9. Climate

9.1 Introduction

This chapter presents an assessment of the effects of the proposed Ringaskiddy Resource Recovery Centre on climate (hereafter referred to as the 'proposed development'). Climate represents long term weather patterns and considers environmental aspects such as climate change resulting from greenhouse gas emissions. Potential emissions of greenhouse gases that can contribute to climate change include carbon dioxide (CO_2) and nitrous oxide (N_2O). This chapter considers the balance between the avoidance of emissions that would otherwise be produced in the generation of electricity from fossil fuel-based power stations that is displaced by electricity produced by the proposed development and the displaced emissions from landfilling of waste and emissions of greenhouse gases from the proposed development.

The proposed development will have a furnace and flue gas cleaning line. The ash hall, ash handling areas and ash silos will be located in the building at the south side. The boiler feed water treatment equipment, boiler feed water tank, transformers and high voltage switch room will also be located in the building. The line will have a moving grate furnace with a state-of-the-art flue gas cleaning system.

In the proposed development, heat will be recovered and converted to electricity, thereby contributing to a reduction in the consumption of fossil fuels and hence a reduction of CO_2 emissions. A quantity of waste residual materials will be produced during operation of the proposed development, which will require disposal. This waste includes flue gas cleaning residues, boiler ash and bottom ash, refer to **Section 4.13** of **Chapter 4** ***Description of the Proposed Development*** and **Section 15.5.3** in **Chapter 15** ***Material Assets*** for further detail.

9.2 Assessment Methodology

The climate assessment has been carried out in line with the guidance outlined in the European Commission publications "*Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*" (EC, 2013) [(1)] and "*Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report*" (EC, 2017) [(2)] and the EPA publication "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*" (EPA, 2022a) [(3)]. In addition, as outlined in Appendix 9.1, a report has been compiled which outlines how the proposed development is in compliance with Section 15 of the Climate Action and Low Carbon Development (Amendment) Act 2021. The climate assessment is divided into two distinct sections – a greenhouse gas assessment (GHGA) and a climate change risk assessment (CCRA).

- GHGA – Quantifies the GHG emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude
- CCRA – Identifies the effects of a changing climate on a project and receiving environment. The assessment considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience

The assessment methodology has been derived with reference to the most appropriate guidance documents relating to climate which are set out in the following sections of this report. The EPA Guidelines (EPA, 2022) outlines the requirements for what an EIAR should contain based on Article 5(1) of the amended Directive (2014/52/EU).

"*The information to be provided by the developer shall include at least:*

a. a description of the project comprising information on the site, design, size and other relevant features of the project;

b. a description of the likely significant effects of the project on the environment;

c. a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

d. a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;

e. a non-technical summary of the information referred to in points (a) to (d); and

f. any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."

An overview of the methodology undertaken for the climate impact assessment is outlined below, which is based on the EPA Guidelines (EPA, 2022):

- A detailed baseline review of GHG emissions has been undertaken in order to characterise the baseline environment. This has been undertaken through a review of available published GHG emission data
- A review of the most applicable guidelines for the assessment of GHG emissions has been carried out in order to define the significance criteria for the Construction and Operational Phases of the Proposed Development. These guidelines describe appropriate methods for quantifying the emissions of GHGs from the proposed development
- Predictive calculations and impact assessments relating to the likely effect of the proposed development on climate (GHG emissions) have been undertaken
- An assessment of the vulnerability of the proposed development to climate change has been undertaken; and
- A schedule of mitigation measures has been incorporated where required to reduce, where necessary, the identified potential climatic effects associated with the proposed development

9.2.1 Relevant Legislation & Guidance

All relevant plans and policies have been considered in this assessment including the following publications:

- Department of Environment, Climate and Communications (DECC) National Adaptation Framework 2024 (4)
- Department of Environment, Climate and Communications (DECC) Buying Greener: Green Public Procurement Strategy and Action Plan (2024–2027) (5)
- Global Facility for Disaster Reduction and Recovery (GFDRR) ThinkHazard! Tool. Available online at: https://thinkhazard.org/en/ (6)
- Government of Ireland 2025 Climate Action Plan (7)
- Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction v2.2 (8)
- SEAI Interim National Energy Balance 2024 (9)
- Transport Infrastructure Ireland (TII) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (10)

In addition, data of relevance to the climate impact assessment is outlined below:

- Environmental Protection Agency (EPA) Ireland's Greenhouse Gas Emissions Projections – 2024 - 2055 (11)
- Environmental Protection Agency (EPA) Ireland's Provisional Greenhouse Gas Emissions 1990-2023 July 2025 (12)
- Met Eireann website: https://www.met.ie/science/translate (13)
- Met Éireann Annual Statement for 2024 (14)

9.2.1.1 European Legislation

Following on from the European Climate Law [15], and as part of the EU's "*Fit for 55*" legislative package where the EU has committed to a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 levels by 2020, the Regulation (EU) 2018/842 "*Effort Sharing Regulation*" [16] has been strengthened with increased ambition by the year 2030. Ireland is to increase the GHG emission reduction target from 30% to 42% relative to 2005 levels whilst the ETS market will also have more stringent reductions from the currently proposed reduction of 43% by 2030 compared to 2005 to a 61% reduction by 2030 based on annual reductions of 4.2% compared to the previous annual reduction level of 2.2% per year with levels in 2023 reducing to 1,064 million tonnes CO_2eq. The EU, in May 2023, published Directive (EU) 2023/959 Amending Directive 2003/87/EC Establishing A System For Greenhouse Gas Emission Allowance Trading Within The Union And Decision (EU) 2015/1814 Concerning The Establishment And Operation Of A Market Stability Reserve For The Union Greenhouse Gas Emission Trading System [17]. As part of this Directive, the cap on emissions has been tightened again to reduce emissions covered by the EU ETS by 62% by 2030 compared to 2005.

Ireland has a binding renewable energy EU target of 43% by 2030 (Renewable Energy Directive EU/2023/2413) [18]. According to SEAI's Energy in Ireland (2024 report), in 2023 renewable energy supply was 14.6% of gross final consumption [19].

The renewable target set in Renewable Energy Directive EU/2023/2413 for 2030 is set at 43% of the total final energy consumption. This target will be made up of contributions from renewable energy in electricity (RES-E), renewable energy in transport (RES-T) and renewable energy for heat and cooling (RES-H). The target for RES-E is 80% of renewables to contribute to gross electricity consumption by 2030. The target for RES-T is that biofuels and the renewable portion of electricity will account for 29% of transport energy by 2030. The RES-H target is that the renewable contribution to heat will reach 16.1% by 2030. As of 2024, the 14.6% of the total final energy consumption comes from renewable energy (SEAI) [19].

9.2.1.2 National Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) [20] was enacted (the 2015 Act). The purpose of the 2015 Act was to enable Ireland 'to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050' (3.(1) of No. 46 of 2015). This is referred to in the 2015 Act as the 'national transition objective'.

In June 2020, the Government published the Programme for Government – Our Shared Future [21]. In relation to climate, there is a commitment to an average 7% per annum reduction in overall greenhouse gas emissions from 2021 to 2030 (51% reduction over the decade) with an ultimate aim to achieve net zero emissions by 2050. Policy changes include the acceleration of the electrification of the transport system, including electric bikes, electric vehicles and electric public transport, alongside a ban on new registrations of petrol and diesel cars from 2030. In addition, there is a policy to ensure an unprecedented modal shift in all areas by a reorientation of investment to walking, cycling and public transport.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) [22] was published in July 2021. The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'*. The 2021 Climate Act will also '*provide for carbon budgets and a sectoral emissions ceiling to apply to different sectors of the economy'*. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority. The 2021 Climate Act has set a target of a 51% reduction in the total amount of greenhouse gases over the course of the first two carbon periods ending 31 December 2030 relative to 2018 annual emissions. The 2021 Climate Act defines the carbon budget as '*the total amount of greenhouse gas emissions that are permitted during the budget period*'.

Section 15 of the Climate Action & Low Carbon Development Act (Amended) 2021 states that:

1. *"A relevant body shall, in so far as practicable, perform its functions in a manner consistent with:*
    a. *the most recent approved climate action plan,*
    b. *the most recent approved national long-term climate action strategy,*
    c. *the most recent approved national adaptation framework and approved sectoral adaptation plans,*
    d. *the furtherance of the national climate objective, and*
    e. *the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."*

The proposed development is aligned with the above-mentioned plans, strategies and objectives as outlined in below.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) outlines a series of specific actions including:

- To make a strategy to be known as the '*National Long Term Climate Strategy*' not less than once in every five-year period with the first to be published for the period 2021 to 2035 and with each subsequent Strategy covering the next three five-year carbon budgets and also include a longer-term perspective of at least 30 years
- To adopt a system of carbon budgets which will be determined as part of a grouping of three five-year periods calculated on an economy-wide basis, starting with the periods 2021 to 2025, 2026 to 2030, and 2031 to 2035
- To introduce a requirement for Government to adopt "*sectoral emission ceilings*" for each relevant sector within the limits of each carbon budget
- To request all local authorities to prepare climate action plans for the purpose of contributing to the national climate objective. These plans should contain mitigation and adaptation measures that the local authority intends to adopt
- Increasing the power of the Advisory Council to recommend the appropriate climate budget and policies
- Requiring the Minister to set out a roadmap of actions to include sector specific actions that are required to comply with the carbon budget and sectoral emissions ceiling for the period to which the plan relates; and
- Reporting progress with the CAP on an annual basis with progress including policies, mitigation measures and adaptation measures that have been adopted

In terms of wider energy policy, as outlined in the EPA publication "*Ireland's Greenhouse Gas Projections 2024-2055*" [(24)] under the *With Additional Measures* (WAM) scenario, emissions from the waste sector are projected to decrease from 3% to 2% of overall emissions over the period 2018 to 2030. The WAM scenario is based on the projection of future emissions based on the measures outlined in the latest Government plans at the time projections are compiled. This includes all policies and measures included in the With Existing Measures (WEM) scenario, plus those included in Government plans but not yet implemented.

In this scenario it is estimated that renewable energy generation increases to approximately 68.3% of electricity consumption. This is mainly a result of further expansion in wind energy (comprising 7.1 GW onshore, 2.7 GW offshore). Expansion of other renewables (e.g. solar photovoltaics to 6.3 GW) also occurs under this scenario.

Under the With Additional Measures, one power station (Edenderry) operates to the end of 2023 with 30% co-firing. In this scenario the Moneypoint power station is assumed to operate in the market up to end 2025 at which point it no longer generates electricity from coal. In terms of inter-connection, the Greenlink 500MW interconnector to the UK came on stream in 2025 and the Celtic 700MW interconnector to France is due to come on stream in 2027 [(24)].

The 2025 Climate Action Plan (CAP25) [(25)] provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting Ireland on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021. The plan outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry, Waste and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. CAP25 also detailed the required governance arrangements for implementation including carbon-proofing of policies and establishment of sectoral emission ceilings and carbon budgets. In relation to waste-to-energy facilities, CAP25 states that:

"Waste emissions in Ireland fell 9.4% in 2023 from 2018 figures and are projected to fall 27% by 2030. The key policy tools which have been successful in Ireland are:

- *Levies on landfill, certain forms of recovery and diversion regulations, including narrowing the scope for derogations.*
- *Widespread segregation of waste, capturing recyclables and biodegradable waste;*
- *Industry-supported recycling operations.*
- *Regional waste planning.*" (P. 133, CAP25)

In relation to the Landfill Directive (1999/31/EC), CAP25 confirmed Ireland met the 2010, 2013 and 2020 targets due to increases in the levy for disposal of waste to landfill and requirements to divert BMW from disposal to landfill under the Landfill Directive targets.

As outlined in CAP24[1], methane contributes 84 to 86 times more to global warming per unit of mass than carbon dioxide during the first twenty years, and thus at COP26 in 2021, 121 countries (including Ireland and the wider EU) signed up to '*The Global Methane Pledge*' which:

"pledges to collectively reduce methane emissions by 30% between 2020 and 2030. This 30% methane reduction target is a collective one which will be accomplished by reducing methane emissions across various sectors, including the production of energy, agriculture, and waste management. Ireland will reduce the fugitive methane emissions which arise from the production and transportation of fossil fuels, especially natural gas, by increasing renewable energy and decreasing the demand for fossil fuels. Waste can also contribute to methane emissions. We will reduce methane from waste by sending less waste to landfill by 2030, by reducing waste overall, by adopting a circular economy which ensures products are renewable and reusable, and by ensuring that waste is a last resort…" (P. 383, CAP24)

CAP25 also outlined a number of waste-related measures in the Waste Action Plan for a Circular Economy including:

- The European Union (Household Food Waste and Bio-Waste) (Amendment) Regulations were introduced in December 2023, requiring waste collection service providers to provide a bio-waste collection service (food and garden waste) to all households in the state with a waste collection service from 1st January 2024.
- Requirement for all plastic beverage containers up to three litres to have cap tethered to the container became mandatory for all products placed on the market from 3rd July 2024.
- Extended producer responsibility schemes are now in place for wet wipes, balloons and fishing gear since 31st December 2024.

As part of the preparation of a 'local authority climate action plan', each local authority shall consult and co-operate with an adjoining local authority in making a local authority climate action plan and co-ordinate the mitigation measures and adaptation measures to be adopted, where appropriate.

[1] "*Climate Action Plan 2025 builds upon last year's Plan by refining and updating the measures and actions required to deliver the carbon budgets and sectoral emissions ceilings and it should be read in conjunction with Climate Action Plan 2024*". Climate Action Plan 2025

Each local authority is also required to consider any significant effects the implementation of the local authority climate action plan may have on the adjoining local authority.

Individual county councils in Ireland have also published their own Climate Action Plans including climate change strategies in the area of GHG reductions, energy efficiencies and pathways to achieve net zero by 2050 which outline the specific climate objectives for that local authority and associated actions to achieve the objectives. The Cork County Council Climate Action Plan 2024-2029 [(26)] (the CCC Plan) outlines a number of goals and plans to prepare for and adapt to climate change within Cork. The CCC Plan has outlined a target of a 51% reduction in carbon emissions and assist the delivery of the climate neutrality objectives at local and community levels and identifying and supporting the development of a Decarbonising Zone (DZ) within the local authority area.

The carbon budget programme was published in November 2021 and comprises three successive 5-year carbon budgets. In relation to carbon budgets, the Climate Action and Low Carbon Development (Amendment) Act 2021 states '*A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')*'. The carbon budget is to be produced for three sequential budget periods with the third carbon budget in draft format. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. The total emissions allowed under each budget is set out below in **Table 9.1**, as well as the average annual reduction for each 5-year period.

Table 9.1 5-Year Carbon Budgets

Period	Mt CO_2eq	Emission Reduction Target
2021-2025	295 Mt CO_2eq	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2eq	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2eq	Reduction in emissions of 3.5% per annum for the third provisional budget.

CAP25 provides that the economy-wide carbon budgets will be supplemented by sectoral emissions ceilings, setting the maximum amount of GHG emissions that are permitted in a given sector of the economy during each five-year carbon budget. The Sectoral Emission Ceilings for each Sector are shown in **Table 9.2**. It should be noted that 5.25 $MtCO_2$eq of annual emissions reductions are currently unallocated on an economy-wide basis for the second carbon budget period (2026-2030). These will be allocated following a mid-term review and identification of additional abatement measures. The electricity sector emitted approximately 10.5 $MtCO_2$eq in 2018 and has a ceiling of 3 $MtCO_2$eq in 2030 which is a 75% reduction over this period.

Table 9.2 Sectoral Emission Ceiling 2030

Sector	Baseline ($MtCO_2$eq)	Carbon Budgets ($MtCO_2$eq)		2030 Emissions ($MtCO_2$eq)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25

Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, a new approach aligned with the EU LULCCF Regulation has been adopted.			
Total	**68**				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	**-**	**295**	**200**	**-**	**51**

CAP25 has outlined the path towards the electricity sectoral emission ceiling target of 3 Mtonnes of CO_2eq by 2030. The core measures are:

- Increasing the share of renewable electricity to 80%
- Indicative Onshore Wind Capacity of up to 9GW
- Indicative Offshore Wind Capacity of at least 5GW
- New Flexible Gas Plant of at least 2 GW
- Demand Side Flexibility – 20-30%
- Indicative Solar PV Capacity of 8GW

The Long-term Climate Action Strategy (DECC, 2024a) was published in 2023 [(27)] and updated in 2024 [(28)]. In relation to electricity the Government commits to the full decarbonisation of the electricity system by 2050. In relation to the EU ETS, the Long-term Climate Action Strategy states that "*A strong price signal, as part of a reformed EU ETS, including progressively more restrictive rules on how many allowances will be available within the EU ETS, is expected to drive decarbonisation over the coming decade by increasing the cost to firms in the EU ETS of doing nothing to reduce their emissions*" (DECC, 2024a). Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction 2024, outlines a range of policies and strategies to address GHG emissions. In relation to electricity the Government commits to the full decarbonisation of the electricity system by 2050 by means of a range of measures including flexibility, grid expansion and increase in renewable power capacity. In relation to waste, Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction 2024 report states:

"In 2018, waste accounted for 1.5% of Ireland's total greenhouse gas emissions –approximately 0.91 MtCO2eq. This figure accounts for emissions from waste treatment that are reported under the waste sector (predominantly methane emissions as a result of disposal to landfill). The gains in reducing material use, and substituting virgin material with recycled material, will be credited back up the supply chain. Minimising waste generation, and improving segregation, reuse and recycling, will lead to less emissions associated with waste transport and treatment." (P.72 (DECC, 2024a))

CAP25 (DECC, 2025) builds on CAP24 with further specific details on the actions required to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting Ireland on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021. There is more specific focus on the roadmap to align with the legally binding economy-wide carbon budgets and sectoral ceilings compared to previous climate action plans.

CAP25 in tandem with the Long-term Strategy on Greenhouse Gas Emissions Reductions will set the strategic direction for meeting Ireland's climate targets, with CAP25 assisting in delivering the required greenhouse gas emissions abatement to meet the climate targets.

In terms of the unallocated savings gaps first identified in CAP21, CAP25 has set out an approach to deal with these unallocated savings no later than 2025. The approach is focused on exploring emerging technologies where there is evidence of technical/commercial readiness and the deployment of carbon removal technologies.

In the Electricity Sector, CAP25 states that corrective actions to accelerate renewable electricity generation and grid flexibility, and manage electricity demand growth, were implemented in 2023. The "*Future Framework for Offshore Renewable Energy Policy Statement* "(DECC, 2024b) [(29)] was published in May 2024 and sets out key actions to deliver a potential 20 GW of offshore wind capacity by 2040 and a potential 37GW by 2050.

CAP25 also includes targeted actions to decarbonise industrial heat and support the transition to carbon-neutral manufacturing processes. Public sector leadership is strengthened through a new "*Buying Greener: Green Public Procurement Strategy and Action Plan (2024–2027)*" (DECC, 2024c) [(30)], the development of mandatory Climate Action Roadmaps, and enhanced emissions monitoring and reporting across government operations. The government has reinforced the public sector's responsibility to lead by example, particularly through climate-proofing operations and sustainable procurement initiatives. To support innovation and ensure future economic resilience, IDA Ireland continues to attract and support businesses investing in climate technologies and low-carbon solutions.

CAP25 also reinforces targets first outlined in CAP24 to reduce the embodied carbon of construction materials, with a 10% reduction by 2025 and 30% reduction by 2030 for materials produced and used in Ireland. Cement and high embodied carbon construction materials can be reduced through product substitution, reduced clinker content in cement and uptake of low-carbon construction methods, including those outlined in the Construction Industry Federation 2021 report "*Modern Methods of Construction*" (Construction Industry Federation, 2021) [(31)].

Furthermore, CAP25 advances sector-specific measures in green procurement, electrification of transport and heat, and just transition (with the introduction of a Just Transition Commission) to support vulnerable communities and ensure equitable decarbonisation. While transport emissions increased by 0.3%, electric vehicles and the expanded use of biofuels are highlighted as the most effective short- to medium-term strategies for emissions reductions in the sector.

In summary, the CAP25 envisages that in tandem with the Long-term Strategy on Greenhouse Gas Emissions Reductions, and on the basis that carbon budgets and sectoral emission ceilings will assist with delivering the required greenhouse gas emissions abatement, the 2030 and 2050 climate targets are achievable.

9.2.2 Construction Phase Methodology

The effect of the traffic associated with the construction phase of the proposed development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities associated with the proposed development. The traffic associated with the construction phase of the proposed development was investigated using the methodology outlined in the TII publication *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022b) [(32)]. As outlined in **Section 9.5.1**, the traffic associated with the construction phase of the proposed development will be below the assessment criteria.

Embodied carbon associated with the raw materials which are manufactured in Ireland and used in the construction of the proposed development buildings including cement and steel will lead to indirect GHG emissions at the point of manufacture. However, when assessed over the 25-years of Proposed Development's lifespan, embodied carbon emissions will not be significant relative to the operational phase of the Proposed Development. In addition, GHG emissions will occur for alternatives such as landfill construction or the construction of a combined-cycle gas turbine (CCGT) (or other energy sources). Therefore, the emissions from the embodied carbon associated with construction have not been considered in detail in this assessment.

9.2.3 Operational Phase Methodology

9.2.4 Greenhouse Gas Assessment (GHGA)

The greenhouse gas assessment of the proposed development is based on the operational emissions of greenhouse gases from the treatment of waste in addition to the offset of greenhouse gases due to the generation of electricity for export to the national grid as a result of the treatment process. In addition, account has been taken of the displacement of waste which would be landfilled in the absence of a waste-to-energy facility.

Predictions of greenhouse gas emissions from the proposed development were prepared using the emission factors derived from the European Commission [33], UK DEFRA [34,35], IPCC [36], using the latest national waste statistics from the EPA[37,38] and from information supplied by Indaver.

The waste-to-energy process would be expected to be the dominant source of CO_2 and N_2O emissions from the proposed development. Detailed waste throughput information was obtained from Indaver and this information was used to estimate Greenhouse Gas (GHG) emissions.

To calculate the proposed development's net contribution to greenhouse gas emissions and the effect of the proposed development on Ireland's obligations under the EU 2030 strategy on climate change [39], the total forecasted anthropogenic ('man-made') emissions due to the proposed development have been calculated. During the incineration of waste at the proposed development, the thermal energy generated will be recovered and converted into electrical output. The electrical energy generated (21 MW_e), minus the plants electrical demand (2.5 MW_e), will be available to the National Grid.

The renewable energy when exported to the National Grid will be used to displace energy currently generated via fossil fuels. In 2023, the primary energy mix within the national generation system was gas (44.3%), renewables (40.7%), imports (9.5%), coal (3.5%), biomass and waste (2%), peat (0.4%) and fuel oil (0.7%) [8]. The energy mix represents the relative contribution of different types of fuels or means of electricity generation supplying the national electricity distribution system.

Ireland has made good progress towards meeting renewable electricity targets. In 2023 the use of renewables in electricity generation avoided 7.15 $MtCO_2eq$. The profile of fuel type by 2030 will be significantly different from the current one due to greater penetration of renewable fuels. In order to calculate the emissions displacement, an average grid intensity of 0.135 tonnes CO_2 / MWh has been used for 2030 which is more conservative than the 2024 value of 0.226 tonnes CO_2 / MWh [40].

The effect of the operational phase of the proposed development on climate was determined by quantifying the operational emissions of greenhouse gases from the treatment of waste in addition to the offset of greenhouse gases due to the generation of electricity for export to the national grid as a result of the treatment process. In addition, account has been taken of the displacement of waste which would be landfilled in the absence of a waste-to-energy facility. The details and results of the assessment are provided in **Section 9.5.1.2**.

9.2.4.1 IPCC Guidelines For National GHG Inventories

The Intergovernmental Panel on Climate Change (IPCC) has outlined detailed guidelines on compiling national GHG inventories. The guidelines are designed to estimate and report on national inventories of anthropogenic GHG emissions and removals to ensure compliance with the Kyoto Protocol. Anthropogenic refers to GHG emissions and removals that are a direct result of human activities or are a result of natural processes that have been affected by human activities [36]. The quantity of carbon from natural cycles through the earth's atmosphere, waters, soils and biota is much greater than the quantity added by anthropogenic GHG sources. However, the focus of the UNFCCC and the IPCC is on anthropogenic emissions because these emissions have the potential to alter the climate by disrupting the natural balances in carbon's biogeochemical cycle, and by altering the atmosphere's heat-trapping ability. The carbon from biogenic sources such as paper waste and food waste were originally removed from the atmosphere by photosynthesis, and under natural conditions, it would eventually cycle back to the atmosphere as CO_2 due to degradation processes. Thus, these sources of carbon are not considered anthropogenic sources and do not contribute to emission totals considered in the EU 2030 Strategy [36].

In relation to solid waste disposal sites (SWDSs) including municipal waste landfills, detailed guidelines have been published for the calculation of GHG emissions [36, 41]. The main GHG emission from SWDSs is methane (CH_4). Even though the source of carbon is primarily biogenic, CH_4 would not be emitted were it not for the human activity of landfilling waste, which creates anaerobic conditions conducive to CH_4 formation. Although CO_2 is also produced in substantial amounts from landfills, the primary source of CO_2 is from the decomposition of organic material derived from biomass sources (crops, forests) and which are re-grown on an annual basis. Hence, these CO_2 emissions are not treated as net emissions from waste in the IPCC Methodology [36].

Similarly, in relation to the proposed development, a large fraction of the carbon in waste combusted (paper, food waste) is derived from biomass raw materials which are replaced by re-growth on an annual basis. Thus, these emissions should not be considered as net anthropogenic CO_2 emissions in the IPCC Methodology [36]. On the other hand, some carbon in waste is in the form of plastics or other products based on fossil fuel. Combustion of these products, like fossil fuel combustion, releases net CO_2 emissions. Thus, in estimating emissions from waste for the Proposed Development, the desired approach is to separate carbon in the waste to be incinerated into biomass and fossil fuel-based fractions and thereafter to use only the fossil fuel fraction in calculating net carbon emissions [36, 41]. This approach follows the methodology outlined in the IPCC Guidelines For National GHG Inventories [36]. Other relevant gases released from combustion are net GHG emissions including CH_4 and N_2O.

9.2.4.2 Significance Criteria for GHGA

The Transport Infrastructure Ireland (TII) guidance document entitled "PE-ENV-01104 Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document" (TII, 2022) outlines a recommended approach for determining the significance of both the construction and operational phases of a development. This guidance document is now widely used to assessment the climatic effect of a wide range of projects including waste and industrial facilities. The approach is based on comparing the 'Do Something' scenario and the net project GHG emissions (i.e. Do Something – Do Minimum) to the relevant carbon budgets. With the publication of the Climate Action Act in 2021, sectoral carbon budgets have been published for comparison with the Net CO_2 project GHG emissions from the proposed development. The Waste Sector emitted approximately 0.9 $MtCO_2eq$ in 2018 and is projected to decrease to 0.7 $MtCO_2eq$ in 2030 with most emissions attributed to methane emissions from landfill. Electricity sector emitted approximately 10.5 $MtCO_2eq$ in 2018 and has a ceiling of 3 $MtCO_2eq$ in 2030 which is a 75% reduction over this period (see **Table 9.2**).

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022) is based on IEMA guidance note on "Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition" (IEMA, 2022) (IEMA, 2022) [42] which is broadly consistent with the terminology contained within Figure 3.4 of the EPA's (2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'. The (IEMA, 2022) states that:

"*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

Mitigation has taken a leading role within the Guidance compared to the previous edition published in 2017 (IEMA, 2017) [43]. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings. The assessment aims to quantify the difference in GHG emissions between the proposed development and the baseline scenario (the alternative project/solution in place of the proposed project). This is done by calculating the difference in whole life net GHG emissions between the two options. The IEMA EIA guidance (IEMA, 2022) does not recommend a particular approach for this due to variations of situations but instead it sets out advice for the key common components necessary for undertaking a GHG emissions assessment. During the assessment IEMA recommend use of a reasonable worst-case scenario rather than an absolute worst-case scenario. The IEMA Guidance (IEMA, 2022) states that a GHG emissions assessment should incorporate the following steps into any climate assessment:

1. Set the scope and boundaries of the GHG assessment
2. Develop the baseline

3. Decide upon the emissions calculation methodologies
4. Data collection
5. Calculate/determine the GHG emissions inventory; and
6. Consider mitigation opportunities and repeat steps 4 & 5

Activities that do not significantly change the result of the assessment can be excluded where expected emissions are less than 1% of total emissions, and where all such exclusions should be clearly stated and total a maximum of 5% of total emissions.

When considering the cumulative assessment, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed (IEMA, 2022). This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other. The following section details the specific appraisal methods utilised in order to complete the assessment in accordance with the IEMA Guidance (IEMA, 2022).

When assessing significance, the *2010 IEMA Principles Series on Climate Change Mitigation & EIA* (IEMA, 2010) [(44)] defines three overarching principles:

- The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect
- The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g. human health, biodiversity, water, land use, air quality); and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit; as such any GHG emissions or reductions from a project might be considered to be significant. The environmental limit is the national global GHG emission budget that defines a level of dangerous climate change, and any GHG emission that contributes to exceedance of that budget or threatens efforts to stay within it can be considered as significant

The 2022 Guidance (IEMA, 2022) document builds on those principles with three points:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. In relation to climate, the earth as a whole is a highly sensitive environment whilst the magnitude of impact is outlined below with the proposed development being assessed against the recommended IEMA (IEMA, 2022) significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered.

- Major or moderate adverse impact (significant): A project that follows a '*business-as-usual*' or '*do minimum'* approach and is not compatible with the net zero[2] trajectory by 2050 or sectoral based transition to net zero targets, results in a significant adverse effect.

  It is down to the consultant completing the assessment to differentiate between the '*level*' of significant

[2] Net Zero: "When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period." Net zero is achieved where emissions are first reduced in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

adverse effects e.g. '*moderate*' or '*major*' adverse effects. A project's impact can shift from significant adverse to nonsignificant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero. Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect. This is particularly true where policy lags behind the necessary levels of GHG emission reductions for a science based 1.5°C compatible trajectory towards net zero.

- Minor adverse impact (not significant): A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and '*good practice*' reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A '*minor adverse*' or '*negligible*' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral[3] (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A '*minor adverse*' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.
- Negligible Impact (not significant): A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant.
- Beneficial Impact (significant): A project that causes GHG emissions to be avoided or removed from the atmosphere has a beneficial effect that is significant. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.

TII (TII, 2022) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG effects. Significance is determined using the criteria outlined in **Table 9.3** (derived from Table 6.7 of PE-ENV-01104 (TII 2022)) along with consideration of the following two factors:

- the extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050
- and the level of mitigation taking place

[3] Carbon Neutral: "When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period irrespective of the time period or magnitude of offsets required."

Table 9.3 GHGA Significance Criteria IEMA (2022) (EPA (2022) Description of Effects in Brackets)

Effects	Significance level Description	Description
Significant adverse	Major adverse (Very Significant / Significant)	• The project's GHG impacts are not mitigated • The project has not complied with do-minimum standards set through regulation, nor provided reductions required by local or national policies; and • No meaningful absolute contribution to Ireland's trajectory towards net zero[4].
	Moderate adverse (Moderate)	• The project's GHG impacts are partially mitigated • The project has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and • Falls short of full contribution to Ireland's trajectory towards net zero
Not significant	Minor adverse (Slight)	• The project's GHG impacts are mitigated through 'good practice' measures • The project has complied with existing and emerging policy requirements; and • Fully in line to achieve Ireland's trajectory towards net zero
	Negligible (Not Significant / Imperceptible)	• The project's GHG impacts are mitigated beyond design standards • The project has gone well beyond existing and emerging policy requirements; and • Well 'ahead of the curve' for Ireland's trajectory towards net zero
Beneficial	Beneficial	• The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration • The project has gone well beyond existing and emerging policy requirements; and • Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact

9.2.5 Climate Change Risk Assessment (CCRA)

The operational phase assessment involves determining the vulnerability of the proposed development to climate change. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability. PE-ENV-01104 (TII, 2022) states that the CCRA is guided by the principles set out in the overarching best practice guidance documents:

- EU (2021a) Technical guidance on the climate proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021) (45); and
- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (IEMA, 2020) (46)

The baseline environment information provided in **Section 9.3** on future climate change modelling and input from other experts working on the proposed development (i.e. hydrologists) should be used in order to assess the likelihood of a climate risk.

First an initial screening CCRA based on the operational phase is carried out, according to the TII guidance PE-ENV-01104. This is carried out by determining the sensitivity of proposed development assets (i.e. receptors) and their exposure to climate change hazards.

The project asset categories must be assigned a level of sensitivity to climate hazards. PE-ENV-01104 (TII, 2022) provides the below list of asset categories and climate hazards to be considered. The asset categories will vary for project type and need to be determined on a project-by-project basis.

- **Asset categories** - Pavements; drainage; structures; utilities; landscaping; signs; light posts; buildings; and fences
- **Climate hazards** - Flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning and hail; landslides; fog

[4] Net Zero: "When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period." Net zero is achieved where emissions are first educed in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

The sensitivity is based on a High, Medium or Low rating with a score of 1 to 3 assigned as per the criteria below.

- **High sensitivity:** The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3
- **Medium sensitivity:** It is possible or likely the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2
- **Low sensitivity:** It is possible the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1

Once the sensitivities have been identified the exposure analysis is undertaken. The exposure analysis involves determining the level of exposure of each climate hazard at the project location irrespective of the project type for example: flooding could be a risk if the project location is next to a river in a floodplain. Exposure is assigned a level of High, Medium or Low as per the below criteria.

- **High exposure:** It is almost certain or likely this climate hazard will occur at the proposed development location i.e. might arise once to several times per year. This is an exposure score of 3
- **Medium exposure:** It is possible this climate hazard will occur at the proposed development location i.e. might arise a number of times in a decade. This is an exposure score of 2
- **Low exposure:** It is unlikely or rare this climate hazard will occur at the proposed development location i.e. might arise a number of times in a generation or in a lifetime. This is an exposure score of 1

Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability.

9.2.5.1 Significance Criteria for CCRA

The CCRA involves an initial screening assessment to determine the vulnerability of the proposed development to various climate hazards. The vulnerability is determined by combining the sensitivity and the exposure of the proposed development to various climate hazards.

$$Vulnerability = Sensitivity \times Exposure$$

The vulnerability assessment takes any proposed mitigation into account. **Table 9.4** details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale.

TII guidance (TII, 2022a) and the EU technical guidance (EC, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. The effect from climate change on the proposed development can therefore considered to be not significant.

Where residual medium or high vulnerabilities exist, the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks.

Table 9.4 Vulnerability Matrix

		Exposure		
		High (3)	**Medium (2)**	**Low (1)**
Sensitivity	**High (3)**	9 - High	6 – High	3 - Medium
	Medium (2)	6 - High	4 - Medium	2 - Low
	Low (1)	3 - Medium	2 – Low	1 - Low

9.3 Baseline Environment

Climate is defined by the IPCC in the AR6 Synthesis Report: Climate Change 2021 (IPCC, 2023) [47] as the average weather over a period of time, whilst climate change is a significant change to the average weather. Climate change is a natural phenomenon but in the industrial age human activities, through the release of GHGs, have impacted on the climate. The release of anthropogenic GHGs is altering the Earth's atmosphere resulting in a '*Greenhouse Effect*'. This effect is causing an increase in the atmosphere's heat trapping abilities resulting in increased average global temperatures over the past number of decades. The release of CO_2 as a result of burning fossil fuels, has been one of the leading factors in the increase of the '*Greenhouse Effect*'. The most significant GHGs are CO_2, methane (CH_4) and nitrous oxide (N_2O).

For the purposes of this assessment, the definition outlined in Council Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (hereafter referred to as the Renewable Energy Directive) for GHGs has been used. In Annex V, C. Methodology Point 5 of the Renewable Energy Directive the relevant GHGs are defined as CO_2, CH_4 and N_2O. CO_2 accounted for 61.1% of total GHG emissions in Ireland in 2023 while CH_4 and N_2O accounted for 28.9% and 8.8% respectively. The main source of CH_4 and N_2O is from the agricultural sector. Perfluorocarbons are not relevant in the context of the Renewable Energy Directive as they are not emitted in significant quantities by energy sources.

GHGs have different efficiencies in retaining solar energy in the atmosphere and different lifetimes in the atmosphere. In order to compare different GHGs, emissions are calculated on the basis of their Global Warming Potential (GWPs) over a 100-year period, giving a measure of their relative heating effect in the atmosphere. The IPCC AR6 Synthesis Report: Climate Change 2021 (IPCC, 2023) sets out the global warming potential for a 100-year time period (GWP100) for CO_2 as the basic unit (GWP = 1) whereas CH_4 has a global warming potential equivalent to 29.8 units of CO_2 (for fossil sources) and N_2O has a GWP100 of 273. These values have been refined since the AR5 report.

9.3.1 Greenhouse Gas Emissions

TII guidance PE-ENV-01104 (TII, 2022) states that a baseline climate scenario should identify, consistent with the study area for the project, GHG emissions without the project for both the current and future baseline (i.e. Do Minimum scenarios).

Given the circumstances of Ireland's declaration of a climate and biodiversity emergency in May 2019 and the November 2019 European Parliament approval of a resolution declaring a climate and environment emergency in Europe, in conjunction with Ireland's current failure to meet its EU binding targets under the GHG Regulation, changes in GHG emissions either beneficially or adversely are of more significance than previously viewed prior to these declarations. Thus, the baseline climatic environment should be considered a highly sensitive environment for the assessment of effects.

9.3.1.1 Existing GHG Emissions Baseline

Anthropogenic emissions of greenhouse gases (GHGs) in Ireland included in the European Union's Effort Sharing Regulation (ESR) (EU 2018/842) are outlined in the most recent review by the EPA which details emissions up to 2024 (EPA, 2025a). The greenhouse gas emission inventory for 2024 is the fourth of ten years over which compliance with targets set in the ESR will be assessed. This Regulation sets 2030 targets for emissions outside of the Emissions Trading System (known as ESR emissions) and annual binding national limits for the period 2021-2030. Ireland's target is to reduce ESR emissions by 42% by 2030 compared with 2005 levels, with a number of flexibilities available to assist in achieving this. Ireland's 2024 GHG ESR emissions are 42.42 Mt CO_2eq, this is 3.74 Mt CO_2eq more than the annual limit for 2024 (EPA, 2025a). Agriculture continues to be the largest contributor to overall emissions at 38% of the total. Transport, energy industries and the residential sector are the next largest contributors, at 21.7%, 13.3% and 10.4%, respectively. Others (including waste) accounts for 1.63 Mt CO_2eq.

National total emissions (including LULUCF) for 2024 are 57.64 Mt CO_2eq (see **Table 9.5**), thus 2021 to 2024 have used 82.5% of the 295 Mt CO_2eq Carbon Budget for the five-year period 2021-2025. This leaves 17.5% of the budget available for 2025, requiring an 10.3% average annual emissions reduction in 2025 to stay within budget.

Table 9.5 Trends in National GHG Emissions in 2021 – 2024

Sector Note 1	2021 Emissions (Mt CO_2e)	2022 Emissions (Mt CO_2e)	2023 Emissions (Mt CO_2e)	2024 Emissions (Mt CO_2e)	Total Budget (Mt CO_2e) (2021-2025)	% Budget 2021-2025 used	Annual change 2023 to 2024
Electricity	9.89	9.69	7.57	6.95	40	85.25%	-8.19%
Transport	11.09	11.76	11.8	11.65	54	85.74%	-1.27%
Buildings (Residential)	6.87	5.75	5.35	5.61	29	81.31%	4.86%
Buildings (Commercial and Public)	1.44	1.45	1.39	1.49	7	82.43%	7.19%
Industry	7.09	6.62	6.31	6.01	30	86.77%	-4.75%
Agriculture	21.94	21.78	20.72	20.41	106	80.05%	-1.50%
Other Note 2	1.86	1.93	1.81	1.63	9	80.33%	-9.94%
LULUCF	4.63	3.98	3.89	3.89	–	–	0
Total including LULUCF	**64.82**	**62.99**	**58.83**	**57.64**	**295**	**82.81%**	**-2.04%**

Note 1 Reproduced from latest emissions data on the EPA website July 2025 (EPA, 2025a).

Note 2 Other includes Petroleum refining, F-Gases and Waste (emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste).

9.3.1.2 Future GHG Baseline

The EPA 2025 GHG Emissions Projections Report for 2024 – 2055 (EPA, 2025b) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the latest Government plans (such as CAP24/CAP25) which have a realistic pathway in place for implementation. Implementation of these is classed as a "*With Additional Measures"* scenario for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. However, over the period 2018 to 2030 Ireland is projected to reduce emissions by 22% (and 26% using available flexible mechanisms[5]) which is less than the 42% reduction target under the EU's Effort Sharing Regulations (Regulation (EU) 2018/842) 2030 targets for the "*With Additional Measures*" scenario.

[5] Ireland is projected to exceed its National and EU climate targets | Environmental Protection Agency

"These flexibilities are the use of EU Emissions Trading System allowances and credit from action undertaken in the Land use, Land use Change and Forestry (LULUCF) sector. Flexibilities under the Effort Sharing Regulation include the allowance by eligible Member States to achieve their national targets by covering some emissions with EU ETS allowances which would normally have been auctioned. EU-wide, this cannot be more than a combined total of 100 million tonnes CO_2 over the period 2021-2030. The ETS flexibility allows Ireland to transfer emissions of up to 4 per cent of 2005 levels per annum, or 19.1 Mt CO_2eq from the non-ETS to ETS sector, reducing the mitigation requirement in the non-ETS sector while cancelling the corresponding ETS allowances. Also, to stimulate additional action in the land use, land-use change and forestry (LULUCF) sector, Member States can use up to a combined (EU-wide) total of 262 million credits over the entire period 2021-2030 to comply with their national targets. The LULUCF flexibility allows for Ireland to account for greenhouse gas removals of up to 26.8 Mt CO_2eq over two compliance periods 2021-2025 and 2026-2030."

9.3.2 Vulnerability of the Project to Climate Change

The proposed development study area for assessing a project's vulnerability to climate change should be based on the construction footprint / project boundary as this is where the proposed development will be located. Effects as a result of climate change involve increases in global temperatures and increases in the number of rainfall days per year. Ireland has seen increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east (EPA, 2015) [48]. The EPA have compiled a list of potential adverse effects as a result of climate change including the following which may be of relevance to the proposed development:

- More intense storms and rainfall events
- Increased likelihood and magnitude of river and coastal flooding
- Water shortages in summer in the east
- Adverse effects on water quality; and
- Changes in distribution of plant and animal species

The region of the proposed development has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Cork Airport is the nearest weather and climate monitoring station to the proposed development that has meteorological data recorded for the 30-year period from 1991 to 2020 (this is the most recent data available). Cork Airport meteorological station is located approximately 12 km west of the proposed development at the closest point. Meteorological data recorded at Cork Airport over the 30-year period from 1991 to 2020 (see **Table 9.6**) indicates that the wettest month was December, and the driest month on average was May. July was the warmest month with a mean temperature of 15.2 Celsius. January was the coldest month with a mean temperature of 5.7 Celsius.

Table 9.6 30-Year Historical Weather Data for Cork Airport 1991 to 2020 (Met Éireann 2023)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature (degrees celsius)													
mean daily max	8.2	8.5	9.8	12	14.6	17	18.6	18.4	16.5	13.3	10.3	8.7	13
mean daily min	3.2	3.2	3.9	5.3	7.6	10.1	11.7	11.6	10.2	8	5.3	3.8	7
mean temperature	5.7	5.8	6.8	8.6	11.1	13.6	15.2	15	13.4	10.6	7.8	6.2	10
absolute max.	16.1	14.5	18.8	21.1	23.6	27.2	26.7	27.8	24.5	21.1	15.9	13.9	27.8
min. maximum	-0.3	-1.9	-1.3	4.1	8.5	10.5	12.6	13.8	10.2	6	0.6	-3.1	-3.1
max. minimum	10.5	10.6	10.8	11.3	14.4	16.6	17.5	18	17	15.5	13	11.5	18
absolute min.	-5.6	-4.7	-7	-2.4	0.1	4.1	6.2	5.4	3	-1	-3.3	-7.2	-7.2
mean num. of days with air frost	3.8	3.5	2.3	0.9	0	0	0	0	0	0.2	1	2.8	14.5
mean num. of days with ground frost	12.7	11.8	10.7	6.8	2.4	0.2	0	0.1	0.5	2.4	6.8	11.2	65.6
Relative Humidity (%)													
mean at 0900UTC	91.1	90.5	88.3	83.3	81.3	80.9	83.5	86.1	89.1	90.7	91.4	91.3	87.3
mean at 1500UTC	84.4	79.9	75.8	72.3	71.7	71.5	73.7	73.6	76.3	80.4	83.9	86.5	77.5
Sunshine (Hours)													
mean daily duration	2	2.6	3.6	5.4	6.2	6.1	5.3	5.1	4.3	3.2	2.5	1.8	4
greatest daily duration	8.5	10	11.5	13.8	15.5	16	15.3	14.4	12.1	10.3	8.8	7.6	16
mean num. of days with no sun	9.8	6.7	5.7	3.1	2.4	2.3	2.2	2.4	3.4	6.5	7.8	11.4	63.7
Rainfall (mm)													
mean monthly total	131.3	97.2	91.5	86.5	80.8	83.3	87.2	94.6	92	131.2	127	136.6	1239
greatest daily total	39.3	39	55.2	37.7	34.9	51.3	73.2	59	58.9	52.1	47.9	61.4	73.2

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mean num. of days with >= 0.2mm	21.3	18.4	18.3	16.8	15.9	14.6	16.9	16.9	17	19.9	20.8	21.4	218.2
mean num. of days with >= 0.1mm	16.7	13.7	13.4	12.3	12	10.1	11.9	12.2	11.9	15.1	15.6	16.8	161.7
mean num. of days with >= 5.0mm	9.1	6.8	5.7	5.8	5.3	5.6	5.7	5.5	5.8	7.8	7.9	8.7	79.7
Wind (knots)													
mean monthly speed	10.9	11	10.5	9.8	9.4	8.9	8.5	8.5	8.8	9.7	10.2	10.8	9.8
max. gust	71	70	65	63	53	49	47	58	51	74	66	80	80
max. mean 10-minute speed	44	50	42	41	34	33	29	45	35	47	46	56	56
mean num. of days with gales	3.1	2.2	1.7	0.6	0.4	0.1	0.1	0.2	0.7	1.2	1.7	2.5	14.6
Weather (mean no. of days with)													
snow or sleet	2.6	2.5	1.7	0.4	0	0	0	0	0	0	0.3	1.9	9.5
snow lying at 0900UTC	0.3	0.4	0.5	0.1	0	0	0	0	0	0	0	0.4	1.8
hail	1	1.1	1.2	1.5	0.5	0.2	0.1	0	0.1	0.3	0.1	0.4	6.5
thunder	0.3	0.1	0	0.1	0.6	0.4	0.6	0.4	0	0.4	0.1	0.1	3.2
fog	8.6	7.2	8.5	7.8	8	7.3	8.5	9.2	8.3	8.5	7.5	8.5	97.8

The recent weather patterns and extreme weather events recorded by Met Éireann have been analysed to determine the potential for extreme weather impacting on the proposed development (Met Éireann, 2025a) [(49)]. A noticeable feature of the recent weather has been an increase in the frequency and severity of storms with notable events including Storm Darwin in February 2014, Storm Ellen in August 2020, Storm Barra in December 2021 and Storm Eunice in February 2022. The maximum wind gust for Cork Airport for Storm Barra peaked at 119 km/hr with a 10-minute speed of 72 km/hr.

Met Éireann's 2024 Climate Statement (Met Éireann, 2025a) states 2024's average shaded air temperature in Ireland is provisionally 10.72°C, which is 1.17°C above the 1961-1990 long-term average. 2023 was the warmest year on record; however, at 0.49°C warmer than 2024 (see **Figure 9.1** in **Volume 3** ***Figures***).

Recent weather patterns and records of extreme weather events recorded by Met Éireann have been reviewed. Met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters. This temperature change means the likelihood of extreme weather events occurring has increased. This will result in longer dry periods and heavy rainfall events. Storm surges and coastal flooding due to sea level rise. Compound events, where coastal surges and extreme rainfall events occur simultaneously will also increase. Met Éireann has high confidence in maximum rainfall rates increasing but not in how the frequency or intensity of storms will change with climate change.

The most recent future climate predictions undertaken by Met Éireann have been published in '*Ireland's Climate: the road ahead'* (Met Eireann, 2013) [(50)] based on four scenarios (RCP2.6, RCP4.5, RCP6.0 and RCP8.5) which is named with reference to a range of radiative forcing values for the year 2100 (i.e. 2.6, 4.5, 6.0 and 8.5 W/m^2 (watts per square metre)) respectively with focus on RCP4.5 (medium-low) and RCP8.5 (high) scenarios. In terms of mean temperatures, it is predicted that increases of between 1°C to 3°C will occur under RCP4.5 rising to 2°C to 4°C under RCP8.5. Warm extremes are expected to rise by 2°C to 3°C (RCP4.5) but by up to 5°C under RCP8.5.

The EPA sponsored Report No.159 '*Ensemble of regional climate model projections for Ireland'* (EPA, 2015) which has projected significant decreases in mean annual, spring and summer precipitation amounts with extended dry periods. The decreases are largest for summer, with reductions ranging from 0% to 13% and from 3% to 20% for the medium-to-low and high emission scenarios, respectively. Conversely increases of heavy precipitation of up to 20% are projected to occur during the winter and autumn months. The number of extended dry periods is projected to increase substantially by mid-century during autumn and summer.

In relation to storms, '*Report No.159 – Ensemble of regional climate model projections for Ireland*' (EPA, 2015) indicates that the overall number of North Atlantic cyclones is projected to decrease by 10% coinciding with a decrease in average mean sea-level pressure of 1.5 hectopascals (hPa) for all seasons by mid-century. Wind energy is also predicted to decrease for spring, summer and autumn with a projected increase in winter.

EPA's *State of the Irish Environment Report 2024 (Chapter 4: Climate Change)* (EPA, 2024) [(51)] notes that projections show that full implementation of additional policies and measures, outlined in the 2025 Climate Action Plan, will result in a reduction in Ireland's total GHG emissions by up to 29 per cent by 2030 compared with 2018 levels. Climate change is not only a future issue in Ireland, as a warming of approximately 0.8°C since 1900 has already occurred. The report (EPA, 2024) underlines that the next decade needs to be one of major developments and advances in relation to Ireland's response to climate change in order to achieve these targets and that Ireland must accelerate the rate at which it implements GHG emission reductions. The report states that mid-century mean annual temperatures in Ireland are projected to increase by between 1.5°C – 2.0°C. In addition, Ireland needs to be invested in adaptation that can protect Ireland from future climatic effects.

Future climate predictions undertaken by the EPA have been published in '*Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach*' (EPA, 2020) [(52)]. The future climate was simulated under both Representative Concentration Pathway 4.5 (RCP4.5) (medium-low) and RCP8.5 (high) scenarios. This study indicates that by the middle of this century (2041–2060). Mid-century mean annual temperatures are projected to increase by 1 to 1.2°C and 1.3 to 1.6°C for the RCP4.5 and RCP8.5 scenarios, respectively, with the largest increases in the east. Warming will be enhanced at the extremes (i.e. hot days and cold nights), with summer daytime and winter night-time temperatures projected to increase by 1 to 2.4°C. There will be a substantial decrease of approximately 50% which is projected for the number of frost and ice days.

Summer heatwave events are expected to occur more frequently, with the largest increases in the south. In addition, precipitation is expected to become more variable, with substantial projected increases in the occurrence of both dry periods and heavy precipitation events. Climate change also has the potential to affect future energy supply which will rely on renewables such as wind and hydroelectric. Wind turbines need a specific range of wind speeds to operate within and droughts or low ground water levels may effect hydroelectric energy generating sites. More frequent storms have the potential to damage the communication networks requiring additional investment to create resilience within the network.

Thus, in summary, the recent research into the changing climate as outlined above shows that the proposed development will need to incorporate into its design the likely future increases in weather variability including increased frequency and intensity of storms and high winds, increased temperatures in summer, the potential for heat waves and flooding from heavy precipitation events.

The research project TRANSLATE (Met Éireann, 2025b) [53] has been led by climate researchers from University of Galway – Irish Centre for High End Computing (ICHEC), and University College Cork – SFI Research Centre for Energy, Climate and Marine (MaREI), supported by Met Éireann climatologists. TRANSLATE's outputs are produced using a selection of internationally reviewed and accepted models from both CORDEX and CMIP5. Representative Concentration Pathways (RCPs) provide a broad range of possible futures based on assumptions of human activity. The modelled scenarios include for "least" (RCP2.6), "more" (RCP4.5) or "most" (RCP8.5) climate change, as shown in **Figure 9.2** in **Volume 3** ***Figures***.

The research project TRANSLATE (Met Éireann, 2025b) provides the first standardised and bias-corrected national climate projections for Ireland to aid climate risk decision making across multiple sectors (for example, transport, energy, water), by providing information on how Ireland's climate could change as global temperatures increase to 1.5˚C, 2˚C, 2.5˚C, 3˚C or 4˚C. Projections broadly agree with previous projections for Ireland. Ireland climate is dominated by the Atlantic Meridional Overturning Circulation (AMOC), a large system of ocean currents – including the Gulf Stream – characterised by a northward flow of warm water and a southward flow of cold water. Due to the AMOC, Ireland does not suffer from the extremes of temperature experienced by other countries at a similar latitude. Recent studies have projected that the AMOC could decline by 30% - 40% by 2100, resulting in cooler North Atlantic sea surface temperatures (SST) (Met Éireann, 2025a). Met Éireann projects that Ireland is nevertheless projected to continue to warm, although the influence of this cool influence may lead to reduced warming compared with continental Europe. AMOC weakening is expected to lead to additional sea level rise around Ireland. With climate change Ireland's temperature and rainfall will undergo more significant changes, for example on average summer temperature could increase by more than 2°C, summer rainfall could decrease by 9% while winter rainfall could increase by 24% as shown in **Figure 9.3** in **Volume 3** ***Figures***. Future projects also include a 10-fold increase in the frequency of summer nights (values >15°C) by the end of the century, a decrease in the frequency of cold winter nights and an increase in the number of heatwaves. A heatwave in Ireland is defined as a period of five consecutive days where the daily maximum temperature is greater than 25°C.

9.4 Characteristics of the Proposed Development

9.4.1 Construction Phase

There is the potential for a number of emissions to atmosphere during the construction of the proposed development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. However, given the modest number of vehicles during the construction phase of the proposed development (peaking at 96 HGVs/day), greenhouse gas emissions during the construction phase will not be significant in the context of Ireland's total GHG emissions.

The proposed development will comprise principally of a waste-to-energy facility (waste incinerator) for the treatment of up to 240,000 tonnes per annum of residual household, commercial and industrial non-hazardous and hazardous waste and the recovery of energy. Of the 240,000 tonnes of waste, up to 24,000 tonnes per annum of suitable hazardous waste will be treated at the proposed development. The proposed development will maximise the extraction and recovery of valuable material (in the form of ferrous and non-ferrous metals) and energy (in the form of 21 megawatts of electricity) resources from residual waste.

The key civil engineering works which will have a potential effect on climate during construction are summarised below:

- During construction, soil will be generated as part of the site preparation works and during excavation for installation of foundations, drainage services and ancillary infrastructure
- Embodied carbon associated with the raw materials used in the construction of the proposed development buildings including cement and steel will lead to indirect GHG emissions at the point of manufacture. However, when assessed over the 30-years of proposed development's lifespan, embodied carbon emissions will not be significant relative to the operational phase of the Proposed Development
- Following completion of the building shell, commissioning of the mechanical and electrical equipment is undertaken
- Infilling and landscaping will be undertaken. Spoil generated during site preparation will be re-used where possible
- Temporary storage of construction materials and fuels; and
- Construction traffic accessing the site will emit air pollutants and greenhouse gases during transport

A construction traffic management plan will be implemented by the appointed Contractor in advance of commencing the works on site. The mitigation measures which will be employed in regard to GHG emission are:

- All vehicles will be required to switch off engines when stationary (no idling)
- All vehicles will be serviced and maintained to ensure emissions are minimised
- Where practicable, building materials will be reused within the extent of the proposed development; and
- Where practicable, building materials will be sourced locally (within 20-25km) to reduce the embodied emissions associated with transport

The measures will be subject to refinement by the contractor prior to construction although the refinement will not affect the committed mitigation measures.

9.4.2 Operational Phase

The proposed waste-to-energy facility would be expected to be the dominant source of CO_2 and N_2O emissions. Waste throughput information was obtained from Indaver and this information has been used to estimate GHG emissions from the proposed development. The annual waste throughput for the proposed grate incinerator will vary but will not be greater than 240,000 tonnes consisting of residual household, commercial and industrial waste with up to 24,000 tonnes per annum of suitable hazardous waste also being treated at the facility. The net GHG contribution from the waste was derived using the procedure recommended by the European Commission [33], UK DEFRA [34, 35] and IPCC [36].

9.4.2.1 Road Traffic

Road traffic would be expected to be a source of GHG emissions as a result of the operation of the proposed development. Waste will be transported from the source of the waste to the proposed development site for disposal whilst the bottom ash and residues may subsequently be removed from the proposed development to be landfilled. If an ash recovery plant is constructed in Ireland, it would be the intention of Indaver to proactively identify potential uses for the bottom ash. If no market can be found for the bottom ash, it will be sent to a suitably licensed landfill site. Recyclable materials recovered by the proposed development will also be transported from the proposed development site. In the absence of the proposed development, this waste will also be collected and disposed of to landfill or exported for incineration in Europe.

The transport of waste, raw materials and wastes/recycling products from the proposed development has been calculated in **Section 9.5.1.2.** This has then been compared to the landfill associated transport CO_2eq in order to determine the net effect of transport related greenhouse gas emissions associated with the proposed development.

9.4.3 Climate Change Adaptation Measures

Annex IV, point 5(f) of the EIAR Directive (2014/52/EU) asks for

"A description of the likely significant effects of the project on the environment resulting from, inter alia:

(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; […]."

The EU EIAR guidance (EU, 2018) [54] defines climate change adaptation in Section 1.3.2 as

"*Climate change adaptation: this considers the vulnerability of the Project to future changes in the climate, and its capacity to adapt to the impacts of climate change, which may be uncertain."*

The proposed development has incorporated climate adaptation measures to address the effects associated with climate change, for example, the rise sea levels or more extreme weather events.

Flooding

During the preparation of the site-specific Flood Risk Assessment (**Appendix 13.4**) completed by Arup, a conservative site flood defence level was proposed for the site (4.55mOD) which factored in a 200-year tidal level, a 1.00m climate change allowance and the nature of the proposed development whereby flooding of the site may lead to negative effects on the environment. This study informed part of the design for the L2545 road upgrade and the proposed raising of the site ground levels.

Climate adaptation was incorporated into the three infrastructure areas of the proposed development which are discussed in more detail in the relevant sections:

- The effects of tidal flooding are addressed by raising of the site ground levels, as considered in **Appendix 13.4** ***Flood Risk Assessment*** of **Chapter 13**
- Flooding of the L2545 road is addressed by raising of the road level of the L2545 along the northern boundary, as considered in **Appendix 13.4** ***Flood Risk Assessment*** of **Chapter 13**; and
- The potential effects of sea level rise due to climate change are considered in **Appendix 13.3** ***Coastal Study*** in terms of coastal management measures for the coastal boundary

Coastal Recession

Sea Level Rise and climate change considerations have been taken into account in both numerical wave model and beach sediment transport assessments for the cliffs and coastal area of the proposed development site. The assessment of the predicted cliff retreat of the coastal boundary of the proposed development site has considered these and is based on the assessment of the measured cliff´s retreat from historical information, topographical surveys and site investigations.

Coastal protection mitigation measures are not required for the waste-to-energy facility element of the proposed development. However, coastal protection measures have been included in this planning application as a precautionary measure so as to reduce the rate of erosion of the glacial till face.

Indaver's coastal boundary will be monitored on an annual basis and the placement of approximately 1,150m^3 of shingle of appropriate size and shape (rounded) above the foreshore on Gobby beach along the eastern boundary of the Indaver site has been recommended. This will be a 'soft' solution which will potentially reduce erosion rates by limiting the exposure of the toe of the glacial till face to wave action.

The main aim of placing the material is to act as a proactive measure for the coastal area adjacent to the proposed development site only. It is proposed that the additional sacrificial material is placed during the construction period of the proposed development site. Thereafter, it is proposed that the placement of further additional sacrificial material is carried out if the cliff erosion rate is more than 0.5m per year measured over a period of six years, which would indicate some acceleration in the current erosion rate, or when the cliffs have retreated by approximately 3m, whichever is sooner. For this reason, the coastal boundary of the proposed development site will be monitored for erosion on an annual basis.

In addition to this and to mitigate the vulnerability of proposed development to coastal recession:

- 1. The likelihood of another slope instability caused by water infiltration into sand lenses will actually be reduced by the proposed development due to the provision of on-site surface water drainage and the resulting reduction in infiltration of surface water in the area surrounding the site.
- 2. The amenity walkway is designed so it will not be impacted by the predicted top of the cliff line in 30 years 'time.

9.5 Potential Effects

9.5.1 Greenhouse Gas Assessment (GHGA)

9.5.1.1 GHGA for the Construction Phase

Construction traffic would be expected to be a source of greenhouse gas emissions during this phase of the proposed development. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the proposed development. The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction'* (IAQM, 2024) states that site traffic and plant is unlikely to make a significant impact on climate.

As noted above, construction phase emissions due to traffic and plant are a small fraction of operational emissions and will last for a defined period only. TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022b), states that road links meeting one or more of the following criteria can be defined as being '*affected*' by a proposed development and should be included in the climate assessment.

- Annual average daily traffic (AADT) changes by 1,000 or more
- Heavy duty vehicle (HDV) AADT changes by 200 or more
- Daily average speed change by 10 kph or more
- Peak hour speed change by 20 kph or more
- A change in road alignment by 5 m or greater

While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic. The maximum daily traffic total along the existing N28, east of the Ferry Port, based on the M28 motorway not being in operation as a worst-case, will be 4,594 vehicles including 908 HGVs with no significant impact on traffic speeds expected. There is the potential for increased traffic volumes to effect climate. The change in traffic was reviewed against the PE-ENV-01104 screening criteria outlined above (TII, 2022a) and a detailed climate assessment of traffic emissions was conducted.

The predicted concentrations of CO_2 for the construction year of 2029 are detailed in **Table 9.7**. This is significantly less than the 2030 target set out under National legislation. It is predicted that in 2029, the construction phase of the proposed development will increase CO_2 emissions by no more than 0.0033% of the Transport Sectoral Emission Ceiling 2030 target.

Table 9.7 GHG Climate Impact Assessment Emissions – Construction Year 2029

Year	Scenario	CO_2eq (tonnes/annum)
2029	**Do Nothing**	3,173
	Do Something	4,435
Increment change in 2029		1,262
Transport Emission Ceiling (Tonnes) 2030		6,000,000
Impact in 2029 (%)		0.0033%

It is important to note that the potential effects associated with the construction phase of the proposed development are short-term in nature. When the mitigation measures detailed in the mitigation section (see **Section 9.6.1**) of this chapter are implemented, direct GHG emissions from the site will not be significant whilst the embodied carbon emissions associated with the construction of the proposed development will also not be significant.

As outlined above, the traffic associated with the construction phase of the proposed development will also be not significant. Thus, due to the duration and nature of the construction activities, CO_2 and N_2O emissions from construction vehicles and machinery will have a ***short-term***, ***not significant, negative*** effect on climate and thus have a ***not significant*** effect.

9.5.1.2 GHGA for the Operational Phase

The proposed development has the potential, in the absence of mitigation, to release GHG emissions during the operational phase. However, the assessment needs to consider the balance between the avoidance of emissions that would otherwise be produced in the generation of electricity from fossil fuel-based power stations that is displaced by electricity produced by the proposed development and the displaced emissions from landfilling of waste relative to direct emissions of greenhouse gases from the proposed development during the operational phase.

The methodology outlined in UK [34, 35] and EU [33] guidance documents in addition to the EPA publications [37,38] has been used to derive the actual breakdown of biogenic and anthropogenic waste based on a waste tonnage of 240,000 tonnes/annum and total CO_2 emission of 256,888 tonnes. The off sets due to electricity export and diversion from landfilling have also been taken into account below in **Table 9.8**. Emission factors for the generation of N_2O and CH_4 from the non-biomass fraction of municipal waste are taken from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table 9.8 Anthropogenic CO_{2eq} Emissions Due To The Incineration Of 240,000 tonnes Of MSW (Tonnes CO_{2eq})

	CO_2	$N2O$(2)	$CH4$(3)
Total / Annum (tonnes)(1)	123,563	2.3	17.2
Total / Annum (tonnes CO_2 Equivalent)(4)	123,563	624.5	511.3
Total (tonnes CO_2 Equivalent) / Annum	**124,699 Tonnes CO_{2eq}**		

1. Fossil fuel fraction based on weighted average of Poolbeg WTE and Carranstown WTE over the period 2000 – 2024 which equated to 48.1%.
2. N2O Emission Factor of 4 kg/TJ taken from Volume 2 Table 2.2 of IPCC Guidelines (2006)(36)
3. CH4 Emission Factor of 30 kg/TJ taken from Volume 2 Table 2.2 of IPCC Guidelines (2006)(36)
4. Conversion of N2O (273) and CH4 (29.8) to carbon equivalents taken from UNFCC 6th Assessment Report (2023).

During the incineration of waste at the proposed development, the thermal energy generated by the burning of 240,000 tonnes of waste will be recovered and will give a Station Gate / net electrical output from the plant for export to the national grid of approximately 18.5 MW (150,720 MWh based on 8,147 hours of operation). Approximately 1 MW of the electrical output generated will be used for the flue gas cleaning system. The European Commission in its "*Non-paper on The Background to of the Development of the Commission Proposal on the Distinction between Energy Recovery and Disposal of Waste in Municipal Incinerators*" [55] has stated that "*the use of electricity for the flue gas cleaning system should be considered as being made available to users – otherwise the threshold would have an inhibiting effect on strengthening the air polluting standards beyond the levels set by the Waste Incineration Directive*". Applying this principal, the net electrical output made available to users has been determined based on 240,000 tonnes of MSW. **Table 9.9** outlines the total CO_{2eq} emissions from the proposed development based on the net electrical output made available to users of 19.5MW and based on operating hours of 8,147 hours/annum giving a total net electrical output made available to users of 158.87 GWh.

Table 9.9 Anthropogenic CO_2 Emissions Due To The Incineration Of 240,000 tonnes Of MSW (Tonnes CO_{2eq} / MWh)

Ringaskiddy WTE Facility	CO_{2eq} Emissions
Total / Annum (tonnes)	124,699 tonnes
Net Power Generation (MW)	19.5 MW
Total CO_{2eq} Emissions Displaced From Electricity Note 1	55,603 tonnes
Total Net CO_{2eq} Emissions from Waste-to-Energy	**69,096 Tonnes CO_{2eq}**

Note 1 Based on a base load CCGT at a best-case current emission rate of 0.35 tonnes CO_2/MWh

The proposed development's primary function is as a waste treatment / recovery facility and in the absence of this facility the waste is likely to be landfilled at a municipal waste landfill facility. Therefore, the calculation of greenhouse gas emissions associated with this proposed development have been calculated in order to take account of the environmental effects of the landfill.

The IPCC Waste Model which was updated in 2019 (IPCC, 2019) with the latest spreadsheet version dated 2023 [56] and updated to take account of the latest information on landfill gas composition and landfill gas capture rate based on the UK DEFRA publication *"Review of Landfill Methane Emission Modelling" (DEFRA, 2014)* [57] was used to calculate methane emissions from landfilling.

The results from the IPCC Waste model are shown in **Table 9.10**. The model gives the emission rate (i.e. production rate – capture rate – oxidation rate = emission rate) in terms of mass (in tonnes/annum) for methane.

Table 9.10 Anthropogenic CO_{2eq} Emissions Due To The Landfilling Of 240,000 tonnes Of MSW (Tonnes CO_{2eq})

	CO_2	N_2O	CH_4
Total Emissions (tonnes CO_{2eq})[1,2] Over 25 Years	-	-	2,426,246
Greenhouse Gas Avoided Due To Gas Recovery and Power Generation (tonnes CO_{2eq})[3] Over 25 Years	132,000		
Total Net Emissions After Power Generation Over 25 Years	**2,294,246 Tonnes** CO_{2eq}		
Total Net Emissions After Power Generation Annualised	**91,770 Tonnes** CO_{2eq}		

1. Total over a period of 80 years: peak generation will occur after 25 years
2. Based on a methane: carbon dioxide ratio of 50:50, on an oxidation rate of 10% and a collection efficiency of 68% using IPCC Waste Model [56]
3. Base on the EU default value of 0.022 tonnes CO2eq avoided / tonne of MSW [33]

Table 9.10 highlights that on an annualised basis, the landfilling of 240,000 tonnes of residual waste results in the emission of 91,770 tonnes CO_{2eq} / annum. The avoidance of these emissions due to the operation of the proposed development has been credited to the facility in addition to the direct greenhouse gas emissions arising from the operation. **Table 9.11** summarises the results from combining the direct emissions from the proposed development and the indirect savings due to the diversion of 240,000 tonnes of waste from landfilling.

Table 9.11 Net Anthropogenic CO_{2eq} Emissions Due To The Incineration Of 240,000 Tonnes Of MSW Taking Into Account Diversion From Landfilling

Ringaskiddy Resource Recovery Centre	CO_{2eq} (Tonnes)
Total CO_{2eq} Emissions From Waste-to-Energy	124,699 tonnes
Total CO_{2eq} Emissions Displaced From Electricity	55,603 tonnes
Net CO_{2eq} Emissions After Power Generation From Waste-to-Energy	69,096 Tonnes
Net CO_{2eq} Emissions From Landfilling as outlined in **Table 9.10** Table 9.10	91,770 Tonnes CO_{2eq}
Total Net CO_{2eq} Direct Emissions Plus Indirect Savings Due To Diversion From Landfilling	**- 22,674 Tonnes CO_{2eq}**

Table 9.12 summarises the results from transport of waste, raw materials and wastes/recycling products from the proposed development which equates to 1,689 tonnes of CO_2eq per annum. This has then been compared to the landfill associated transport CO_2eq which equates to 2,759 tonnes of CO_2eq per annum. Thus, the transport associated greenhouse gas savings due to the proposed development replacing the landfilling of 240,000 tonnes of waste is approximately 1,070 tonnes of CO_2eq per annum.

Table 9.12 Net Anthropogenic CO_{2eq} Emissions Due To Transport Associated With The Incineration Of 240,000 Tonnes Of MSW Compared To Transport Associated With Landfilling

Residue/ Re-agent	% per tonne waste input	Tonnes per annum	Tonnes per Truck	Truck Movements Annually	1-Way Distance	Location	Total Km Travelled	CO2 (tonnes) note 1
Waste distance to Ringaskiddy RRC	n/a	240,000	11.5 - 25	11715	57	Mallow to Ringaskiddy	667,755	724
Bottom Ash	17%	53,630	22	2,438	240	Bord Na Mona Drehid	585,059	634
Boiler Ash	1%	2,037	24	85	454	Distance to ISME in Carrickfergus	38,528	42
FGC Residues	4.50%	9,271	24	386	454	Distance to ISME in Carrickfergus	175,378	190
Ferrous Metals	3%	2,444	20	122	25	Cork Metal - worst-case distance to metal recyclers in Cork	3,055.05	3
Non-Ferrous	0.3%	244	24	10	1300	Belgium	13,239	14
Hydrated Lime	1.3%	3,177	22	144	200	From Clogrennane Lime Carlow	28,884	31
Activated Carbon	0.03%	163	21	8	2000	Germany Walhalla Kalk	15,518	17
Ammonia	0.26%	847	22	38.5	764	Chemco - imported from UK	29,423	32
Fuel Oil	0.10%	240	15	16	30	Local from Cork Area	480	1
Sum Of Ringaskiddy RRC Transport Related CO_2eq Emissions								1,689 tonnes
Waste distance to Drehid Landfill Transport Related CO_2eq Emissions	**n/a**	**240,000**	**20**	**12,000**	**212**	**Mallow to Bord Na Mona Drehid**	**2544000**	**2,759 tonnes**

Note 1 Calculated using the TII Carbon Tool (2025) (58).

9.5.2 Effect of Climate Change

9.5.2.1 Effect of Climate Change on the Construction Phase

Appropriate flood risk measures and extreme weather events have been considered as part of the construction planning. As outlined in **Chapter 4** ***Description of the Proposed Development*** of the EIS, the facility itself has a recommended minimum flood defence level / building level of 4.55mOD. This is significantly higher than the 1 in 200 year flood level, even when a 1.00m conservative climate change allowance is included i.e. 2.87mOD + 1.00m = 3.87mOD). This therefore provides a very high standard of flood protection to the site infrastructure.

Thus, the potential for changes to long-term weather effects as a result of climate change are not considered to be as significant in the context of the construction phase of the proposed development which will take place over a short-term period in the near future. Thus, in line with the methodology outlined in **Table 9.4**, the likelihood of extreme weather and flooding for the construction phase of the proposed development is assessed to be of low likelihood and with a low exposure leading to a finding of low vulnerability and thus a non-significant effect.

9.5.2.2 Effect of Climate Change on the Operational Phase

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. Changes in climate will lead to a variety of associated climate effects including:

- Increased average temperatures will lead to a greater requirement for cooling of the buildings leading to greater energy use and associated GHG emissions
- Increased rainfall will lead to a greater risk of flooding
- Periods of drought may lead to reduction in water availability

Examples of potential climate effects are included in Annex D (Climate proofing and environmental impact assessment) of the *Technical Guidance on the Climate Proofing of Infrastructure* (European Commission, 2021a). Potential effects to the proposed development as a result climate change include:

- Flood risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding
- Increased temperatures potentially causing drought, wildfires and prolonged periods of hot weather
- Reduced temperatures resulting in ice or snow
- Geotechnical effects; and
- Major Storm Damage – including wind damage

In order to determine the vulnerability of the proposed development to climate change the sensitivity and exposure of the development to various climate hazards must first be determined. The following climate hazards have been considered in the context of the proposed development: flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning, hail, landslides and fog.

The sensitivity of the proposed development to the above climate hazards is assessed whilst the exposure of the proposed development is also taken into account separately. **Table 9.13** details the sensitivity of the proposed development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been established the exposure of the proposed development to each of the climate hazards is determined, this is the likelihood of the climate hazard occurring at the proposed development location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the overall vulnerability of the proposed development to each of the climate hazards as per **Table 9.4**. The results of the vulnerability assessment are detailed in **Table 9.13** below.

Table 9.13 Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (coastal, pluvial, fluvial)	1 (Low)	2 (Medium)	2 (Low)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low)
Extreme Wind	1 (Low)	2 (Medium)	2 (Low)
Extreme Cold	1 (Low)	2 (Medium)	2 (Low)
Wildfires	1 (Low)	2 (Medium)	1 (Low)
Drought	1 (Low)	1 (Low)	1 (Low)
Lightning & Hail	1 (Low)	1 (Low)	1 (Low)
Fog	1 (Low)	1 (Low)	1 (Low)

The sensitivity and exposure of the area was determined with reference to a number of online tools, including the *Think Hazard!* tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) (2025) and with input from the various discipline specialists on the project team as outlined in detail below in **Section 9.5.2.3** – **Section 9.5.2.8**. It was concluded that proposed development does not have any significant vulnerabilities to the identified climate hazards as described in the below sections. All vulnerabilities are classified as low.

9.5.2.3 Flooding

There is the potential for flooding related effects on site in future years due to climate changes as outlined in **Section 9.3.2** in the absence of mitigation. As outlined in **Chapter 4 *Description of the Proposed Development*** of the EIS, the facility itself has a recommended minimum flood defence level / building level of 4.55mOD. This is significantly higher than the 1 in 200 year flood level, even when a 1.00m conservative climate change allowance is included i.e. 2.87mOD + 1.00m = 3.87mOD). This therefore provides a very high standard of flood protection to the site infrastructure.

9.5.2.4 Extreme Wind, Fog, Lightning & Hail

The Updated High-Resolution Climate Projections for Ireland (EPA 2025c) [59] records that the mean annual 10m wind speed is projected to decrease for all seasons and scenarios, so the proposed development is not predicted to be affected by more frequent extreme wind events in its design life. In relation to extreme winds, the appropriate wind loadings are to be calculated in line with the requirements of IS EN 1991-1-4. Lightning protection will be provided for the buildings and designed by a specialist. Hail and fog are not predicted to significantly affect the buildings due to their design. The frequency of heavy precipitation events in Ireland is projected to increase over this century (EPA 2025c), with a likely associated increase in frequency of lighting and hailstorms. The proposed development does not have any particular vulnerability to lighting and hail, and is therefore not predicted to be affected by these events. Near-surface (2m) specific humidity is projected to increase for all seasons in this century (EPA 2025c), with the largest projected increases in relative humidity noted for summer. The proposed development does not have any particular vulnerability to fog or humidity, and is therefore not predicted to be affected by these changes.

9.5.2.5 Wildfires

In relation to wildfires, the *Think Hazard!* tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) (2025), indicates that the wildfire hazard is classified as medium for the Cork area. This means that there is between a 10% to 50% chance of experiencing weather that could support a problematic wildfire in the project area that may cause some risk of life and property loss in any given year. Future climate modelling indicates that there could be an increase in the weather conditions which are favourable to fire conditions, these include increases in temperature and prolonged dry periods.

However, due to the proposed development location the risk of wildfire is significantly lessened and it can be concluded that the proposed development is of low vulnerability to wildfires.

9.5.2.6 Landslides

Landslide susceptibility mapping developed by GSI indicates that the proposed development location is not within an area that is susceptible to landslides and there are no recorded historical landslide events at the proposed development location. It can be concluded that landslides are not a risk to the proposed development site.

9.5.2.7 Extreme Temperatures (Heat & Cold)

Temperature change projections for Ireland in the worst-case '*Late Action*' scenario (as defined in the IPCC Sixth Assessment Report) could be in the range 2.02 to 3.49 degrees Celsius at the end of this century. Truly extreme heat events that are rare in the present climate are projected to become more common under all scenarios. The proposed development has been designed to ensure that it can continue to operate in this worst-case scenario. At the detailed design stage chosen building materials will be high quality, durable and hard-wearing and chosen to withstand increased variations in temperature in the future as a result of climate change. Snow loads are to be calculated in line with the requirements of IS EN 1991-1-3 and new Met Eireann reports and mapping published in 2022. In relation to extreme cold, projections of Irish temperature changes in this century consistently show warming, and no significant increases in extreme cold are predicted for Ireland in this century. The proposed development is not predicted to be affected by more frequent extreme cold events in its design life.

9.5.2.8 Drought

Drought has the potential to cause settlement of soils around the drainage and sub surfaces of roads, in particular if it is followed by periods of heavy rain or flooding. Drainage will require additional maintenance during extended periods of drought as the lack of water can result in the building-up of debris or sedimentation in drainage ducts.

The sensitivity of the proposed development indicate that drought is low vulnerability for most receptors / project assets, with the exception of landscaping which is of medium vulnerability under the RCP8.5 scenario.

9.5.2.9 Summary

Overall, the proposed development has at most low vulnerabilities, as outlined in **Table 9.13** and as outlined in detail above in **Section 9.5.3.1** – **Section 9.5.3.5**, to the identified climate hazards and therefore no detailed risk assessment is required.

Thus, in line with the methodology outlined in **Table 9.4** the likelihood of extreme weather and flooding was assessed to be of low likelihood and with a low or medium exposure leading to a finding of low vulnerability and thus a not significant effect.

Under the 2021 Climate Act, the National Adaptation Framework, which aims to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive effects, remains in place as does the Carbon Action Plan, which will reduce GHG emissions in future years, with a number of other strategies currently being proposed.

The Electricity & Gas Networks Sector Climate Change Adaptation Plan prepared under the National Adaptation Framework has been prepared by the DECC (DECC, 2022) [60] and considers future climate change effects on energy infrastructure and aims to reduce vulnerability by building resilience in the energy sector. The plan proposes to avoid or minimise future adverse effects within the sector and to exploit opportunities. Steps include diversification of energy sources, improved communication between relevant bodies/stakeholders, a requirement for energy network companies to continue to ensure climate change is taken into account in planning and design standards and engineering management practices and identification of vulnerable areas and measures to take with respect to climate effects.

9.6 Mitigation and Monitoring Measures

9.6.1 Construction Phase

The objective of the mitigation measures outlined below is to ensure that GHG emissions are minimised wherever possible during the construction phase of the proposed development. The mitigation measures which are relevant to GHG emission reductions are outlined below:

- All vehicles will be required to switch off engines when stationary (no idling)
- All vehicles will be serviced and maintained to ensure emissions are minimised
- Where practicable, building materials will be reused within the extent of the proposed development; and
- Where practicable, building materials will be sourced locally (within 20-25km) to reduce the embodied emissions associated with transport

As a result of these mitigation measures, the GHG emissions will be reduced during the construction phase compared to the baseline scenario.

During construction, the Contractor will be required to mitigate against the effects of extreme rainfall / flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind / storms, temperature extremes through site risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction.

During construction, the Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

9.6.2 Operational Phase

The objective of the mitigation measures outlined below is to ensure that GHG emissions are minimised wherever possible during the operational phase of the proposed development. The key mitigation measures which are relevant to GHG emission reductions are outlined below:

- During the treatment of waste at the facility, the thermal energy generated by the burning of waste will be recovered and will give an electrical output of about 21 MW_e with a net electrical output from the plant for export to the national grid of 18.5MW_e (see **Table 9.6**). Thus, the export of 18.5MW_e will give a direct benefit in terms of GHG emissions which would have been released in the production of 18.5MW_e from fossil-fuel burning power stations.
- The proposed development will also recover and recycle ferrous and non-ferrous materials during the thermal treatment process. The recycling of these metals will require less energy than processes using virgin inputs and thus lead to a direct saving in energy and thus GHG emissions.
- Currently, Ireland is exporting an average of 314,00 tonnes of residual waste per annum (based on data over the period 2019 – 2024). The operation of the facility could potentially allow 240,000 tonnes of residual waste currently exported to continental Europe to cease leading to a saving of over 5,070 tonnes of $CO2_{eq}$ / annum.
- The risk of rising sea levels due to climate change and the risk of increased flooding has been mitigated by a range of site-specific measures including the raising of the levels on the site and the adjoining road. As outlined in **Chapter 4** ***Description of the Proposed Development*** of the EIS, the facility itself has a recommended minimum flood defence level / building level of 4.55mOD. This is significantly higher than the 1 in 200 year flood level, even when a 1.00m conservative climate change allowance is included i.e. 2.87mOD + 1.00m = 3.87mOD). This therefore provides a very high standard of flood protection to the site infrastructure. The proposed L2545 upgrade works will include raising a 190m section of the road to a maximum height of 3.495mOD between the car park and the eastern end of the Hammond Lane Metal Company. This is approximately 0.9m above the existing road level. This will elevate the road to above the 1 in 200-year design tidal water level. This will offer a high level of protection to the road from tidal flooding.

As outlined in **Section 6.3.2.1** of **Chapter 6** ***Population and Human Health*** states that there are no major accident scenarios envisaged from either flooding or coastal erosion.

9.7 Residual Effects

9.7.1 Construction Phase GHGA

The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction'* (IAQM, 2024) states that site traffic and plant is unlikely to have a significant impact on climate. As outlined in **Section 9.5.1**, the quantity of road traffic during the construction phase of the proposed development leads to a very small increase in greenhouse gas emissions. Based on the scale and temporary nature of the construction works and the intermittent use of equipment, the potential effect on climate change from the direct effect of the proposed development in relation to Ireland's obligations under the EU 2030 target is deemed to be short-term, not significant and negative.

As outlined in detail in **Section 9.5.1**, a detailed climate assessment of the construction stage traffic has found that GHG emissions will be no more than 0.0033% of the Transport Sectoral Emission Ceiling 2030 target. It has also been confirmed that there is no significant traffic cumulative effect (**Chapter 7** ***Roads and Traffic*** of the EIS) and it can therefore be determined that the construction stage traffic will have a residual direct, short-term, not significant, negative effect on climate.

9.7.2 Operational Phase Greenhouse Gas Assessment

The assessment has shown that the operational phase will not have a significant effect on climate. Net emissions from the operational phase will be equivalent to a saving of approximately 0.057% of the 2031-2035 Carbon budget thus the effect of the proposed development will be insignificant in the context of aggregated national emission sources as determined after taking into account the benefits associated with energy recovery and displacement of electricity derived from fossil fuel sources and the benefits from the replacement of landfilling with the proposed facility operations.

The criterium for determining the significance of effects, using the IEMA guidance, is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors as set out in **Section 9.2.4.2**. In relation to climate, as there are no project specific assessment criteria, the proposed development has been assessed against the recommended IEMA (IEMA, 2022) significance determination (see **Section 9.2.4.2**).

In reference to Principle 1 of IEMA Guidance (IEMA, 2022), the proposed development will replace activities which have a higher GHG profile. As outlined in **Section 9.5.1.2**, the proposed development will lead to lower net greenhouse gas emissions than landfilling when energy recovery under both scenarios is considered.

In reference to Principle 2 of IEMA Guidance (IEMA, 2022), a range of measures will be employed which will reduce GHG emissions and are in line with "best practice" as outlined in the IEMA guidance (IEMA, 2022). During the treatment of waste at the proposed development, the thermal energy generated by the burning of waste will be recovered and will give an electrical output of about 21 MW with a net electrical output from the plant for export to the national grid of 18.5MW_e (see **Table 9.6**). Thus, the export of 18.5MW_e will give a direct benefit in terms of GHG emissions which would have been released in the production of 18.5MW_e from fossil-fuel burning power stations.

The proposed development will also recover and recycle ferrous and non-ferrous materials during the thermal treatment process. The recycling of these metals will require less energy than processes using virgin inputs and thus leads to a direct saving in energy and thus GHG emissions.

In reference to Principle 3, where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the proposed development's remaining emissions should be considered as outlined in the IEMA guidance (IEMA, 2022). However, given that the proposed development will lead to lower GHG emissions than the landfilling alternative, no compensation measures are required in line with IEMA guidance (IEMA, 2022).

With a reduction in residual emissions through best practice and the implementation of a series of adaptive design measures, the net impact of the proposed development is not significant. The impact of these measures will be to ensure that the proposed development will have in effect net positive GHG emissions when the displacement of fossil-fuel burning power stations and replacement of landfilling is taken into account. Thus, the predicted impact to climate is deemed to be indirect, long-term, negative and negligible in line with IEMA guidance (IEMA, 2022). As the proposed development itself will not directly reduce emissions a negligible impact, in terms of IEMA terminology, is more appropriate than a positive impact, in line with IEMA guidance (IEMA, 2022).

Using the EPA EIAR terminology (EPA, 2022) the operational phase will have a residual direct, long-term, not significant, negative effect on climate.

9.7.3 Effects of Climate Change on the Construction Phase

The potential for changes to long-term weather effects as a result of climate change are not considered to be as significant in the context of the construction phase of the proposed development which will take place over a short-term period in the near future. Thus, in line with the methodology outlined in **Table 9.4**, the likelihood of extreme weather and flooding for the construction phase of the proposed development is assessed to be of low likelihood and with a low exposure leading to a finding of low vulnerability and thus a non-significant effect.

Therefore, the effect of climate change on the construction phase of the Proposed Development is direct, short-term, not significant and negative.

9.7.4 Effect of Climate Change on the Operational Phase

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. However, the likelihood of extreme weather and flooding was assessed to be of low likelihood and with a low or medium exposure leading to a finding of low vulnerability and thus a not significant effect.

A detailed flood risk assessment has been undertaken as part of the proposed development and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the effect of climate change on the operational phase of the Proposed Development is direct, long-term, not significant and negative.

9.8 Cumulative Effects

In relation to climate, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects in general should not be individually assessed. This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other (IEMA, 2022).

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