. Cultural Heritage

14.1 Introduction

As the Proposed Tonnage Increase does not involve change to the physical structure of the Facility and would involve a small increase in the volume of WDV's travelling to and from the Facility on existing roads only, no likely significant effects with cultural heritage were identified during the EIA scoping. The EIA Scoping Report is provided in Appendix A1-1. This chapter therefore focuses on the baseline cultural heritage only as per the EPA requirements outlined in Chapter 1 Introduction.

14.2 Legislation and Guidance

The legislation and guidance applicable to the baseline is as follows:

- EIA Directive (EU, 2014);
- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)) (EU, 2018); and
- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017).

14.3 Methodology

A desktop assessment of the following client provided, and publicly available information was undertaken to determine the baseline environment:

- 'Dublin Waste to Energy Project, Environmental Impact Statement' (Eslam Engineering, 2006).
- 'Dublin City Development Plan 2016-2022, Record of Protected Structures' (DCC, 2016);
- The Heritage Council of Ireland mapping29;
- 'Archaeological Survey of Granite Blocks, Dublin Waste to Energy Project' (Frazer, 2008)
- The National Monument's Service Historic Environment Viewer online mapping tool30;
- 'National Monuments in State Care: Ownership & Guardianship, Dublin' (Department of Environment, Heritage and Local Government, 2009); and
- Excavations.ie Database of Irish Reports online Bulletin31.

14.4 Baseline

14.4.1 National Monuments

There are no national monuments within the study areas, i.e. within 1 km of the Facility boundary.

14.4.2 Record of Monuments and Places

Previous cultural heritage assessment identified a low rubble stone wall approximately 80 cm in height (sea wall Record of Monuments and Places (RMP) no. DU019:029-01), which according to historic and cartographic sources correlates within or approximately to the location of earlier sea walls (RMP no. DU019:029-02) constructed along the line of Pigeon House Road (Eslam Engineering, 2006).

[29] Heritage Maps Accessed 21/07/202
[30] Historic Environment Mapper Accessed 21/07/2020
[31] https://excavations.ie/ Accessed 21/07/2020

A number of granite blocks are located within the Facility boundary and form part of the existing landscaping. The providence of granite blocks is unknown; however, could be remnants of the sea wall recorded monument. These granite blocks have been identified as being of nominal to low archaeological significance (Frazer, 2008).

A review of the Historic Environment Viewer mapping tool has shown that the RMP site (RMP no. DU019:029-02) is located circa 700 m to the north east of the Facility. Another asset recorded on the RMP is located circa 382 m to the east of the Facility (RMP no. DU019-027---- 'Blockhouse', known as Pigeon house Fort).

14.4.3 National Inventory of Architectural Heritage Building Survey

No protected structures or structures of architectural heritage merit listed on the National Inventory of Architectural Heritage (NIAH) are located within the Facility boundary (Eslam Engineering, 2006).

The nearest protected structure is the remnants of Pigeon House Fort (RPS No. 6794 in DCDP 'Record of Protected Structures' (RPS) (DCC, 2016)). A number of other protected structures along Pigeon House Road include the former Pigeon House Hotel (RPS No. 6795), the former St. Catherine's Hospital (RPS No. 6794) and Pigeon House power station (RPS No. 6796) (DCC, 2016).

The sea wall recorded monument has also been identified as a protected structure (RPS Ref No. 6797) (DCC, 2016).

14.4.4 Previous Excavations

The Excavation Bulletin, which is an annual account of all excavations carried out under license in Ireland, indicates that there were two previous excavations undertaken. One excavation was undertaken in 2010 at the site where the Facility is located (Licence number: 09E022 ext):

"*Site investigation works on the southern and northern ends of the site were monitored. The exposed ground comprised modern/late post-medieval fill and no features or finds of archaeological significance were discovered*." *(Author: Melanie McQuade, Margaret Gowen & Co. Ltd)*

Another excavation was undertaken in lands to the south of the Facility between September and December 2014, as part of the Facility's development (Licence number: 13E0066):

"In total 23 test trenches were excavated, ten in Phase 1, 13 in Phase 2. The majority of the trenches encountered significant modern fill deposits associated with estuarine land reclamation south of the modern Pigeonhouse Road. Test trenches excavated as part of Phase 2 (Test trenches 12 and 13) exhibited the partially truncated remains of a metalled surface and walling. These remains are considered to have formed part of the causeway which led to the 19th-century Pigeonhouse Fort. Both test trenches were only excavated to a depth where extant services could be identified. The archaeological remains exposed were covered with a protective layer of sand before backfilling.

The site of a coffer dam associated with a pump station for the facility was excavated during October 2015. Significant reclamation deposits overlay navigation channel silts with modern debris inclusions. Nothing of archaeological significance was recovered". (Authors: Fintan Walsh & David McIlreavy).

14.4.5 Architectural Conservation Areas

The Facility is not located within an Architectural Conservation Area (ACA). The closest ACA is located circa 3.2 km to the west of the Facility.

14.5 Summary

In summary:

- As the Proposed Tonnage Increase does not involve change to the physical structure of the Facility and would involve a small increase in the volume of WDV's travelling to and from the Facility on existing roads only, no likely significant effects with cultural heritage were identified during the EIA scoping. This chapter is therefore focused on the baseline cultural heritage only;
- No cultural heritage assets including national monuments, protected structures, RMP or NIAH sites are located within the Facility boundary. A number of granite blocks are located within the Facility boundary and

form part of the landscaping. The providence of granite blocks is unknown; however, these could be remnants of to the sea wall recorded monument. These granite blocks have been identified as being of nominal to low archaeological significance (Frazer, 2008); and

- Two previous excavations were undertaken in the area in 2010 and 2014; however, nothing of significant archaeological significance was identified. Partially truncated remains of a metalled surface and walling was discovered during test trenching undertaken prior to the Facility's construction; however, these were covered with a protective layer of sand before backfilling.

Chapter 15:
Material Assets

15

15. Material Assets

15.1 Introduction

The EPA's draft guidance document describes material assets to be taken to mean "*built services*" (i.e. utilities networks including electricity, telecommunications, gas, water supply and sewerage), "*waste management*" and "*infrastructure*" (e.g. roads and traffic) (EPA, 2017). The assessment of likely significant effects associated with "*waste management*" and "*infrastructure*" are included separately in Chapters 3 and 13 respectively. The EIA Scoping identified no likely significant effects of the Proposed Tonnage Increase on "*built services*". This chapter therefore provides an overview of the baseline built services at the Facility only as per the EPA requirements outlined in Chapter 1 Introduction. The EIA Scoping Report is provided in Appendix A1-1.

As detailed in Chapter 2 Project Description as the Proposed Tonnage Increase does not include any physical change to WtE plant or the Facility buildings, there will be no change to built services as a result of the Proposed Tonnage Increase.

15.2 Legislation and Guidance

The legislation and guidance applicable to the baseline is as follows:

- EIA Directive (EU, 2014);
- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)) (EU, 2018); and
- Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017).

15.3 Methodology

The methodology for determining the baseline-built services environment involved desktop review of client provided data, including existing utility network drawings.

15.4 Baseline

15.4.1 Electricity Network

As outlined in Chapter 2 Project Description, the Facility has an existing 11kV connection to the grid, which is ramped up to 110kV for export. The Facility is connected to the 110kV switchyard located circa 500 m to west of the Facility. Similarly, when electricity is required it is imported at 110kV then ramped down to 11kV and then further to 400V for WtE plant use. There is one emergency generator onsite which in the event of a loss of power to the Facility maintains essential site services.

15.4.2 Water Supply Network

The Facility is serviced by mains water supplies (sanitary and drinking purposes).

The Operator has an arrangement with Ringsend MWwTP for the supply of "grey" water from the MWwTP. Additional Facility process water is sourced from the storm water attenuation tank and recycled process wastewater.

15.4.3 Drainage Network

15.4.3.1 Stormwater

A 725 m^3 underground attenuation tank is located at the Facility, which collects and stores stormwater drainage from roofs, roads and parking areas for reuse in the facility process, where possible. Overflow from the attenuation tank is discharged to the Ringsend MWwTP, when required.

The main process building is served by an isolated drainage system which acts as tertiary containment in the event of a spill within the building.

15.4.3.2 Sewerage and Process Effluent

Sanitary effluent is discharged to the adjacent Ringsend via a HDPE connection to the MWwTP in Ringsend on the eastern boundary of the Facility.

A FGT System is located at the Facility, which collects all process water unless it is being used for humidification/cooling of the bottom ash outlet. Wash water is discharged to the floor drains in the boiler house and is also collected and used in the process water system.

15.4.4 Telecommunications

There are robust telecommunication lines in existence for telephone and broadband services in the area including:

- Extra-low voltage comms duct bank;
- Telecom duct bank; and
- Telecom chamber.

15.4.5 Gas Distribution Network

A gas main with wayleave is running to the south of the Facility boundary. No existing gas mains are located within the Facility boundary.

15.5 Summary

In summary:

- The EIA Scoping identified no likely significant effects of the Proposed Tonnage Increase on “built services”. This chapter therefore provides an overview of the baseline built services at the Facility only;
- The baseline desktop study highlighted that there is an extensive network of existing utilities infrastructure across the Facility; and
- As the Proposed Tonnage Increase does not include any physical change to WtE plant or the Facility buildings, there will be no change to built services as a result of the Proposed Tonnage Increase.

Chapter 16: Major Accidents and Disasters

16

16. Major Accidents and Disasters

16.1 Introduction

This chapter contains an assessment of the potential Major Accidents and Disasters (MA&D) associated with the Proposed Tonnage Increase at the Facility.

An assessment of MA&D is a requirement of all EIARs, the purpose of which is to identify the most serious incidents which could potentially affect a Facility and the surrounding environment. The infrastructure, systems and procedures, which have been installed to prevent these incidents and mitigate their consequences, are considered in this assessment.

The format of this assessment is a review of the existing risk assessments carried out in 2006 to support the original planning application and produced at the commencement of operation; which are contained within the Facility ERP. The primary change which would occur due to the proposals is the increase in waste throughput, no new procedures or processes would be implemented within the facility to achieve this. Consequently, no new types of hazard or potential major unplanned incidents have been identified as part of the review and the scope and focus of the assessment is on the significance of potential hazards with the increase in additional waste throughput within the facility.

This updated MA&D risk assessment takes into consideration the impact of the Proposed Tonnage Increase in the throughput of waste at the Facility of 15%, from 600,000 to 690,000 tpa. It also considers any changes which have occurred since 2006; such as updates in legislation, guidance, operational experience and other pertinent changes.

The Proposed Tonnage Increase at the Facility will not require the construction of new facilities or equipment to accommodate the increase in throughput. Consequently, there is no requirement for this study to consider potential major accidents and/or disasters associated with construction operations.

The original assessment of potential major accident hazards carried out in August 2006 (Elsam Engineering, 2006), was based on the expectation that the Facility would be required to comply with the Control of Major Accident Hazards Involving Dangerous Substances Regulations, 2006 (S.I. 74), the 'COMAH' Regulations. These Regulations implement the Seveso III directive in Ireland. However, following a detailed review (AECOM, 2016) it was confirmed that the Facility was not required to comply with Seveso due to the quantity of dangerous substances present; which are below the threshold of application.

Major accidents and disasters are by their nature very infrequent and low probability events, as such it would not be appropriate to consider the cumulative impacts associated with similar simultaneous events occurring at other nearby facilities where there is no direct connection. The assessment does, however, consider the possibility for 'domino' effects to occur, where a major incident at the Facility could cause an event at another site elsewhere to take place.

16.2 Legislation and Guidance

The following relevant legislation has been complied with and the following guidance has informed the MA&D assessment:

- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)) (EU, 2018); and
- Draft 'Guidelines on Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017).

The EU's (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (2018 Regulations) require the submission of an EIAR for certain proposed developments (EU, 2018). Specifically; Schedule 6, part (h) of the Planning and Development Regulations 2001, as amended (as inserted by the 2018 Regulations) (Information to be Contained in EIAR) states:

> *"a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national*

legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met.

Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events".

The methodology which has been applied in this assessment to identify the potential major accidents and disasters for the Facility is described in Section 16.4. The significant adverse effects of each potential scenario to the environment are described in Section 16.5 (Accidents) and 16.6 (Disasters) alongside the measures incorporated in the design and operation of the Facility to prevent these and mitigate the impact should they occur.

As an existing facility, which has been operational since June 2017, the Facility has a comprehensive safety management system, including emergency procedures. These are referenced in Table 1 where they apply to each identified major accident hazard, and an overview of the Facility's ERP is contained in Section 16.7.

16.3 Methodology

Major accidents are defined within Article 3 of the Seveso directive (EU, 2012) as those that could result in multiple fatalities and serious injuries and/or widespread damage to property and the environment as the result of a single incident. The impact of major accidents can be very significant, with the potential to impact people both on and off-site, assets and property on and off-site, and the surrounding environment.

Disasters can be natural, such as earthquakes, landslides and flooding or can be caused by humans, such as fires and explosions with the potential to cause an event or situation that meets the definition of a major accident.

Both natural and human causes are considered in this assessment to determine the impact on:

(a) population and human health;

(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC (conservation of natural habitats and of wild fauna and flora) and Directive 2009/147/EC (conservation of wild birds);

(c) land, soil, water, air and climate; and

(d) material assets, cultural heritage and the landscape.

Table 16-1 lists the potential major accident hazards and disasters which have been identified for the Facility within the 2006 report, the ERP and during this review, which has been based on a standard hazard identification (HAZID) technique.

This is a desktop review carried out by a suitably qualified and experienced person (refer to Section 1.8 Introduction – Expertise of EIAR Team), initially identifying the dangerous substances present on the Facility site and technologies used, then employing a structured process to determine the credible and reasonably foreseeable major accidents and disasters associated with the substances and activities undertaken.

For each identified major accident and disaster scenario, the qualitative assessment documented in Table 1 considers the potential impact on the surrounding environment, taking into consideration the proximity and sensitivity of the receptors. The infrastructure, systems and procedures in place to prevent or mitigate the consequences of each scenario are also listed.

A proportionate approach has been used in this assessment, based on the relative likelihood of each of the identified scenarios, with a greater focus on situations which are more likely to occur or those with greater consequences.

The risks of a major accident and/or disaster are connected to the presence of dangerous substances, such as flammable and combustible materials.

The EU's guidance and EPA draft guidance (EPA, 2017) form the basis of this assessment. The guidelines include a requirement to consider the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change. For example, the potential for rising sea levels causing flooding to the site and initiating a major accident hazard.

The assessment of MA&D is required to focus on impacts that are both likely and significant, with impact descriptions which are accurate and credible. These descriptions should cover the direct effects and any indirect, secondary, cumulative and domino effects, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development.

The most significant and likely major accident scenario at a facility handing large quantities of combustible material is a fire, therefore fire safety guidance published by the Health & Safety Authority (HSA) has also been used as a reference source for this assessment.

16.4 Assessment of Major Accidents

This assessment considers the substances present on the Facility site, identifying those which are potentially dangerous, such as combustible and flammable materials. The following materials have been identified:

- Mixed combustible domestic refuse materials, which are received on site as a source of fuel;
- Diesel fuel, which is used in a backup power generator (used during start-up), the site fire water pumps, site vehicles and in the auxiliary burner system. Diesel is a flammable liquid which is also classified as harmful to the environment;
- APCR, generated by the emissions abatement system, are classified as harmful to the environment due to the concentration of heavy metals;
- Bottom ash collected in the grate of the combustion chamber is non-hazardous;
- Boiler ash is collected from the flue gas within the boiler operation and could be either hazardous or non-hazardous. The boiler ash is routinely sampled and analysed and if it is confirmed to be hazardous, it is stored with the APCR within a closed containment system;
- A large volume of water is used on site to cool condensed steam. This water is treated with small quantities of chemicals, to prevent corrosion and inhibit the formation of bacteria within the cooling process, such as sodium hypochlorite;
- The emissions abatement system uses activated carbon and hydrated lime to remove pollutants in a scrubbing process. These materials are stored on site within silos, a maximum quantity of 44 t and 180 t are stored respectively. Activated carbon is a classified as a combustible dust and hydrated lime is not combustible but is classified as an irritant, therefore harmful to people. It must be kept dry and segregated from acids, and if released to the environment would cause an increase in pH, therefore cause harm to aquatic organisms;
- Aqueous ammonium hydroxide is also used in the emissions abatement system, to minimise the release of oxides of nitrogen from the combustion operation. The aqueous ammonium hydroxide solution could be harmful to the environment if released; and
- Sulphur hexafluoride (SF6) is a commonly used gas used on site for electrical insulation. This material is not classified as a dangerous substance, but if inhaled, it is an asphyxiant at high concentrations. It is a greenhouse gas and therefore harmful to the environment. Only one cylinder of this gas is present on site therefore and, while it can cause harm if released, it would be unlikely to cause a major accident affecting people or the environment offsite.

The Facility also uses small quantities of other dangerous substances such as lubricating oils, ferric chloride, compressed flammable gases (i.e. acetylene used for welding) and ethylene glycol. The maximum amount of these materials would be insufficient to initiate a major accident affecting people or the environment offsite, and therefore are not considered further in this assessment.

Other dangerous substances considered in this assessment include firewater. In the event of a major fire, water would be applied, generating runoff containing a mixture of materials which could be harmful to the environment if released to ground, groundwater and the controlled waters of Dublin Bay. An aerial plume of smoke and steam containing products of combustion would also be released to air in the event of a fire, which could be harmful to people and the environment on grounding.

Table 16-1 contains a review of the potential accident scenarios which involve the substances listed above, assessing the likely significance of effects with the proposed increase in throughput.

Table 16-2 contains a review of potential disaster scenarios.

For each accident or disaster scenario identified, the likelihood and risk of significant effects are described, along with the installed safeguards and mitigating measures.

No new major accidents or disaster scenarios have been identified for the site as a result of this review, however the impact of an increase in the throughput of waste of 15% is considered for each scenario.

Table 16-1 Summary of Major Accidents

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
1	Major fire	Domestic refuse / Waste handling systems	Risk of fire within waste reception hall and bunker caused by self-heating of waste, the presence of flammable materials such as aerosols or other harmful substances. A major fire could cause significant damage to the Facility, such as the waste crane, and could prevent operation until repairs are completed, resulting in waste being temporarily diverted to landfill. Potential for harm to persons on site, however operators not routinely present within the waste bunker area. Low risk for escalation offsite due to resistance to fire of the bunker and the main building, which are constructed from concrete. Impact of fire is low to offsite receptors as localised and contained onsite.	A CCTV system within the waste reception hall is continuously monitored by site operators, to detect material which should not be present and fires/smouldering materials. Thermal imaging cameras are used by operators to check for hot spots forming within the bunker. An infrared flame detection system is located throughout the waste handling areas, which is connected to an automatically operated sprinkler system. A firewater distribution main is installed throughout the site, with hydrant connections providing a supply of firewater to all buildings. A foam system is also installed in the waste handling area, which suppresses fires by excluding oxygen when deployed. Foam firefighting systems require less water than a conventional firewater system, generating less contaminated firewater for containment. Remotely operated water cannons cover all areas of the waste bunker if a fire is detected. The waste bunker has a capacity of approximately 65,000 m^3 and significant volumes of firewater can be retained in the bunker in the event of an incident.	Increased waste throughput can be accommodated by the existing facilities; therefore no additional fire detectors, sprinklers or water cannons are required. There is no increase in the quantity of materials stored, they are just processed more quickly through operations. Hazard and risk potential remain the same.
2	Release of contaminated firewater to the environment	Domestic Refuge / Waste handling systems	A major fire on site could generate significant quantities of firewater runoff containing unburned wastes and products of combustion, which could result in harm to the environment, i.e. nearby surface waters and groundwater underlying the site. Firewater runoff would predominantly be retained onsite within the waste bunker, however if this capacity was exceeded, there is the potential for firewater to reach sensitive environmental receptors nearby such as Dublin	Firewater generated on site would be held in primary containment (waste handling bunker), secondary containment (bunds) and tertiary containment systems (attenuation tank and closed drainage system). In the event of a fire/emergency, an automatic shutoff valve will prevent any discharge of firewater offsite through the sites storm water drainage system.	An increased waste throughput would not increase the required application rate of firewater in an emergency. There is no increase in the quantity of materials stored, they are just processed more quickly through operations.

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
			Bay / River Liffey, causing controlled waters to become contaminated with a mixture of pollutants formed in the fire and washed out from the Facility and potentially causing effects on sensitive ecosystems.	The EPA has recently published revised guidance on firewater containment in late 2019 – "EPA Guidance on Retention Requirements for Firewater Run-off". An updated assessment of firewater volumes and containment requirements, as specified within the guidance will be undertaken. This will be produced by the site separately to the EIAR as the application of the guidance is being rolled out through the environmental permitting regime by the regulator.	The capacity of the existing waste handling systems can accommodate the level of firewater generated during a major fire. Hazard and risk potential remain the same.
3	Fire in diesel bund	Diesel / Emergency Power Generator	A fire could result from the loss of containment of diesel into the bund through pipe/tank leakage, rupture of a hose connection from a road tanker wagon or through the catastrophic rupture of a tank; followed by subsequent ignition of the material in the bund. A diesel pool fire associated with the emergency generation system could escalate to other parts of the Facility but would likely be contained on site and not to extend to neighbouring facilities offsite due to the containment of the flammable material within the concrete bund and the separation distance between the facility and other off-site structures.	The design of the emergency diesel generators is to recognised international and industry standards such as International Organization for Standardization (ISO) / European Standards (EN). Inspection and routine maintenance of these systems is carried out in accordance with manufacturer's instructions.	The quantity of diesel stored onsite, and the secondary and tertiary containment measures, remain unchanged. All tanks are double skinned / bunded and pipework is located within contained areas. The frequency of diesel deliveries would not increase with an increase in waste throughput. The diesel is used in emergency and back up operations. Hazard and risk potential remain the same.
4	Release of diesel fuel to the environment	Diesel / Emergency Power Generator	A loss of diesel could occur directly from site storage tanks or during filling from road tankers. For example, a driveaway of the delivery vehicle whilst connected to a diesel storage tank.	The maximum quantity of diesel present on site is 120 m^3. This is stored below ground in a concrete bund pit arrangement. The bund pit, site surfacing and storm water drainage systems have been designed to fully	The quantity of diesel stored onsite, and the secondary and tertiary containment measures, remain unchanged.

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
			A release of diesel would be contained on site surfacing and within the site drainage system. It is therefore unlikely to reach offsite areas and is not considered to be a major accident.	contain a release of diesel, either directly or contained in firewater. Two Class 1 interceptors have been installed in the surface water drainage system, which would collect diesel in the event of a loss of containment. Site roads are constructed from concrete, this is regularly inspected for cracks and other defects, which could potentially be a pathway for materials to enter the environment, i.e. the soil and groundwater beneath the site. Due to the containment measures already incorporated into the facility design, as described above, the likelihood of diesel entering areas of ground offsite, which are not covered with an impermeable concrete surface is considered to be low. The automatic shut off valve in the storm water drainage system will prevent a spillage of diesel from being discharged to surface water.	The frequency of diesel deliveries would not increase with an increase in waste throughput. The diesel is used in emergency and back up operations. Hazard and risk potential remain the same.
5	Explosion / Fire	Liquefied Petroleum Gas (LPG) / Release of gas from cylinders used on site for start-up of burners	An LPG bottle battery is used for the ignition of the oil-fired burners, which operates for approximately 10 seconds nominally 20 times per year (i.e. 200 seconds a year). A malfunction of a cylinder containing LPG could be caused for example, by damage to a valve, releasing LPG to air. This has the potential for a fire if immediately ignited, or an explosion if ignition is delayed. There is the potential for harm to personnel on site and damage to facilities from shrapnel released in an explosion, however due to the limited (relatively small) quantity of LPG present there is unlikely to be an impact offsite.	The LPG system has been designed in accordance with all relevant Irish codes and standards. All compressed gas cylinders used on site are regularly inspected and replaced when necessary by suitably trained and experienced operators. The gas cylinders are subject to inspection for leaks and leak detection procedures prior to use.	No increase in the number of LPG cylinders on site and/or frequency of use as a result of increased waste throughput. Hazard and risk potential remain the same.
6	Fire in flue gas treatment system /	Release of unabated emissions from the flue	A fire within the fabric filtration system of the flue gas treatment system could be caused by a malfunction, i.e. failure to cool the flue gas	The flue gas treatment system is continuously monitored by suitably qualified operations personnel, to ensure the concentration of pollutant emissions remains within the limits established in	There would be no demonstrable increase in the volume and composition of flue gas as

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
	Release of pollutants to air	gas treatment, i.e. products of combustion Fire in the fabric filter system – which is designed to remove dusts.	before it reaches the filter, thus igniting the filter. There is a low potential for harm to personnel as operators are not routinely present in this area. The boiler house and flue gas treatment areas are designed as fire compartments, therefore preventing escalation of a fire to other areas on site. Low potential for escalation offsite due to the resistance of concrete structure which would contain a fire within the building. Loss of the abatement system would prevent the Facility from operating until repairs are completed, resulting in waste being diverted to landfill.	the Environmental Permits and Licenses for the Facility. The process has a series of alarms and trips so as to protect the integrity of the filtration system from elevated temperatures. Detection of increased temperatures would be immediately identified, and corrective actions taken.	a result of the proposed increased waste throughput as the combustion rate within the furnace permitted by the original planning permission would not be exceeded. Therefore, no impact on the capacity and operability of the abatement system. Hazard and risk potential remain the same.
7	Fire/explosion in flue gas treatment system	Activated carbon used in powder form to treat flue gas, stored in bulk silo	Activated carbon powder can form a combustible dust. If this material is in contact with a source of ignition and oxygen in a confined area, the potential for a deflagration event exists. This could cause harm to people onsite, damage to site assets from shrapnel released in an explosion. It could also cause an impact offsite through soiling of property, pollution of controlled waters and harm to individuals.	Carbon is difficult to ignite and is weakly explosive. An inert gas fire suppression system is installed in the activated carbon silo storage area which would automatically operate in an emergency. Ventilation and hygiene systems are installed to prevent dust being formed, along with all necessary housekeeping systems.	As Scenario 6. Hazard and risk potential remain the same.
8	Pollution - loss of containment of hydrated lime from flue gas treatment system	Hydrated lime (95%) used in powder form to treat flue gas, stored in bulk silo	In the event of an accidental release, this material is not toxic to humans but if it comes into contact with skin, eyes or is inhaled, this can cause harm to people on site. It is considered unlikely that a release of powdered lime could affect people offsite. A very large accidental spill of lime which entered the drainage system and was released into Dublin Bay could cause a major	Handling procedures on site avoid dust formation of hydrated lime. The material is kept dry at all times within a dedicated silo and if spilt, would be mechanically recovered using vacuum suction for large releases or swept for minor releases. Spills would be contained within the site and collected at the attenuation tank which would be isolated and the material disposed off-site as appropriate.	As Scenario 6. Hazard and risk potential remain the same.

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
			environmental incident through the pollution of controlled waters and damage to ecosystems.		
9	Pollution - emission of untreated flue gases	Unabated emissions through failure of the flue gas treatment system, i.e. failure of: • ammonia solution injection system (for oxides of nitrogen abatement); • lime addition (for acid gases abatement); • activated carbon addition (for dioxin / furan abatement); • fabric filter (for particulate / dust abatement)	A malfunction of the system for reasons other than a fire could result in the short-term emission of untreated gases to the environment. A release of untreated gases could contain very small quantities of pollutants which could cause harm to the health of individuals offsite. The process would detect failure of the abatement plant and enter an emergency shutdown sequence. The quantity of unabated emissions that would be emitted would therefore be small.	Air dispersion modelling has been carried out under abnormal operating conditions to assess any short-term impact due to these infrequent events. The conclusions of this assessment were that the impact was negligible as no exceedance of health-based standards was predicted to occur. The Facility operates in accordance with an Industrial Emissions Licence. A failure of emission systems would be immediately notifiable to the Regulator and operations would not continue if the abatement system was unavailable.	As Scenario 6, an increase of 15% in waste throughput will not impact on the operation of the emissions abatement system. Hazard and risk potential remain the same.
10	Pollution - Ammonia solution release into controlled waters / groundwaters	Release of aqueous ammonia solution (24.9%) from storage and handling	Aqueous ammonia is used on site within the flue gas treatment system to reduce the concentration of specific pollutants (oxides of nitrogen) from combustion. A release of aqueous ammonia could be caused by damage to the storage tank or delivery pipework, or during road tanker offloading, resulting in a loss of liquid within the main building. The quantity of aqueous ammonia liquid stored on site would be unlikely to reach offsite receptors and would be contained within the ammonia tank bund and tertiary site drainage system. If the full inventory did enter Dublin Bay, there could be a local impact on water quality and organisms within the environment	The maximum capacity of the ammonia tank is 60 m^3, and it is double-lined and fitted with a leak detection system. Ammonia solution would initially be contained within the integral bund and secondly within the building. If both the secondary and tertiary containment measures were to fail, ammonia solution could enter site drains where it would be isolated (due to the storm water isolation valve system) and recovered for safe disposal. The design and operation of the ammonia system is to established codes and standards. The ammonia storage system is regularly inspected and continuously monitored. The bund, drains and hardstanding are inspected for integrity to prevent emissions to soil and groundwaters beneath the site.	There is no planned increase in the quantity of ammonia stored on site and an increase of 15% in waste throughput will not impact on the operation of the ammonia system. Hazard and risk potential remain the same.

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
			at the point of discharge, however this would be rapidly dispersed. Aqueous ammonia vapour has a distinctive odour; therefore, it may be possible for people offsite to detect a spill of ammonia solution via the building ventilation systems. However, the quantity would not be sufficient to cause harm to people or the environment. The flue gas treatment system and site would not operate in the event of a loss of ammonia solution. Ammonia vapour is flammable; however, the flammable range is very narrow therefore the risk of this material initiating or causing the escalation of a fire due to loss of containment is low.	Operation of the Facility would be suspended if ammonia was unavailable for the abatement system.	
11	Pollution - Sodium hypochlorite release into controlled waters / groundwaters	Release of sodium hypochlorite from storage and handling	Sodium hypochlorite, commonly known as bleach, is dosed at low concentrations into cooling water to prevent the growth of microorganisms, which could create blockages in pipework and equipment. A loss of containment of this substance can occur for example by damage to the tank or pipework, or during road tanker offloading. If released, it can cause a localised impact on groundwater quality and organisms within the environment if released to soil or groundwater or surface waters The quantity of sodium hypochlorite stored on site would be unlikely to reach offsite receptors and would be contained within the tank bund (secondary containment) and the site drainage system (tertiary containment). If the full inventory did enter Dublin Bay, there could be a local impact on water quality and organisms within the environment at the point of	The maximum capacity of the sodium hypochlorite tank is 50 m^3 As with the aqueous ammonia tank, the tank is double lined and fitted with leak detection. Monitoring of surface water would also detect low concentrations of sodium hypochlorite in the cooling water, alerting operators to potential leaks from the storage and handling system. The bund, drains and hardstanding are inspected for integrity to prevent emissions to soil and groundwaters beneath the site.	There is no planned increase in the quantity of sodium hypochlorite stored on site. An increase of 15% in waste throughput will not impact on the operation of the cooling water system or chemical dosing system. Hazard and risk potential remain the same.

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
			discharge, however this would be rapidly dispersed.		
12	Pollution - emission of APCR	APCR release from handling and storage systems	Residues collected in the FGT system contain substances which are potentially harmful to human health and the environment if released to land, water and/or groundwater due to the toxic effects of the substances contained within the material (for example heavy metals). This material is stored in dedicated silos within the building, prior to safe transfer and disposal offsite. The total volume of the APCR silos is 700 m^3. A loss of containment of this material could occur via scenarios such as mechanical damage to the silos or a major fire. There is a potential for material to reach offsite receptors via air, depending on the wind direction. Material deposited to the ground would be mechanically recovered and material which enters Dublin Bay would be rapidly dispersed by the tides. There could potentially be a short-term impact on the environment or human health, but this is unlikely to be a major accident.	APCR are stored in silos, that are equipped with HEPA filters, and are located inside the main process building. In the unlikely event of a minor loss of containment from the silos, there is the potential for a small quantity of APCR to be entrained in the air extracted from the building by the ventilation system, however the quantity released would not be significant to cause an impact offsite. In the event of a catastrophic loss of containment from the silos, the APCR would be released to ground level within the building, where they would be contained, collected and disposed of appropriately. A coincident failure of the building fabric would be required for a significant quantity of this material to be released offsite. The simultaneous structural failure of the silo and building is not considered likely or credible. In the event of a major fire, which caused a release of APCR, this material would be contained within the firewater which would be retained onsite.	An increase of 15% in waste throughput will have a corresponding increase in the quantity of ash and residues produced, however this will not impact the operation of the emissions abatement system. The same quantity of APCR will be stored onsite within the silos. Hazard and risk potential remain the same.
13	Pollution – Out of specification cooling water discharge to docks / River Liffey	Cooling water containing additives (biocides) discharged from the cooling water system	A cooling water circuit is used to cool the condensed steam, which has been used in the turbine to generate electricity. The cooling water is treated with additives to prevent corrosion and the build-up of microorganisms. A malfunction of the chemical dosing system could result in a short-term discharge of a high concentration of biocide (hypochlorite) in discharged cooling water or a release of cooling water at a higher than permitted temperature. This water could be discharged into the Dublin Bay docks north of Pigeon House Road,	Sodium hypochlorite (i.e. household bleach) is added to cooling water to inhibit the growth of microorganisms (i.e. as a biocide). This material is classified as harmful to the environment and considered in Scenario 9. The concentration of biocide in the cooling water system is normally very low. In the event of a malfunction and release to the docks of a higher concentration, there may a short-term localised impact to life within controlled waters at the point of discharge, however this would be rapidly dispersed and diluted by tidal processes.	An increase of 15% in waste throughput would not require a corresponding increase in cooling water flow and chemical dosing therefore there is no impact on the operation of the cooling water system. Hazard and risk potential remain the same.

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
			causing pollution of controlled waters and potentially affecting the ecosystem. The release would be rapidly dispersed and diluted by tidal processes.	The cooling water system discharges to controlled waters under the Environmental Licence. This license establishes limits on the temperature and total residual chlorine level of the discharge. A malfunction in the cooling system, which causes a release of high temperature water to the river could result in a localised warming of water, however this is discharged in an area where there are a lot of shipping movements which would create rapid dispersion. In addition, the cooling water discharge is relatively small compared to the receiving body of water. The impacts would be minimal. An upset in the operation of the cooling system would be detected by site operators, through water sampling and measurement within the cooling water circuit and corrected immediately.	
14	Domino effects - Explosion	Natural gas / Pipeline explosion	A buried natural gas pipeline runs along the southern boundary of the Facility. Damage to this pipeline could result in a release of flammable natural gas which, if in contact with a source of ignition, could result in an explosion and fire. This could cause significant damage to the Facility, harm (including potential loss of life) to personnel on and offsite and harm to the environment. An explosion could create debris such as fragments of the pipeline, which could cause harm to people and damage to property on and offsite. The Irishtown Nature Park is located to the south of the site, which could be harmed through physical damage in the event of an explosion from this pipeline.	The location of the gas pipeline to the south of the Facility was present before construction and its location, including the associated easement (exclusion area), is clearly defined on drawings. Gas pipelines are buried to an appropriate depth, to provide protection from accidental damage. The area adjacent to the pipeline easement is used as a staff car park. Any work carried out in this area, involving excavation during normal maintenance activities, will be carefully controlled in accordance with guidance provided by the pipeline owner and operator. The concrete construction of the Facility would protect operators and equipment inside the building from damage from debris. High pressure gas pipelines are designed and operated to codes and standards defined by statutory Regulations and therefore the risk to the Facility and the locality is considered to be very low.	The proposed 15% increase in waste throughput does not require modifications or construction work at the site, therefore no work is planned in the vicinity of this pipeline. Hazard and risk potential remain the same.

Scenario Ref.	Major Accident / Disaster	Substance / System Hazard	Risks and Likely Effects	Mitigation Measures and References	Impact of Increased Throughput
15	Domino effects – Fire	Oil storage tanks / Fire	There are a number of large hydrocarbon fuel oil storage tanks located immediately to the west of the Facility. These tanks are sited within a concrete containment bund. A major pool fire caused by a release of fuel oil into the bund which ignites could generate high levels of thermal radiation and plumes of smoke. Personnel working in external areas of the site could be harmed and this could also result in damage to cladding panels and glazed areas of the site building. It is considered unlikely that this would have a significant effect on the concrete structural sections of the Facility. All combustible materials are stored within the building, therefore there is a low potential for this scenario to initiate a major accident onsite.	A major accident such as a fire in a neighbouring facility could have an impact on operations at the Facility in the short term due to potential road closures and disruption to operations on safety grounds. Emergency systems and procedures are in place for incidents such as these, as there are several Seveso sites in the area, including the following high-hazard operations: • LPG storage and filling; • Waste handling and blending; and • Chlorine storage (see Scenario 14). In the event of a major incident at a neighbouring Seveso site, appropriate measures would be taken at the Facility, including temporary cessation of operation, if required.	There is no impact on the site emergency procedures as a result of the proposed 15% increase in waste throughput. Hazard and risk potential remain the same.
16	Domino effects – Toxic Chemical Release	Neighbouring sewage treatment facility – chlorination system used to disinfect water	Chlorine is an extremely dangerous material and is classified as highly toxic, oxidising and very toxic to aquatic life. A release of chlorine from a neighbouring facility would not be expected to have an impact on the site, other than a short term interruption to operations, to ensure site personnel remained in a safe place to prevent exposure to the gas (i.e. within a toxic gas refuge).	Emergency procedures have been developed to consider off-site domino effects such as fires and toxic releases from neighbours.	As Scenario 15. Hazard and risk potential remain the same.

16.5 Assessment of Natural Disasters

The assessment of major hazards carried out in 2006/2007 considered a broad range of credible natural disasters, which are summarised in Table 16-2. There are no changes to this assessment as a result of the proposed increase in waste throughput of 15% as the activities carried out on site, the installed equipment and the quantities of chemicals stored on site would be unchanged. The size of the waste bunker would remain the same, meaning that the amount of waste stored on site would not increase.

The potential impact of climate change effects, such as increased ambient temperatures, rising river and sea levels are, however, considered in this assessment. Disasters such as those listed in the following Table are very low probability events, which were considered in the design and construction of the Facility. The risk of disasters occurring is very low but cannot be eliminated and are therefore managed via installed mitigation measures and operating systems such as APP and ERPs. These plans and procedures reduce the risk of disasters to very low levels.

Table 16-2 Summary of Natural Disasters

Scenario Ref.	Major Accident / Disaster	Risks and Likely Effects	Mitigation Measures and References
15	Natural disaster – Flooding	The site is located within Dublin Bay, therefore rising sea levels could flood the site causing damage to equipment and inability of the site to operate.	The site elevation is not liable to flooding and there are significant flood defences on the north and south side of the peninsula. Storage of wastes is within buildings; therefore, the potential of waste material being contained in flood water should this breach the installed defences is low.
16	Natural disaster - Climate change	The impact of climate change, causing rising ambient temperatures, may affect process operations at the Facility, such as the cooling water systems. This could potentially impact the operation and efficiency of the development. Increased wind speeds could cause impact damage from debris blown at the Facility.	The engineering design of the cooling water systems takes these changes into consideration by incorporating suitable allowances for operating at higher and lower temperatures. Constant vigilance of site processes such as cooling water conditions by operational personnel would detect deviations in temperatures. The selection of suitable materials of construction such as concrete panels will protect critical equipment from damage in the event of high winds. Visual inspection of the Facility is regularly undertaken by operations personnel to identify any damage which could be caused by windblown debris. In the event this is identified, the appropriate maintenance activities would be scheduled to carry out repairs. A detailed assessment of the potential impacts of climate change on the Facility is contained in Chapter 10 of the EIAR.
17	Terrorism / Arson	Fires and explosions at the Facility could be caused by acts of vandalism and/or terrorism, resulting in damage to the site.	Security measures at the site include security guards, CCTV and high fencing to deter and detect intruders. Garda stations are located throughout Dublin and would respond to incidents on site within a very short response time.

Scenario Ref.	Major Accident / Disaster	Risks and Likely Effects	Mitigation Measures and References
18	Earthquake / Seismic Event	The risk of earthquakes in Ireland is very low, but seismic events could result in asset damage to the Facility and the potential for subsequent fires and explosions if the nearby gas pipeline was damaged.	The Irish National Seismic Network has a number of monitoring stations, including one south of Dublin. No significant earthquakes or seismic activity has been reported in recent years. Seismic activity is taken into consideration within the civil and structural engineering design of the site, which has utilised the appropriate design codes and standards.
19	Subsidence	Movement in the made ground below the site could cause significant structural damage to the Facility, harm to people and potentially a release of substances such as diesel and aqueous ammonia to the environment if containment bunds are damaged.	The Facility is built on reclaimed land which was well compacted and piled. It is not expected that subsidence will occur, and if it does, it would be of such a limited nature that it would not be expected to result in a major accident at the Facility.
20	Lightning	A lightning strike could cause a major accident, harm to people onsite and damage to site infrastructure. Lightning could also present a source of ignition to flammable materials such as diesel. A subsequent major fire could harm people both onsite and offsite.	The engineering design of the Facility incorporates the appropriate electrical earthing and bonding systems. The design, inspection and maintenance of these systems will reduce the likelihood of a major accident being initiated by a lightning strike to a very low level.
21	Aircraft / Drone Impact	Dublin airport is located approximately 10 km north of the site, which is not in a direct flight path; however, the impact of an aircraft crash on the site would be a major accident with the potential for significant injuries to people and damage to assets, both onsite and offsite.	The site is located in an area which does not have a high density of air traffic and facilities such as the Facility are not designed to withstand such an impact. Consequently, vigilance and security systems are the key mitigation measures.

16.6 Emergency Management

The mitigation measures described in Table 16-1 and Table 9-1 contain references to the ERP for the Facility. This document is regularly updated to incorporate new and revised procedures, including the Facility's response to the Covid-19 pandemic. An ERP is required as part of the Permitting regime for the Facility, which will be regularly reviewed and updated in line with those requirements.

The ERP contains detailed plans for the response to emergencies including fires and severe weather events. The Director of Operations at the Facility is the contact with the Dublin Fire Brigade, to regularly review and update the procedures and Dublin City Fire Department will assume the role of incident commander during emergency events. All personnel on site receive appropriate training in the contents of the ERP, are aware of their responsibilities during emergency events and participate in regular training exercises.

Emergency critical roles include personnel trained to use water cannons and other fire suppression systems such as CO_2 gas, which is used for electrical fires.

In the event of a major fire on site, which requires a significant quantity of firewater, all firewater will be retained on site within the waste handling bunker and an attenuation tank, which has an additional maximum capacity of 725 m^3. Following the fire incident, the contents of the attenuation tank will be tested and disposed of as process water, if the composition is within the limits set by the IE Licence. If contaminated, the firewater and rainwater in the attenuation tank will be sent for disposal to the furnace or to an off-site licensed disposal facility.

As highlighted in Table 16-1, the EPA has recently published revised guidance on firewater containment in late 2019, therefore an updated assessment of firewater volumes and containment strategy will be prepared using this guidance as part of ongoing operations. This is will prepared separately to this EIAR.

16.7 Summary

An assessment of the potential MA&D associated with the Proposed Tonnage Increase at the Facility has been carried out. This has been based on a review of the existing Major Accident Hazard Assessment study produced for the Facility in 2006, which identified a number of hazards which have the potential to result in major accidents. The results of this review have determined that the Proposed Tonnage Increase will introduce no new hazards to the Facility, therefore the potential MA&D are unchanged. Consequently, no changes are required to the existing hazard prevention and risk mitigation measures already in place at the Facility.

The existing assessments identified a fire within the main waste storage area, bunker or incineration area as the most likely cause of a major accident at the Facility, which will be unchanged as a result of the Propose Tonnage Increase.

Fires can cause significant harm to people and the environment as a result of airborne pollutants and firewater containing products of combustion therefore the site has been developed with a number of safety systems to prevent fires. The main building is constructed from concrete, which is non-combustible and provides a resistance to fire. This reduces the potential for thermal radiation to cause harm to people and the environment, and prevents a fire spreading to neighbouring sites. If a major fire was to occur, the firewater applied would be fully contained on site. This prevents the transport of pollutants offsite into the River Liffey and Dublin Bay, groundwater and soil, preventing harm to water supplies, public health, wildlife and recreational use at the nearby Irishtown Nature Park and Poolbeg beach.

This Facility is located in a mature, industrial area near to power stations and bulk fuel storage depots, which are Seveso sites, and therefore cooperates with neighbours in the development of emergency procedures. These are required to comply with The Safety, Health and Welfare at Work Act 2005 and include a fire safety risk assessment. The appropriate emergency equipment and signage has been installed, as required by the risk assessments, including a new crash gate at the southern boundary of the Facility, which was recommended by the Fire and Rescue Service.

The potential impact of natural disasters including climate change effects, such as rising river and sea levels, has been considered in detail within a separate chapter of this EIAR. The area of the site contains flood defence systems to prevent the ingress of water.

The risk of a major accident or disaster from the Facility is low, as the Facility has been designed, constructed and is managed by an experienced operator who adheres to all applicable Regulations and good practice in controlling potential hazards. These risks are unchanged as a result of the Proposed Tonnage Increase, as the systems installed at the Facility are designed to operate efficiently at these levels. No additional assets or expansions are required for the throughput increase.

In accordance with best practice for facilities, regular reviews of major accidents and disasters will be undertaken within the ERP to ensure lessons are learned from any incidents at the Facility and at similar facilities worldwide.

Chapter 17: Interactions

17

17. Interactions

This chapter of the EIAR evaluates the potential interaction of impacts described within this EIAR, which the Proposed Tonnage Increase at the Facility may have on the receiving environment and sensitive receptors.

As a requirement of the EIA Directive (EU, 2014), and considering best practice guidelines and advice notes, the inter-relationships between the following individual factors must be identified and assessed: population and human health; biodiversity, with particular attention to species and habitats protected under the Habitats Directive 92/43/EEC and Birds Directive 2009/147/EC; land and soil, water, air and climate, noise and vibration, material assets, cultural heritage, waste and the landscape. In accordance with this and to align with the environmental aspects assessed in this EIAR, a summary of the interactions (or inter-relationship) of impacts identified from the Proposed Tonnage Increase of waste intake at the Facility between the following environmental factors are outlined in this chapter:

- Population and Human Health;
- Air Quality;
- Roads and traffic;
- Waste management; and
- Climate.

As outlined in Chapter 1 Introduction, no likely significant environmental effects were identified in relation to the following environmental factors: land, soil, water, biodiversity, landscape, and cultural heritage, and therefore detailed impact assessments were not required. These environmental factors have not been considered in this chapter.

Moreover, for context, the effects of impacts associated with the Proposed Tonnage Increase of 90,000 t remain within the envelope of those set out in the original 2006 EIS which was assessed in the approval of the original planning application (ref: PL29S.EF2022) for the processing of 600,000 tpa at the Facility.

17.1 Air Quality

17.1.1 Population and Human Health

As discussed in Chapter 5 Population and Human Health, the amenity of community facilities, open space, public right of ways or residential properties will not be compromised by air quality as a result of the Proposed Tonnage Increase, as the air quality assessment concluded that the Proposed Tonnage Increase will not result in any significant change to the local air quality environment. Modelling also indicated that the air quality impacts (NO_2, PM_{10} and $PM_{2.5}$) from site-specific traffic is not significant. Therefore, it was determined there would be a permanent negligible (not significant) effect on amenity and local communities, and a neutral (0) impact on air quality and neighbourhood amenity as a determinant of human health and well-being.

17.2 Roads and Traffic

17.2.1 Air Quality

The Proposed Tonnage Increase at the Facility has the potential to result in impacts to the local air quality from the increase in road traffic associated with the waste to energy plant. The air quality impact assessment concluded only one receptor is predicted to experience a slight adverse impact, which occurs at R16 (student accommodation on Mayor Street Upper) in terms on NO_2. The largest increase in NO_2 concentration (+2.1 µg/m^3) was predicted to occur at receptor R6 which is on the access road from the Facility to the main road. Both with or without the increase in capacity at the Facility, there is no exceedances of the European standards or the upper Irish air quality thresholds.

The predicted changes in annual mean concentrations of PM_{10} and $PM_{2.5}$ were considered to be not significant with no exceedances of the European standard or the upper or lower Irish air quality thresholds.

17.2.2 Population and Human Health

As outlined in Chapter 13 Roads and Traffic, forecasted traffic to the Facility is not likely to result in a significant effect on the existing road network within the study area during the opening year and future year scenarios during the AM and PM peak times. Therefore, the amenity of community facilities, open space, public right of ways or residential properties will not be compromised by traffic impacts as a result of the Proposed Tonnage Increase. It was determined from the Population and Human Health impact assessment (Chapter 5) that there would be a permanent negligible (not significant) effect on amenity and local communities, and a neutral (0) impact on air quality and neighbourhood amenity as a determinant of human health and well-being.

17.3 Waste Management

17.3.1 Climate

As discussed in Chapter 10 Climate, the total operational emissions associated with burning the waste to energy are potentially reduced by the avoidance of the waste entering standard disposal methods, such as landfill. Renewable grid electricity generated from the Facility will also displace emissions associated with other generated fossil fuel sources of grid electricity. Emissions from the operation of the Facility do not contribute to more than 1% of Ireland's total emissions inventory.

Therefore, it was concluded that the magnitude of effects during operation is considered 'low' with the significance of effects being considered as 'minor adverse'.

17.3.2 Population and Human Health

As discussed in Chapter 05 Population and Human Health, increasing the capacity at the Facility from 600,000 tpa to 690,000 tpa is an intervention that seeks to prevent further waste going to landfill. Reducing or minimising waste, including disposal, as well as encouraging recycling at all levels can improve human health directly and indirectly by minimising environmental impact. Therefore, the impact of the Proposed Tonnage Increase on minimising the use of resources as a determinant of human health and well-being is assessed to be positive (+).

17.4 Summary

In summary, no potential for significant effects is from the interactions of the constituent elements of the Proposed Tonnage Increase is predicted. The interactions are summarised in Table 17-1.

Table 17-1 Summary of Environmental Interactions

Environmental Aspect / Interaction	Land & Soils	Water	Air Quality	Noise & Vibration	Biodiversity	Cultural Heritage	Landscape & Visual	Roads and Traffic	Population & Human Health	Waste Management	Material Assets	Climate	Major Accidents and Disasters
Land & Soils													
Water	✘												
Air Quality	✘	✘											
Noise & Vibration	✘	✘	✘										
Biodiversity	✘	✘	✘	✘									
Cultural Heritage	✘	✘	✘	✘	✘								
Landscape & Visual	✘	✘	✘	✘	✘	✘							
Roads and Traffic	✘	✘	✓	✘	✘	✘	✘						
Population & Human Health	✘	✘	✓	✘	✘	✘	✘	✓					
Waste Management	✘	✘	✘	✘	✘	✘	✘	✘	✓				
Material Assets	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘			
Climate	✘	✘	✘	✘	✘	✘	✘	✘	✘	✓	✘		
Major Accidents and Disasters	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘	

✓	Weak / Some / Strong Interaction
✘	No Interaction

18. References

18.1 General

- EC. (2017). *Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Impact Assessment Report.* European Commission.
- EPA. (2002). *EPA Guidelines on the information to be contained in Environmental Impact Statements.* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2003). *EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2013). *Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites.* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2017). *EPA Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.

18.2 Project Description

- AECOM. (2020). *Dublin Waste to Energy Facility*, *Traffic and Transport Assessment*.
- Eslam Engineering. (2006). *Dublin Waste to Energy Project, Environmental Impact Statement.*
- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.
- DCC. (2019). *Poolbeg West Planning Scheme*, Dublin City Council.
- DCC. (2016). Dublin City Development Plan, 2016-2022. Dublin City Council.

18.3 Waste

- DCC. (2016). *Dublin City Development Plan, 2016-2022*. Dublin City Council.
- EC. (2018). *Circular Economy Package*, European Commission.
- EMWR. (2018). *Eastern Midlands Waste Region, Annual Report 2016/2017*, Eastern Midlands Waste Region.
- EMWR. (2015). *Eastern Midlands Region Waste Management Plan*, 2015-2021, Eastern Midlands Waste Region.
- EU. (2018a). Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste (Text with EEA relevance), European Union.
- EU. (2018b). Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste, European Union.
- Government of Ireland. (2020). *A Waste Action Plan for a Circular Economy. Ireland's National Waste Policy. 2020-2025.*
- Government of Ireland. (2015). Waste Management (Landfill Levy) Regulations 2015 (as amended).
- Government of Ireland. (2014). Waste Management (Packaging) Regulations 2014 (as amended).
- Government of Ireland. (2009). Waste Management (Food Waste) Regulations 2009 (as amended).
- Government of Ireland. (2007a). Waste Management (Collection Permit) Regulations 2007 (as amended).
- Government of Ireland. (2007b). Waste Management (Facility Permit and Registration) Regulations 2007 (as amended).
- Government of Ireland. (2007c). Waste Management (Hazardous Waste) Regulations 2007 (as amended).

- Government of Ireland. (2007d). Waste Management (Shipments of Waste) Regulations 2007 (as amended).
- Government of Ireland. (2004). Waste Management (Licensing) Regulations 2004 (as amended).
- Government of Ireland. (2003). Protection of the Environment Act, 2003 (as amended).
- Government of Ireland. (2000-2010). Planning and Development Acts 2000 to 2020.
- Government of Ireland. (1992-2011). Environmental Protection Agency Acts 1992 to 2011.
- Government of Ireland. (1997-2009). Litter Pollution Acts 1997 to 2009.
- Government of Ireland. (1997). Waste Management (Planning) Regulations 1997 (as amended);
- Government of Ireland. (1996-2011). The Waste Management Acts 1996 to 2011.
- RWMO. (2020). *Interim Report, Performance of the Waste Sector in Ireland, Covid 19- Initial Restrictions Phase*, Regional Waste Management Offices.
- WMPLA. (2020). *Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022 Bulletin*, Waste Management Planning Regional Co-ordinators.

18.4 Alternatives

- EC. (2017). *Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU*, European Commission.
- EPA. (2020). *Waste*. [Online]. Accessed 06/08/2020
- EPA. (2017). *EPA Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2016). *Ireland's Environment- An Assessment 2016*, Environmental Protection Agency, Co. Wexford, Ireland.
- EMWR. (2015). *Eastern Midlands Region Waste Management Plan*, 2015-2021, Eastern Midlands Waste Region.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.
- DHPLG. (2018). *Guidelines for Planning Authorities and An Bord Pleanála on Carry Out Environmental Impact Assessment,* The Department of Housing, Planning, and Local Government.
- RWMO. (2020). *Interim Report, Performance of the Waste Sector in Ireland, Covid 19- Initial Restrictions Phase*, Regional Waste Management Offices.
- Watson, D. (2013). *Municipal Waste Management in Ireland*, European Environmental Agency.
- WMPLA. (2020). *Waste Treatment Capacity Analysis-Q4 2019 & Projections 2020-2022 Bulletin*, Waste Management Planning Regional Co-ordinators.
- WMPLA. (2018). *Waste Treatment Capacity Analysis*, Waste Management Planning Regional Co-ordinators.

18.5 Population and Human Health

- ABP. (2007). *Planning Permission 29S.EF2022*, An Bord Pleanála.
- CSO. (2020a). *Labour Force Survey (2020, Q1),* Central Statistics Office.
- CSO. (2020b). *Live Register (2020, June),* Central Statistics Office.
- CSO. (2020c). *Irish Life Tables: Period Life Expectancy by Sex, Age, Region and Year (*2015-2017), Central Statistics Office.
- CSO. (2016a). *Census 2016,* Central Statistics Office.
- CSO. (2016b). *Geographic Profiles of Income in Ireland* (2016), Central Statistics Office.
- CSO. (2015). *Irish Health Survey 2015,* Centre Statistics Office.

- DCC. (2020). The Community Gain Liaison Committee [Online]. Available at http://www.dublincity.ie/cglc/community-gain-projects-grant-scheme, Dublin City Council.
- EPA. (2017). *EPA Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2015). *Draft Advice Notes for Preparing Environmental Impact Statements*, Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2002). *EPA Guidelines on the information to be contained in Environmental Impact Statements.* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2003). *EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.* Environmental Protection Agency, Co. Wexford, Ireland.
- Haase, T., and Pratschke, J. (2017). *The 2016 Pobal HP Deprivation Index for Small Areas (SA)*.
- IPH. (2009). *Health Impact Assessment Guidance*, Institute of Public Health.
- NHS. (2019). *HUDU Planning for Health: Rapid Health Impact Assessment Tool*. London Healthy Development Unit. National Health Service.
- WHO. (2006). *Constitution of the World Health Organisation,* World Health Organisation.

18.6 Land & Soils

- AECOM. (2019). *Attachment 4.8.3 Site Condition Report, Sub Section 4.8 IE Licence Application ID LA003577*.
- Elsam Engineering. (2006). *Dublin Waste to Energy Project, Environmental Impact Statement.*
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2003). *Towards Setting Guideline Values for the Protection of Groundwater in Ireland*', Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.
- EU. (2000*).* Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for the community action in the field of water policy, European Union.
- Heffernan.M. (2020). *Annual Environmental Report*, Dublin Waste to Energy.
- IGI. (2013). *Guidelines for Preparation of Soils, Geology, Hydrogeology Chapters of Environmental Impact Statements*, Institute of Geologists of Ireland.

18.7 Water

- AECOM. (2019). *Attachment 4.8.3 Site Condition Report, Sub Section 4.8 IE Licence Application ID LA003577.*
- DWTE. (2020a). '*Quarterly Environmental Report For Period: 01st January 2020 to 31st March 2020*', Dublin Waste to Energy.
- DWTE. (2020b). '*Quarterly Environmental Report Q4 2019. For Period: 01st October 2019 to 31st December 2019*', Dublin Waste to Energy.
- DWTE. (2019a). '*Quarterly Environmental Report Q1 2019. For Period: 01st January 2019 to 31st March 2019*', Dublin Waste to Energy.
- DWTE. (2019b). '*Quarterly Environmental Report Q2 2019. For Period: 01st April 2019 to 30th June 2019*', Dublin Waste to Energy.
- DWTE. (2019c). '*Quarterly Environmental Report Q3 2019. For Period: 01st July 2019 to 30th September 2019*', Dublin Waste to Energy.

- DWTE. (2018a). '*Quarterly Environmental Report Q2 2018. For Period: 01st April 2018 to 30th June 2018*', Dublin Waste to Energy.
- DWTE. (2018b). '*Quarterly Environmental Report Q3 2018. For Period: 01st July 2018 to 30th September 2018*', Dublin Waste to Energy.
- DWTE. (2018c). '*Quarterly Environmental Report Q4 2018. For Period: 01st October 2018 to 31st December 2018*', Dublin Waste to Energy.
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.
- Irish Hydrodata. (2019). *Covanta, Dublin Waste to Energy Facility, Pigeon House Road, Dublin 4, (Licence Reg. No. W0232-01), Thermal Plume Surveys of August 1st and 12th 2019.*

18.8 Biodiversity

- AECOM. (2019). *Attachment 4.8.3 Site Condition Report, Sub Section 4.8 IE Licence Application ID LA003577.*
- AQUAFACT. (2018). *Dublin Waste to Energy Water Discharge Biological Surveys,* AQUAFACT International Services Limited.
- City Analysts Limited. (2019). *Certificate of Analysis.*
- Eslam Engineering. (2006). *Dublin Waste to Energy Project, Environmental Impact Statement.*
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.
- Heffernan.,M. (2020). *Annual Environmental Report*, Dublin Waste to Energy.

18.9 Air Quality

- AECOM. (2020). Dublin Waste to Energy Facility, Traffic and Transport Assessment.
- CERC. (2020). *Air Dispersion Modelling Software (ADMS) ADMS-Roads (v5.0)*, Cambridge Environmental Research Consultants.
- DEFRA. (2019a) *Emission Factor Toolkit (EFT v9.0)*, Department for Environment, Food and Rural Affairs.
- DEFRA. (2019b), *NOx to NO2 Calculator v7.1*, Department for Environment, Food and Rural Affairs.
- EC. (2020) *Natura 2000 data and maps* https://ec.europa.eu/environment/nature/natura2000/data/index_en.htm, European Commission.
- EC. (2010) *Industrial Emissions Directive,* European Commission.
- EPA. (2019a). *2019 Air Quality Report – supplemental information: Summary data tables 2018,* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2019b). *Nitrogen Dioxide Diffusion Tube Survey in Dublin: 2016 – 2017*, Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.

- EPA. (2011). *Air Quality Standards Regulations 2011*, Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2008). *Waste Licence for a Non-Hazardous Waste Incineration or/Waste-to-Energy Facility, W0232-01.* Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2008). Directive 2008/50/EC of the European Parliament and of the Council, of May 2008, on ambient air quality and cleaner air for Europe, European Union.
- EU. (2002). Directive 2002/3/EC of the European Parliament and of the Council of 12 February 2002 relating to ozone in ambient air, European Union.
- EU. (2000). Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air, European Union.
- EU. (1999). Council Directive 1999/30/EC, of 22 April 1999, relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, European Union.
- Eslam Engineering. (2006). *Dublin Waste to Energy Project, Environmental Impact Statement*
- Highways England. (2019). *Design Manual for Roads and Bridges.*
- Laxen and Marner. (2003). *Analysis of the Relationship Between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites.*
- Moorcroft and Barrowcliff. et al. (2007) *Land-Use Planning & Development Control: Planning For Air Quality* Institute of Air Quality Management, London.
- NRA. (2011). *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*, National Roads Authority.

18.10 Climate

- British Standards Institution. (2011). *PAS 2050:2011 Specification for the assessment of the life cycle greenhouse gas emissions of goods and services.*
- Carbon Brief. (2019). *Why Ireland is nowhere near meetings its climate change goals* [online] available at: https://www.carbonbrief.org/in-depth-qa-why-ireland-is-nowhere-near-meeting-its-climate-change-goals
- Codema. (2018). *Dublin City Baseline Report.*
- Codema. (n.d.). *A Strategy Towards Climate Change Action Plans for The Dublin Local Authorities.*
- DCC. (2019). *Climate Change Action Plan 2019-2024*, Dublin City Council.
- DCC. (2010). *Dublin City Sustainable Energy Action plan 2010 – 2020,* Dublin City Council.
- DEFRA. (2014). *Energy recovery for residual waste: A carbon based modelling approach* http://randd.defra.gov.uk/Document.aspx?Document=11918_WR1910Energyrecoveryforresidualwaste-Acarbonbasedmodellingapporach.pdf Department for Environment, Food and Rural Affairs.
- Department of Communications, Climate Action & Environment. (2020a). *EU Emission Targets* https://www.dccae.gov.ie/en-ie/climate-action/topics/eu-and-international-climate-action/2020-eu-targets/Pages/default.aspx.
- Department of Communications, Climate Action & Environment. (2020b). *Paris Agreement* [online] available at: https://www.dccae.gov.ie/en-ie/climate-action/topics/eu-and-international-climate-action/paris-agreement/Pages/default.aspx
- Department of Communication, Climate Action & Environment. (2018). *National Adaptation Framework Planning for a Climate Resilient Ireland*.
- EirGrid. (2019). *Tomorrow's Energy Scenario, 2019 Ireland*.
- EPA. (2020a). Irelands Greenhouse Gas Emissions Projections [online] available at: http://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/2020-EPA-Greenhouse-Gas-Emissions-Projections_final.pdf [accessed 10/08/2020], Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2020b). *Ireland's Greenhouse Gas Emissions Projections (2019 – 2040)* (July 2020 update) [online] available at: https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/2020-EPA-Greenhouse-Gas-Emissions-Projections_final.pdf, Environmental Protection Agency, Co. Wexford, Ireland.

- EPA. (2020c). *National Inventory Report,* Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2018). Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste (Text with EEA relevance), European Union.
- Government of Ireland. (2020). *A Waste Action Plan for a Circular Economy. Ireland's National Waste Policy. 2020-2025.*
- Government of Ireland. (2019). *Climate Action Plan 2019*.
- Government of Ireland. (2015). *Climate Action and Low Carbon Development Act 2015.*
- IEMA. (2020). *Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation*. Institute of Environmental Management and Assessment.
- IEMA. (2017). *Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance.* Institute of Environmental Management and Assessment.
- IFC. (2011). *Guidance Note 3*, International Finance Corporation.
- Irelands Coalition Government. (2020). P*rogramme for Government – Our Shared Future*.
- MaREI, UCC, ICHEC. (2020). *Climate Ireland* [online] available at: https://www.climateireland.ie/#!/, Centre for Marine and Renewable Energy, University College Cork, and the Irish Centre for High End Computer.
- SEAI. (2020a). *Key Statistics: CO_2 Emissions* [online] available at: https://www.seai.ie/data-and-insights/seai-statistics/key-statistics/co2/?gclid=EAIaIQobChMI9bPn75S06wIVg-3tCh1M2AJVEAAYASAAEgLmOvD_BwE, Sustainable Energy Authority of Ireland.
- SEAI. (2020b). *Conversion Factors* [online] available at: https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/, Sustainable Energy Authority of Ireland.
- WBCSD and WRI. (2012). T*he Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard,* World Business Council for Sustainable Development and World Resources Institute.

18.11 Noise and Vibration

- Altum Scientific. (2020). *Dublin Waste to Energy, Annual Environmental Noise Monitoring Report – 2020*.
- EPA. (2008). *Waste Licence for a Non-Hazardous Waste Incineration or/Waste-to-Energy Facility, W0232-01.* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.

18.12 Landscape

- Eslam Engineering. (2006). *Dublin Waste to Energy Project, Environmental Impact Statement.*
- DCC. (2016). *Dublin City Development Plan, 2016-2022*. Dublin City Council.
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.

18.13 Cultural Heritage

- DCC. (2016). *Record of Protected Structures*, Dublin City Development Plan, 2016-2022, Dublin City Council.
- Department of Environment, Heritage and Local Government. (2009). *National Monuments in State Care: Ownership & Guardianship, Dublin*.
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.
- Frazer, W. (2008). *Archaeological Survey of Granite Blocks, Dublin Waste to Energy Project*.

18.14 Roads & Traffic

- AECOM. (2020). *Dublin Waste to Energy Facility, Traffic and Transport Assessment.*
- DCC. (2016). *Dublin City Development Plan, 2016-2022*. Dublin City Council.
- Dublin Port Company. (2018). *Dublin Port Masterplan 2040 Reviewed 2018.*
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- Elsam Engineering. (2006). *Dublin Waste to Energy Project, Environmental Impact Statement*.
- ILTB Consulting. (2006). *Dublin Waste to Energy Facility, Traffic Impact Assessment.*
- NRA. (2011). *Project Appraisal Guidelines, Unit 5.5 Link-Based Traffic Growth Forecasting*, National Roads Authority.
- TII. (2014). *PE-PDV-02045 Traffic and Transport Assessment Guidelines*, Transport Infrastructure Ireland, Dublin, Ireland.

18.15 Material Assets

- DCC. (2016). *Dublin City Development Plan, 2016-2022*. Dublin City Council.
- EPA. (2017). *Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.
- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.

18.16 Major Accidents and Disasters

- AECOM. (2016). Dublin Waste to Energy: Review of COMAH Status. Prepared for: Covanta Europe Operations Ltd, April 2016.
- Elsam Engineering. (2006). *Dublin Waste to Energy Project, Major Accident and Hazard Assessment, Environmental Impact Statement*.
- EPA. (2019). *Guidance on Retention Requirements for Firewater Run-off,* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA. (2017). *EPA Guidelines on the information to be contained in Environmental Assessment Reports*, Draft, August 2017, Environmental Protection Agency, Co. Wexford, Ireland.

- EU. (2018). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
- EU. (2012). DIRECTIVE 2012/18/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC

18.17 Interactions

- EU. (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, European Union.