Iarnród Éireann
Irish Rail

Rosslare ORE Hub

EIAR Environmental Topic Chapters

Chapter 24:

Climate

venterra | GDG GAVIN & DOHERTY GEOSOLUTIONS | NICHOLAS O'DWYER an RSK company

Co-funded by the European Union

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LIST OF ABBREVIATIONS

AADT	Annual Average Daily Traffic
AMOC	Atlantic Meridional Overturning Circulation
BEng	Bachelor of Engineering
BSI	British Standards Institution
CAP	Climate Action Plan
CD	Chartered Datum
CESSM	Civil Engineering Standard Method of Measurement
CEnv	Chartered Environmentalist
CFRAM	Catchment Flood Risk Assessment Management
CCRA	Climate Change Risk Assessment
CSci	Chartered Scientist
DECC	Department of Climate and Communications
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EPBD	Energy Performance of Buildings Directive
ESD	Effort Sharing Decision
ESR	Effort Sharing Regulation
ETS	Emissions Trading System
EU	European Union
GGBS	Ground Granulated Blast Furnace Slag
GHG	Greenhouse Gas
GHGA	Greenhouse Gas Emissions Assessment
GIA	Glacial Isostatic Adjustment
GW	Gigawatt
HAT	Highest Astronomical Tide
HDip	Higher Diploma
HDV	Heavy Duty Vehicle
HEFS	High-End Future Scenario
HVO	Hydrotreated Vegetable Oil
ICHEC	Irish Centre for High End Computing
IEMA	Institute of Environmental Management & Assessment
IPCC	Intergovernmental Panel on Climate Change
KPH	Kilometres Per Hour
LULUCF	Land Use, Land-use Change and Forestry
MoU	Memorandum of Understanding
MRFS	Mid-Range Future Scenario
Mt CO2e	Million Tonnes of Carbon Dioxide Equivalent
NCCRA	National Climate Change Risk Assessment
NDC	Nationally Determined Contributions
NFCS	National Framework for Climate Services

NAF	National Adaption Framework
OPW	Office of Public Works
ORE	Offshore Renewable Energy
PAS	Publicly Available Specification
PhD	Doctor of Philosophy
RCP	Representative Concentration Pathways
SOV	Service Operation Vessels
SST	Sea Surface Temperatures
tCO2e	tonnes of carbon dioxide equivalent
TII	Traffic Infrastructure Ireland
UNFCCC	United Nations Framework Convention on Climate Change
WCC	Wexford County Council
AADT	Annual Average Daily Traffic

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24 CLIMATE

24.1 INTRODUCTION

Iarnród Éireann – Irish Rail is applying for development permission for the Rosslare Offshore Renewable Energy Hub (hereafter the 'Proposed Development'), located immediately adjacent and to the northwest of the existing Rosslare Europort at Rosslare Harbour in County Wexford, which is operated by Iarnród Éireann. The Proposed Development includes capital dredging to achieve navigable depths for vessels delivering ORE components; land reclamation to create a storage area for these components; and construction of two new berths to facilitate loading and unloading of ORE components. The land reclamation works include infilling the existing small boat harbour, after the construction of a new small boat harbour. The Proposed Development also includes the installation of a new slipway and facility for local clubs, such as the Sea Scouts.

The purpose of the Proposed Development is to provide a facility for the efficient handling and storage, marshalling, staging and integration of ORE components to facilitate installation of offshore wind energy projects by ORE developers and operators. The Proposed Development is designed to provide facilities that accommodate a wide range of infrastructure uses, both for current requirements and anticipated future needs. For instance, the Proposed Development could be used for traditional port activities if required, including during periods of reduced ORE-related activity. Refer to EIAR Chapter 6: Project Description for further detail.

This chapter of the Environmental Impact Assessment Report (EIAR) presents the assessment of the likely significant effects (as per the "EIA Regulations") of the Proposed Development on Climate arising from the construction and operation of the Proposed Development, both alone and cumulatively with other projects. This chapter was informed by the Proposed Development EIA scoping report.

The assessment presented in this chapter has been informed by the following chapters and related technical appendices of the EIAR:

- Chapter 1: Introduction and Methodology
- Chapter 2: Legislation and Policy Context
- Chapter 3: Need for the Project
- Chapter 4: Scoping and Consultation
- Chapter 6: Project Description
- Chapter 7: Soils, Geology, Hydrogeology and Contamination
- Chapter 9: Water Quality and Flood Risk
- Chapter 17: Traffic and Road Transport
- Chapter 18: Air Quality
- Chapter 20: Shipping and Navigation
- Chapter 22: Material Assets

- Chapter 23: Seascape, Landscape and Visual Assessment
- Chapter 25: Interactions.

This chapter provides a summary of topic-relevant guidance and outlines the data sources used to characterise the topic-specific Study Area. Building on the general EIAR methodology outlined in Chapter 1: Introduction and Methodology, the topic-specific methodology followed in assessing the impacts of the Proposed Development on greenhouse gas emissions and the potential effects of climate change on the Proposed Development is included in this chapter. Relevant mitigation measures, following the 'mitigation hierarchy' of avoidance, minimisation, restoration and offsets, and/or monitoring requirements, are proposed in respect of any significant effects and a summary of residual impacts is provided, where relevant.

The climate assessment is divided into two distinct sections – a greenhouse gas assessment (GHGA) and a climate change risk assessment (CCRA).

- Greenhouse Gas Emissions Assessment (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.
- Climate Change Risk Assessment (CCRA) – Identifies the impact 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.

24.2 RELEVANT LEGISLATION AND GUIDELINES

24.2.1 INTERNATIONAL LEGISLATION AND POLICY

The Paris Agreement (UNFCCC, 2015), which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C (degrees Celsius) above pre-industrial levels with efforts to limit this rise to 1.5°C. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs comprise the efforts and actions by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement requires each country to prepare the NDCs that it intends to achieve, updating and enhancing the NDCs every 5 years. Countries are required to implement mitigation measures, with the aim of achieving the objectives of such contributions. Each of the EU Member States submit their own NDCs, which contribute to the overall EU NDC.

The European Green Deal, published by the European Commission in December 2019, provides an action plan which aims for the EU to be climate neutral by 2050. The EU Green Deal highlights that further decarbonisation of the energy sector is critical to reach climate objectives in 2030 and 2050. The European Green Deal has increased the GHG emissions reduction 2030 target to at least 55% in comparison to 1990 levels. Targets for renewable energy and energy efficiency are also likely to be increased.

On 14 July 2021, the European Commission adopted a series of legislative proposals setting out how it intends to achieve climate neutrality in the EU by 2050, including the intermediate target of at

least a 55% net reduction in greenhouse gas emissions by 2030. The package of proposals is known as the 'Fit for 55' package.

The package includes revisions to the legislation put forward as part of the Climate and Energy Framework 2021-2030, including the EU Emissions Trading System (ETS), Effort Sharing Regulation, transport and land use legislation, setting out in real terms the ways in which the Commission intends to reach EU climate targets under the European Green Deal.

The EU ETS was launched in 2005 as the world's first international company- level 'cap-and trade' system for reducing emissions of greenhouse gases cost-effectively. The EU ETS regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry.

Under this new package of legislative proposals, the sectors of the economy covered by the current ETS must reduce emissions by 61% by 2030 compared to 2005 levels by increasing annual emissions reduction to 4.2% per annum. This is a substantial increase from the previous target which was a 43% reduction by 2030.

The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture. Under this new package of proposals, the Commission is now proposing to reduce emissions under the non-ETS sectors or the sectors which fall under the Effort Sharing Regulation by at least 40%, compared to 2005 levels. This is an increase of 11 percentage points compared to the existing target of a 29% emission reduction.

The European Climate Law aims to write into law the goal set out in the European Green Deal – for Europe's economy and society to become climate-neutral by 2050. On 17 September 2020, the Commission adopted a proposal to include a revised EU emissions reduction target of at least 55% by 2030 as part of the European Climate Law.

The 2021 EU Strategy on Adaptation to Climate Change sets out the pathway to prepare for the unavoidable impacts of climate change. The aim is that *"by 2050, when we aim to have reached climate neutrality, we will have reinforced adaptive capacity and minimised vulnerability to climate impacts…"*

Adaptation refers to measures that can reduce the negative impact of climate change by, for example, ensuring a project is resilient to future increases in storm frequency and rainfall levels.

The EU has adopted integrated monitoring and reporting rules to ensure progress towards its 2030 climate and energy targets and its international commitments under the 2015 Paris Agreement.

Climate is also addressed specifically in Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. Recital (7) of Directive 2014/52/EU states that:

> "Over the last decade, environmental issues, such as resource efficiency and sustainability, biodiversity protection, climate change, and risks of accidents and disasters, have become more important in policy making. They should therefore

also constitute important elements in assessment and decision-making processes".

Recital (13) of Directive 2014/52/EU states that:

"Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change".

Additionally Annex IV requires the following to be considered within Environmental Impact Assessment:

- Paragraph 4 states:

"A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape".

- Paragraph 5 (f) states:

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

24.2.2 NATIONAL LEGISLATION & POLICY

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) 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'*. The 2015 Act made provision for a national mitigation plan, and a national adaptation framework. In addition, the 2015 Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published

the second Climate Action Plan in November 2021 (Government of Ireland, 2021a) and a third update in December 2022 (Government of Ireland, 2022) with an Annex of Action published in March 2023. The current Climate Action Plan is CAP24, published in December 2022 (DECC, 2023a).

Following on from Ireland declaring a climate and biodiversity emergency in May 2019, and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme in December 2019, followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (hereafter referred to as the 2021 Climate Act), in March 2021, which amended the Climate Action and Low Carbon Development Act 2015. The Climate Act was signed into Law on the 23rd July 2021, giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act (Government of Ireland, 2021) 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 also provides for "carbon budgets and a decarbonisation target range for certain sectors of the economy". The 2021 Climate Act defines the carbon budget as "the total amount of greenhouse gas emissions that are permitted during the budget period".

In relation to carbon budgets, the 2015 Act (as amended) 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, as shown in Table 24.1.

Table 24.1: 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025 (DECC, 2023a)

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO_2e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2e	Reduction in emissions of 3.5% per annum for the third provisional budget.

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. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period, and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published in the Climate Action Plan 2024 (CAP24) (DECC, 2023a) and are shown in Table 24.2.

Table 24.2: Sectoral Emission Ceilings 2030 (DECC, 2023a)

Sector	Baseline ($MtCO_2e$)	Carbon Budgets ($MtCO_2e$)		2030 Emissions ($MtCO_2e$)	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, CAP24 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	68				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	295	200	-	51

In December 2023, CAP24 was published, establishing key actions to deliver a 51% reduction in GHG emissions by 2030 (compared to 2018 levels) and achieve climate neutrality by 2050 (DECC, 2023a). The updated and current CAP25, published in April 2025 (DECC, 2025), builds on the progress of the previous four iterations of the CAP, with CAP23 first publishing carbon budgets and sectoral emission ceilings, and reaffirms Ireland's climate ambition, with a focus on delivery, implementation and measurable outcomes, particularly ahead of the second carbon budget period (2026–2030). 2025 is the last year in the first 5-year carbon budget period. During the initial 5-year budget period the average annual reduction required was 4.8%, this increases to 8.3% in the second budget period (2026-2030). CAP25 retains the high-impact sectors where the biggest savings can be achieved, while emphasising public sector leadership and green procurement. These sectors include renewable energy; energy efficiency of buildings; transport; sustainable farming; sustainable business; and land-use change.

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, 2024a) 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 highlights a significant 17% reduction in electricity emissions in early 2024, with wind power supplying nearly 40% of Ireland's total electricity demand and over 100,000 rooftop microgenerators connected to the grid. Investments are ongoing in grid reinforcement, offshore wind development, and interconnectors with France and the UK to enhance renewable generation capacity. According to legal and policy analysts, these developments place Ireland among the top countries globally in per capita wind generation, while continuing to expand domestic and community-based renewable energy. EirGrid, Enterprise Ireland and IDA Ireland have recently signed an MoU to collectively support offshore wind development in Ireland.

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). There also remains scope for the construction industry to use more timber in construction. In 2022, 24% of new construction in Ireland was built using timber frames to satisfy the demand for housing. Public bodies are now required under the Public Sector Mandate to use best practice project design to reduce embodied carbon; procure concretes with clinker replacements (lower carbon); and require that large construction projects produce a whole life cycle GHG emissions assessment. Further guidance on how the built environment can contribute to a circular, low-carbon economy is detailed in the recently published *A Roadmap for a Resource Efficient Circular Built Environment.* This supports the Circular Economy And Miscellaneous Provisions Act 2022 (No. 26 of 2022), which allows for waste material to be safely and sustainably re-used as secondary raw materials and is particularly important for the construction sector.

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 April 2023, the Government published its *Long-Term Strategy on Greenhouse Gas Emissions Reductions* (DECC, 2023b). This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050, achieving the interim targets set out in the Climate Action Plan.

The National Planning Framework specifies a number of policies relevant for climate in terms of reducing GHG emissions and adapting to climate change:

- National Policy Objective 69: *Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions reductions as expressed in the most recently adopted carbon budgets*.
- National Policy Objective 70: *Promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a climate neutral economy by 2050*.
- National Policy Objective 71: *Support the development and upgrading of the national electricity grid infrastructure, including supporting the delivery of renewable electricity generating development*.
- National Policy Objective 78: *Promote sustainable development by ensuring flooding and flood risk management informs place-making by avoiding inappropriate development in areas at risk of flooding that do not pass the Justification Test, in accordance with the Guidelines on the Planning System and Flood Risk Management, and taking account of the potential impacts of climate change on flooding and flood risk, in line with national policy regarding climate adaptation*.

The second National Adaptation Framework (NAF) (DECC, 2024) was published in June 2024 in line with the five-year requirement of the 2015 Climate Act. The plan provides a whole of government and society approach to climate adaptation in Ireland in order to reduce Irelands vulnerability to climate change risks including extreme weather events, flooding, drought, loss of biodiversity, sea level rise and increased temperatures. Similar to the "Just Transition" when considering carbon emissions, the NAF aims for "Just Resilience" stating that:

> *"A climate resilient Ireland will have a reduced reliance on fossil fuel, it will have widely accessible electrified public transport and will have transitioned towards sustainable agricultural practices such as agroforestry and organic farming."*

The NAF highlights that there is a projected increased frequency of droughts, coupled with higher evapotranspiration rates, which could cause reduced river flow, groundwater recharge, and reservoir refill capacity, leading to potential water supply shortages. The NAF warns that national long-term water supply projects must be planned for within budgets to ensure the adaptation required to make Ireland resilient by 2050 and beyond is funded. With respect to the water sector the 2nd NAF states that the potential adaptation measures for the transport sector, which is led by the Department of Transport, are:

- Projected extreme precipitation may increase pluvial and fluvial flooding, impacting the transport sector with service disruptions, hazardous driving conditions, and bridge scour
- Intensified windstorms may disrupt transport hubs, causing delays and cancellations, and affecting transport networks with fallen trees and debris

- Sea level rise and intensified storms may significantly impact transport infrastructure in low-lying coastal areas, eroding coastlines, and estuaries; and
- Heatwaves and drought may degrade transport infrastructure, affecting road surfaces and rails, and require temperature control measures in hubs.

The National Climate Change Risk Assessment (NCCRA) was published in June 2025 (EPA, 2025c). The NCCRA was required to be developed under Action 457 from the 2021 CAP (Government of Ireland, 2021). Action 457 seeks to "Further develop Ireland's national climate change risk assessment capacity to identify the priority physical risks of climate change to Ireland'. The NCCRA uses definitions of the risk determinants from the Intergovernmental Panel on Climate Change (IPCC) Risk Framework (IPCC, 2023):

- **Hazard** - the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources
- **Exposure** - the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected
- **Vulnerability** - the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity
- **Risk** - the potential for adverse consequences for human or ecological systems.

When considering risk, the NCCRA assess exposure and vulnerability for two future climate change scenarios or Representative Concentration Pathways (RCPs):

- RCP4.5 was selected as it represents a scenario aligned with the global temperature trajectory
- RCP8.5 was selected as it represents a high-emissions scenario and achieves the highest level of modelled temperature increases by the end of the century. Consequently, this scenario will result in the highest level of physical risk for Ireland, and therefore the greatest requirement for adaptation.

These scenarios align with a conservative approach to assess risks to Ireland and assumes global emission reduction targets are not met. This aligns with the principle of precaution as stated in the NAF (DECC, 2024). In addition to the future climate scenarios, the NCCRA assesses the risk from the future climate during the following timeframes:

- Present (~2030)
- Medium term (~2050)
- Long term (~2100).

24.2.3 LOCAL POLICY

The *Wexford Climate Action Plan 2024 – 2029* was published in 2024 (WCC, 2024). The plan sets out how Wexford County Council will be responsible for enhancing climate resilience, increasing energy efficiency, and reducing greenhouse gas emissions, across its own assets, services, and infrastructure, to which it is fully accountable for, whilst also demonstrating a broader role of inspiring, leading and facilitating, other sectors, to meet their own climate targets and ambitions. The plan references Wexford's ports, specifically in relation to their potential to support offshore renewable energy development:

> *"*The offshore wind industry offers strong commercial possibilities for the port and county in general. It will also provide much needed infrastructure to enable Ireland to reach its renewable energy targets into the future*".*

The following measures apply to all of WCC's climate actions:

> *"*Promote climate action projects that support and maximize environmental co-benefits, such as biodiversity protection and enhancement; improved air, water or soil quality; or enhanced recreation, amenity and cultural heritage value, to ensure win-win benefits are gained*".*

> *"*Ensure all development underpinned or supported by climate action is planned and implemented in a manner that appropriately considers the potential for environmental co-benefits, potential environmental impacts and environmental protection requirements. No climate action related development project that is likely to have a significant negative effect on the receiving environment shall be supported*".*

A Climate Change Risk Assessment (CCRA) was carried out by Wexford County Council as part of the development of the *Wexford Climate Action Plan 2024 – 2029* (WCC, 2024), which identified the current and future climate risks. This is discussed in more detail in Sections 24.5.3 and 24.5.4.

24.2.4 GUIDANCE

The principal guidance and best practice documents used to inform the assessment of potential impacts on climate are summarised below. In addition to specific climate guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022)
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017)
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013).

The assessment makes reference to national guidelines where available, in addition to international standards and guidelines relating to the assessment of climate impacts. These are summarised below:

- Transport Infrastructure Ireland (TII) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022a)
- Transport Infrastructure Ireland (TII) PE-ENV-01105: Climate Assessment Standard for Proposed National Roads (TII, 2022b)
- Transport Infrastructure Ireland (TII) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII, 2022c)
- Institute of Environmental Management & Assessment (IEMA) Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (hereafter referred to as the IEMA 2022 GHG Guidance) (IEMA, 2022)
- IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the IEMA 2020 EIA Guide) (IEMA, 2020a)
- IEMA GHG Management Hierarchy (hereafter referred to as the IEMA 2020 GHG Management Hierarchy) (IEMA, 2020b)
- IEMA Principles Series: Climate Change Mitigation & EIA (IEMA, 2010)
- Publicly Available Specification (PAS) 2080:2016 on Carbon Management in Infrastructure (BSI, 2016)
- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a).

24.3 ASSESSMENT METHODOLOGY

24.3.1 STATEMENT OF COMPETENCE

This chapter was completed by Dr. Avril Challoner, a Principal Environmental Consultant in the Air Quality and Climate section of AWN Consulting, with 12-years of consultancy experience. She holds a BEng (Hons) in Environmental Engineering from the National University of Ireland Galway, a HDip in Statistics from Trinity College Dublin, and has completed a PhD in Environmental Engineering (Air Quality) at Trinity College Dublin. She is a Chartered Environmentalist (CEnv), Chartered Scientist (CSci), Member of the Institute of Air Quality Management, Member of the Institute of Environmental Management and Assessment (IEMA) and specialises in the fields of air quality, climate, EIA and air dispersion modelling. She has undertaken air quality and climate impact assessments for a wide array of development types including transportation schemes (active, public and private transport), renewable energy schemes and residential schemes from constraints, through to route selection, EIAR and oral hearing stage.

24.3.2 TOPIC-SPECIFIC CONSULTATION

No additional consultation was required other than with the EIA project team.

24.3.3 DATA SOURCES

This chapter refers to publicly available data from:

- Environmental Protection Agency (EPA)
- Met Éireann
- Climate Ireland.

24.3.4 APPROACH TO ASSESSMENT OF EFFECTS

24.3.4.1 GREENHOUSE GAS ASSESSMENT

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established with reference to EPA data on annual GHG emissions (see Section 24.5).

24.3.4.2 CONSTRUCTION PHASE GREENHOUSE GAS ASSESSMENT

The GHG assessment accounts for various components relating to the project during different life stages to determine the total impact of the Proposed Development on climate. The reference study period (i.e. the assumed building life expectancy) for the purposes of the assessment is 50 years. Embodied carbon emissions are attributed to four main categories, taken from BS EN 15978. The categories are:

- **Product Stages (Category A1 to A3)** The carbon emissions generated at this stage arise from extracting the raw materials from the ground, their transport to a point of manufacture and then the primary energy used (and the associated carbon impacts that arise) from transforming the raw materials into construction products.
- **Construction (Category A4 to A5)** These carbon impacts arise from transporting the construction products to site, and their subsequent processing and assembly into the building.
- **Use Stage (Category B1 to B7)** This covers a wide range of sources from the GHG emissions associated with the operation of the building (B1), maintenance (B2), repair (B3), refurbishment (B4) and replacement (B5) of materials, and operational energy use (B6) and water use (B7).
- **End of Life Stages (Category C1 to C4)** The eventual deconstruction and disposal of the existing building at the end of its life takes account of the on-site activities of the demolition contractors. No 'credit' is taken for any future carbon benefit associated with the reuse or recycling of a material into new products.

PE-ENV-01104 (TII, 2022a) recommends the calculation of the construction stage embodied carbon using the TII Online Carbon Tool (TII, 2022c). Embodied carbon refers to the sum of the carbon needed to produce a good or service. It incorporates the energy needed in the mining or processing of raw materials, the manufacturing of products and the delivery of these products to site. The purpose of the embodied carbon assessment is to engage the design team in the consideration of embodied carbon at an early stage in the development and mitigate embodied carbon. This engagement aims to ensure carbon savings are made and to assist in aligning the project to Ireland's CAP goal of Net Carbon Zero by 2050.

The TII Online Carbon Tool (TII, 2022c) has been commissioned by TII to assess GHG emissions associated with road or rail projects in Ireland. The TII Carbon Tool (TII, 2022c) uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013), which can be applied to a variety of developments, not just road or rail. The tool aligns with PAS 2080. The use of the TII carbon tool is considered appropriate for certain elements of the Proposed Development as the material types and construction activities employed by the Proposed Development are accounted for in the tool. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction/maintenance phase. The outputs are expressed in terms of tCO_2e (tonnes of carbon dioxide equivalent). Inputs for the TII Carbon Tool were provided by the Proposed Developments design team.

Reasonable conservative estimates have been used in this assessment where necessary to provide an estimate of the GHGs associated with the Proposed Development.

24.3.4.3 OPERATIONAL PHASE GREENHOUSE GAS ASSESSMENT

Traffic Emissions

Emissions from road traffic associated with the Proposed Development have the potential to emit carbon dioxide (CO_2) which will impact climate. The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022c), 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 local air quality assessment, and also the climate assessment. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic.

- 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 mor
- Peak hour speed change by 20 kph or more
- A change in road alignment by 5m or greater.

As per Chapter 17: Air Quality a detailed assessment of traffic related carbon dioxide (CO_2) emissions was scoped out for the Proposed Development in isolation. The Proposed Development may support traditional port operations (e.g. Roll-On Roll-Off cargo operations) in periods where there is no offshore renewable energy project demand for the development, though the primary use of the facility will be for ORE operations. There is the potential for traffic associated with this potential future use of the development to increase above the TII PE-ENV-01106 screening criteria. When this potential future use of the development is accounted for, none of the road links exceed the scoping criteria. As a result, a detailed assessment of traffic related carbon dioxide (CO_2) emissions was scoped out.

Vessel Emissions

Emissions due to vessel movements at sea have been calculated based on the annual number of predicted required trips, number of vessels, daily fuel usage and a factor to convert the total fuel usage to CO_2 emissions (Marine Benchmark, 2020).

24.3.5 MITIGATION

As discussed in EIAR Chapter 1: Introduction and Methodology, three types of mitigation measures are considered in this chapter.

- Primary mitigation
- Secondary mitigation
- Tertiary mitigation

24.3.6 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, 2022a) outlines a recommended approach for determining the significance of both the construction and operational phases of a development.

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022a) is based on IEMA guidance (IEMA, 2022) which is 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 2022 IEMA Guidance (IEMA, 2022) sets out the following principles for significance:

- 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
- 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 is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors (i.e. Ireland's National GHG targets). In relation to climate, there is no project specific assessment criteria, but the project will be assessed against the recommended TII significance determination. This takes account of any primary mitigation measures that form part of the project design which should be considered.

TII (TII, 2022a) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. TII (TII, 2022a) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. In line with IEMA Guidance (IEMA, 2022), TII state that the crux of assessing significance 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".

Significance is determined using the criteria outlined in Table 24.3 (derived from Table 6.7 of PE-ENV-01104 (TII, 2022a)) 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
- The level of mitigation taking place

Table 24.3: Significance Criteria for GHGA

Effects	Significance Level	Description
Significant adverse	Major adverse	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.
	Moderate adverse	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	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	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.

Ireland's carbon budgets can also be used to contextualise the magnitude of GHG emissions from the Proposed Development (TII, 2022a). The approach is based on comparing the net Proposed Development GHG emissions to the relevant carbon budgets (DECC, 2023a). With the publication of the Climate Action Act in 2021 and the Climate Action Plan 2024, sectoral carbon budgets have been

published for comparison with the net GHG emissions from the Proposed Development over its lifespan.

24.3.7 CLIMATE CHANGE RISK ASSESSMENT

The 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, 2022a) states that the CCRA is guided by the principles set out in the overarching best practice guidance documents and EU policy:

- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a)
- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (IEMA, 2020)
- Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change (European Commission, 2021b)

The baseline environment information provided in Section 24.5.4, future climate change modelling and input from other experts working on the Proposed Development (i.e. hydrologists) should be used 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 the Proposed Development assets (i.e. receptors) and their exposure to climate change hazards.

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

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 project 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 project 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 project 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.

24.3.8 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 x Exposure

The vulnerability assessment takes any proposed mitigation into account. Table 24.4 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale.

TII guidance (TII, 2022a) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. Therefore, the impact from climate change on the Proposed Development can be considered to be not significant.

However, 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 24.4: Vulnerability Matrix

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

24.4 DIFFICULTIES AND UNCERTAINTIES

There were no significant difficulties and uncertainties in completing this assessment.

24.5 BASELINE CLIMATE

PE-ENV-01104 (TII, 2022c) 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.

Ireland declared a climate and biodiversity emergency in May 2019, and in November 2019 there was European Parliament approval of a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation 2018/842 (European Union, 2018) results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations.

24.5.1 CURRENT GHG BASELINE

Data published in April 2025 (EPA, 2025a), indicates that Ireland exceeded, without the use of flexibilities, its 2023 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 2.22 Mt CO_2e. However, the 2023 emissions were the first time that Ireland's emission were below (-3.3%) 1990 levels. ETS[1] (Emissions Trading Scheme) emissions decreased (-17.0%) and ESR (Effort Sharing Regulation) emissions decreased (-3.5%). Ireland's target is an emission reduction of 626 kt of CO_2e by 2030 on an average baseline of 2016 to 2018. The EPA estimate that 2023 total national GHG emissions, excluding LULUCF, have decreased by 6.8% on 2022 levels to 54.93 Mt CO_2e, with a 2.2 Mt CO_2e (-21.4%) reduction in electricity industries alone. This was driven by a 40.7% share of energy from renewables in 2023 and by increasing our imported electricity. Manufacturing combustion and industrial processes decreased by 5.2% to 6.3 Mt CO_2e in 2023 due to declines in fossil fuel usage. The sector with the highest emissions in 2023 was agriculture at 37.7% of the total, followed by transport at 21.5%. For 2023, total national emissions (including LULUCF) were 58.83 Mt CO_2e (EPA, 2025), see Table 24.5.

The current estimates of national greenhouse gas emissions (including LULUCF) in 2023 are 10.3% below 2018, well off the national climate ambition of a 51% reduction by 2030. The data indicate that from 2021- 2023 Ireland has used 63% (186 Mt CO_2e) of the 295 Mt CO_2e carbon budget for the five-year period 2021-2025. This leaves 37% of the budget available for the next two years, requiring a substantial 5% annual emissions reduction for 2024 and 2025 to stay within budget.

Table 24.5: Trends in Total National GHG Emissions 2021 – 2023 (EPA, 2025a)

Sector *Note 1*	2021	2022	2023	Total Budget (Mt CO_2e) (2021-2025)	% Budget 2021-2025 Used	Annual Change 2022 to 2023
Electricity	9.89	9.69	7.57	40	67.89%	-21.91%
Transport	11.09	11.76	11.80	54	64.16%	0.35%
Buildings (Residential)	6.87	5.75	5.35	29	61.97%	-7.01%
Buildings (Commercial and Public)	1.44	1.45	1.39	7	61.16%	-3.94%
Industry	7.09	6.62	6.31	30	66.75%	-4.71%
Agriculture	21.94	21.78	20.72	106	60.79%	-4.88%
Other *Note 1*	1.86	1.93	1.81	9	62.28%	-6.27%
LULUCF	4.63	3.98	3.89	–	-	-2.33%
Total including LULUCF	64.82	62.99	58.83	295	63.27%	-3.80%

Note 1 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).

24.5.2 FUTURE GHG BASELINE

The future baseline with respect to the GHGA can be considered in relation to the future climate targets which the assessment results will be compared against. In line with TII (TII, 2022c) and IEMA Guidance (IEMA, 2022) the future baseline is a trajectory towards net zero by 2050, "whether it [the project] contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050".

The future baseline will be determined by Ireland meeting its targets set out in the CAP24, and future CAPs, alongside binding 2030 EU targets. The European Union (EU) enacted 'Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013' (hereafter referred to as the Regulation) (European Union, 2018) to meet the commitments under the Paris Agreement.

The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. The Regulation was amended in April 2023, and Ireland must now limit its greenhouse gas emissions by at least 42% by 2030. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS sector includes all

domestic GHG emitters which do not fall under the ETS scheme and includes GHG emissions from transport, residential and commercial buildings and agriculture.

In May 2025, the EPA released the report *Ireland's Greenhouse Gas Emissions Projections 2024-2055* (EPA, 2025b), which includes total projected emissions and a breakdown of projected emissions per sector under the 'With Existing Measures' and 'With Additional Measures' scenarios. The EPA projections indicate that currently implemented measures (With Existing Measures) will achieve a reduction of 10% on 2005 levels by 2030, significantly short of the 42% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, EPA projections show that Ireland can achieve a reduction of 22% by 2030, still short of the 42% reduction target.

24.5.3 CURRENT CCRA BASELINE

The region of the Proposed Development has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Dublin Airport is the nearest representative weather and climate monitoring station to the Proposed Development with meteorological data recorded for the 30-year period from 1991 to 2020. The historical regional weather data for Dublin Airport metrological station is representative of the current climate in the region of the Proposed Development. The data for the 30-year period from 1991 to 2020 indicates that the wettest months at Dublin Airport Metrological Station were October and November, and the driest month on average was March (Met Éireann, 2024a). July was the warmest month with a mean temperature of 15.4 Celsius. January was the coldest month with a mean temperature of 5.2 Celsius.

Met Éireann's 2023 Climate Statement (Met Éireann, 2024b) states 2023's average shaded air temperature in Ireland is provisionally 11.20°C, which is 1.65°C above the 1961-1990 long-term average. Previous to this 2022 was the warmest year on record; however, 2023 was 0.38°C warmer (see Figure 24.1). 2023 also had above average rainfall, this included the warmest June on record and the wettest March and July on record. Record high sea surface temperatures (SST) were recorded since April 2023 which included a severe marine heatwave to the west of Ireland during June 2023. This marine heatwave contributed to the record rainfall in July.

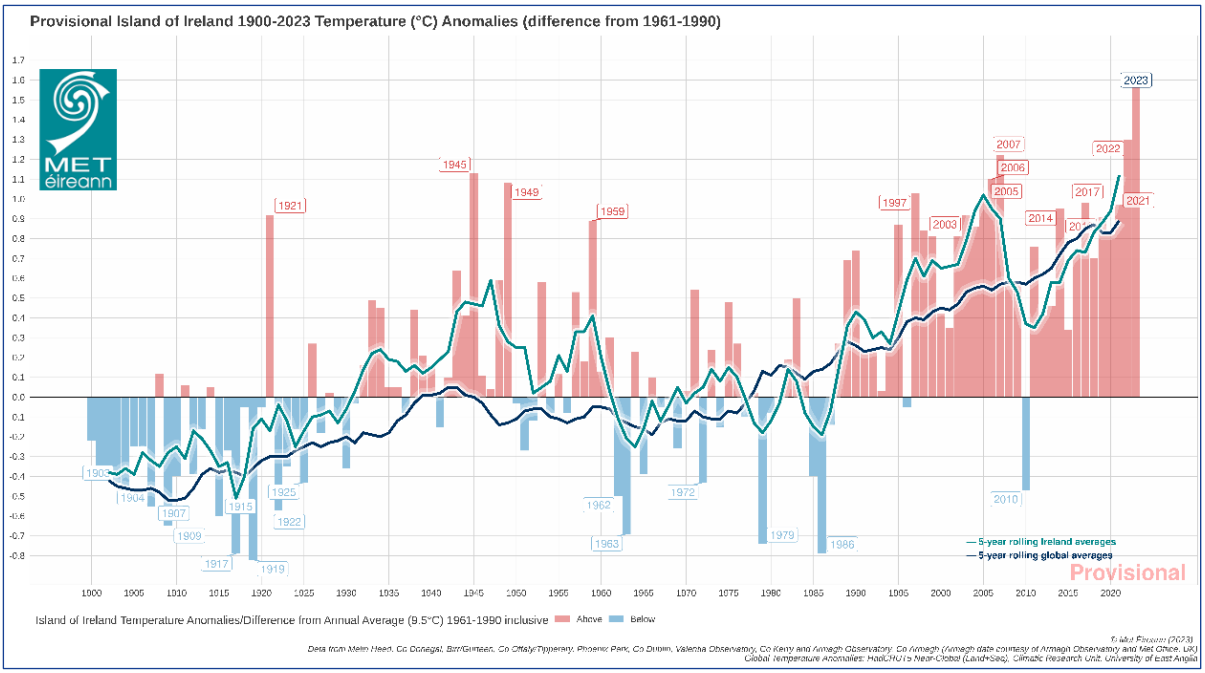


Figure 24.1: 1900-2023 Temperature (°C) Temperature Anomalies (differences from 1961-1990)

Recent weather patterns and records of extreme weather events recorded by Met Éireann have been reviewed. Considering the extraordinary 2023 data, Met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters. The record temperatures mean 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.

A Climate Change Risk Assessment (CCRA) was carried out by Wexford County Council as part of the development of the *Wexford Climate Action Plan 2024 – 2029* (WCC, 2024), which identified the current and future climate risks. The CCRA concludes that *"the most significant current climate risks in County Wexford are identified as: River Flooding; Coastal Flooding; and Coastal Erosion"*. Coastal erosion in particular was identified as a unique risk for County Wexford and that "*erosion rates have accelerated in County Wexford in recent years, as several high wind events, storm surge occurrences and coastal flooding events particularly over the last 5 years have exacerbated the coastal erosion rate at identified erosion risk zones in County Wexford*".

24.5.4 FUTURE CCRA BASELINE

Impacts as a result of climate change will evolve with a changing future baseline, changes have the potential to include increases in global temperatures and increases in the number of rainfall days per year. Therefore, it is expected that the baseline climate will evolve over time and consideration is needed with respect to this within the design of the Proposed Development.

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 including in the region where the Proposed

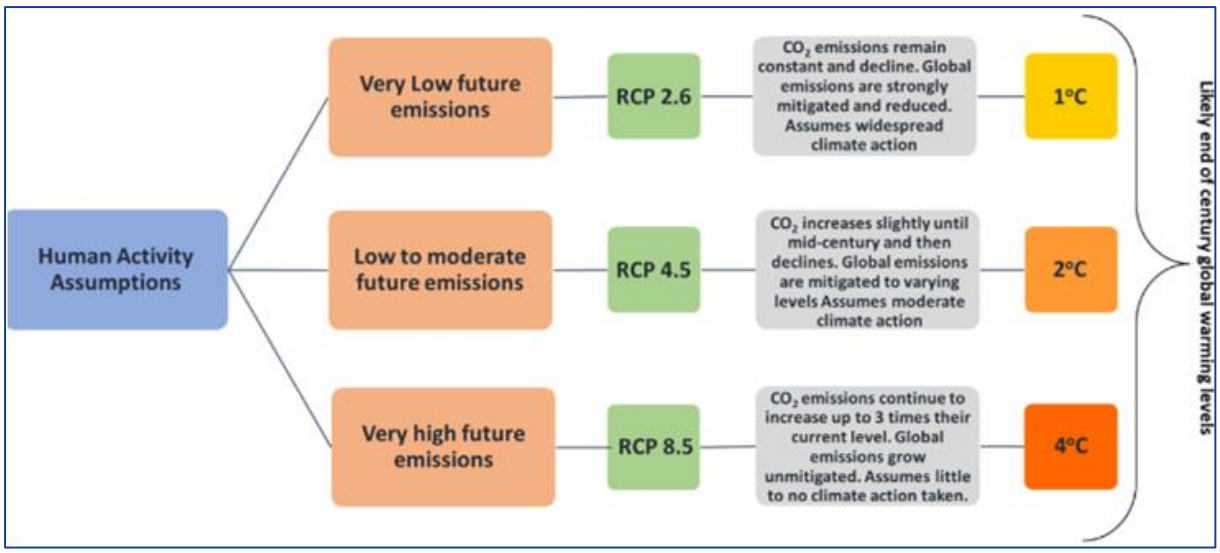
Development will be located (EPA, 2021b). The EPA have compiled a list of potential adverse impacts as a result of climate change including the following which may be of relevance to the Proposed Development (EPA, 2021b):

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

TII's Guidance document PE-ENV-01104 (TII 2022c) states that for future climate change a moderate to high Representative Concentration Pathways (RCP) should be adopted. RPC4.5 is considered moderate, while RPC8.5 is considered high. Representative Concentration Pathways (RCPs) describe different 21st century pathways of GHG emissions depending on the level of climate mitigation action undertaken.

National Framework for Climate Services (NFCS) was founded in June 2022 to streamline the provision of climate services in Ireland and will be led by Met Éireann. The aim of the NFCS is to enable the co-production, delivery and use of accurate, actionable and accessible climate information and tools to support climate resilience planning and decision making.

In addition to the NFCS, further work has been ongoing into climate projects in Ireland through research under the TRANSLATE project. TRANSLATE (Met Éireann, 2023b) 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, see Figure 24.2.



Source: TRANSLATE project storymap (Met Éireann, 2023a)

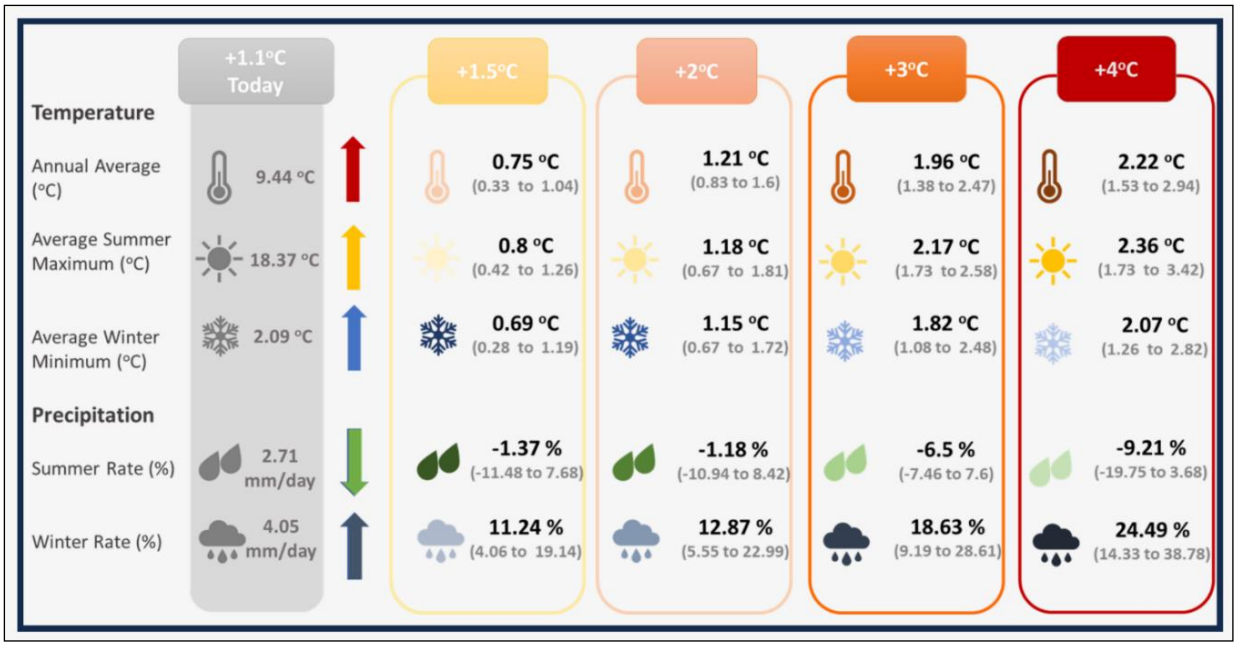
Figure 24.2: Representative Concentration Pathways associated emission levels

TRANSLATE (Met Éireann, 2023b) 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's 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 (SSTs) (Met Éireann, 2023b).

Met Éireann projects that Ireland will nevertheless continue to warm, although the AMOC cooling influence may lead to reduced warming compared with continental Europe. AMOC weakening is also expected to lead to additional sea level rise around Ireland. With climate change, Ireland's temperature and rainfall will undergo more and more significant changes e.g. on average summer temperature could increase by more than 2°C, summer rainfall could decrease by 9% while winter rainfall could increase by 24% (See Figure 24.3).

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 5 consecutive days where the daily maximum temperature is greater than 25°C.



Source: TRANSLATE project storymap (Met Éireann, 2023b)

Figure 24.3: Change of climate variables for Ireland for different Global warming thresholds

The TRANSLATE research report (Met Éireann, 2024b) finds that night-time temperatures will warm more than day-time temperatures, with temperatures increases across all seasons but the highest in the summer (with an increase of 0.5°C to 3.5°C). Autumn is projected to have the highest increase in average minimum temperatures (with an increase of 1.1°C to 4.4°C). The variance is dependent on the scenario that is being reviewed. While these temperatures are projected across all of Ireland, they increase most in the east of the country compared to the west. With respect to rainfall, increases of 4% to 38% are projected, however, this will not be spread across the year as during summer months there are projected decreases in rainfall beyond the 2°C warming scenario.

In January 2024, the EPA published *Ireland's Climate Change Assessment Synthesis Report* (EPA, 2024e) which contained four volumes:

- Volume 1: Climate Science: Ireland in a Changing World
- Volume 2: Achieving Climate Neutrality by 2050
- Volume 3: Being Prepared for Ireland's Future Climate
- Volume 4: Realising the Benefits of Transition and Transformation.

This report reinforces the existing and future risks arising from climate change. Volume 1 (EPA, 2024e) states that under Early action, the temperature increase averaged across the island of Ireland relative to the recent past (1976 to 2005) would reach 0.91°C (0.44 to 1.10°C) by mid-century before falling back to 0.80°C (0.34 to 1.07°C) at the end of the century. Whereas under Late action, by the end of the century it is projected that the temperature increases could be 2.77°C (2.02 to 3.49°C). Heat extremes will become more frequent and more severe and cold extremes will become less frequent and less severe with further warming.

Precipitation was 7% higher over the period 1991 to 2020 than over the 1961 to 1990 period. The average future predicted increase in precipitation is <10% in annual mean accumulated. By 2100 projected additional rises in sea level range from 0.32 to 0.6m under early action to 0.63 to 1.01m under late action scenarios, with greater storm surges potentially effecting critical infrastructure along the coastline. Projections of changes in storminess are highly uncertain and translate into large uncertainties in future frequency and intensity of extreme waves.

Volume 3 (EPA, 2024e) discusses how water supplies will face growing pressures resulting in increased water demand and how options need to be developed, including potential new sources. The report states the key role of critical infrastructure for delivering public services, economic development and a sustainable environment. These are exposed to a range of climate extremes. Failures in critical infrastructure can cascade across other sectors and present a multi-sector risk due to climate change.

Volume 4 (EPA, 2024e) calls for system change, including a transformation of urban settings. Stating that meaningful urban transformation can create a better living environment while simultaneously reducing emissions.

In June 2025 Ireland's first National Climate Change Risk Assessment (NCCRA) was published (EPA 2025c). The Risk Assessment was published in three parts, a technical report (EPA, 2025e), a main report (EPA, 2025c) and a summary for policy makers in non-technical and accessible language (EPA 2025d). While the NCCRA main report provides a general overview of the assessment methodology, the technical report provides further detail on the risk assessment findings, including descriptions of exposure, vulnerability, and consequence and outlines knowledge gaps Regional Policy and Guidelines. The assessment technique follows a semiquantitative risk assessment approach following the conceptual risk framework for climate change risks used in the Intergovernmental Panel on Climate Change (IPCC) Assessment Report (AR6) across 9 systems; The systems include Biodiversity and Ecosystems, Built Environment, Economy and Finance, Energy, Food Production and Supply Chain, Health, Marine and Coastal Ecosystems, Social, and Water Security. Transport is primarily assessed under the Build Environment system. The assessment of risks was considered across two IPCC Representative Concentration Pathways (RCPs) – RCP 4.5 and RCP 8.5. The NCCRA (EPA, 2025e) notes that The Office of Public Works (OPW) adopted the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS) for flood risk assessment in the CFRAM Programme and no timeframes for these scenarios to occur were provided in the assessment. Therefore, some uncertainties persist regarding the timing of changes in coastal and fluvial flooding extents due to this alignment approach even when the MRFS and HEFS have been aligned to correspond with the RCP4.5 and RCP8.5 scenarios, utilising global sea level rise data and TRANSLATE proxy variables (such as winter precipitation change).

A Climate Change Risk Assessment (CCRA) was carried out by Wexford County Council as part of the development of the *Wexford Climate Action Plan 2024 – 2029* (WCC, 2024), which identified the current and future climate risks. The CCRA concludes that *"future projections of climate change indicate that Extreme Precipitation, Prolonged Cold Periods and Heavy Snowfall will remain relatively consistent with existing conditions. However, risk is predicted to increase for all other identified*

climate hazards, with River Flooding, Coastal Flooding and Coastal Erosion remaining the perceived highest risk to County Wexford".

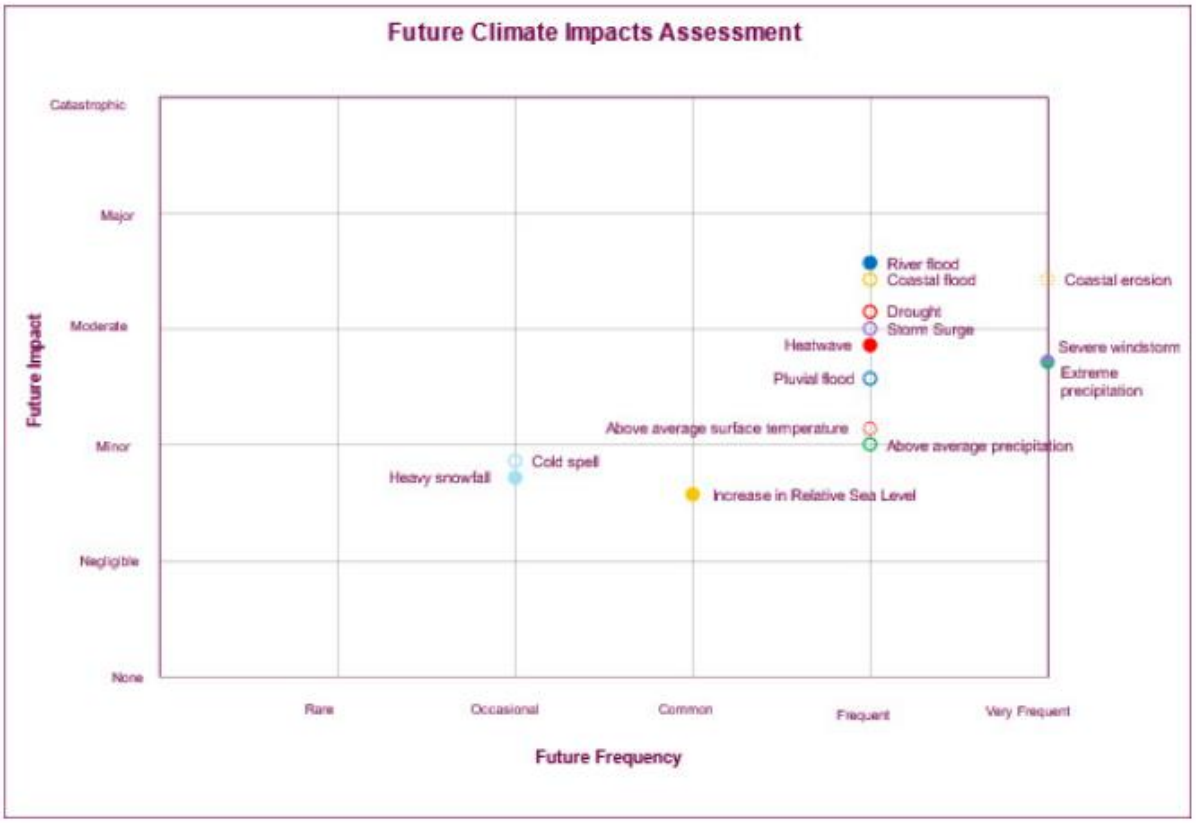


Figure 24.4: Wexford Future Climate Impact Assessment (reproduced from Section 3.2 of Wexford CCRA (WCC, 2024)

24.6 ASSESSMENT OF EFFECTS

24.6.1 "DO-NOTHING" SCENARIO

In the Do-Nothing scenario, the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc.). The Do-Nothing scenario is considered neutral in terms of the climate assessment.

In the Do-Nothing scenario Ireland plans to have 37GW of offshore wind by 2050 in order to meet our carbon neutral by 2050 target. The facilitation of offshore windfarm construction, which is the main operational activity of the Proposed Development, is required to achieve this offshore wind target. Should the Proposed Development not proceed, the construction of offshore windfarms and the clean renewable power which replaces power generated from fossil fuels would be delayed or prevented.

Therefore, this scenario can be considered adverse in terms of climate.

24.6.2 CONSTRUCTION PHASE IMPACTS

The most significant proportion of GHG emissions tend to occur during the construction phase as a result of embodied carbon in construction materials and emissions from construction activities. Therefore, the assessment has been included in the construction phase assessment for the purposes of the EIAR. The assessment is broken down into the following stages as per Section 24.3.4.1:

- Product stage (A1 – A3)
- Transportation to site (A4)
- Site operations (construction activities) (A5);
- Material replacement & refurbishment (B4 – B5)
- Waste disposal and transport (C2 - C4).

The construction phase GHG emissions comprise stages A1 – A5 which includes the construction materials, the transport of the materials to site and the construction activities or site operations. Ongoing material refurbishment and replacement throughout the lifetime of the development is included within category B4 – B5, these are default values based on the typical maintenance requirements for the chosen material types over the assumed 120-year lifetime (based on guidance in EN17472:2022 Sustainability of construction works. Sustainability assessment of civil engineering works. Calculation methods (BSI, 2022). Figure 24.5 shows the GHG emissions for the Proposed Development per life-cycle stage.

The carbon assessment has highlighted the areas where the highest embodied carbon emissions occur. Construction materials make up the majority of GHG emissions for the Proposed Development making up approximately 62% of the total construction phase GHG emissions. Where material types were not known, as these will not be selected until detailed design stage, the standard default material type was used.

However, where primary mitigation built into the project design was known it has been applied. This includes the reuse of dredged material within the project to significantly reduce the need for importing materials and the reduction in waste disposal and transportation. In addition, the design aims to avoid the use of concrete where possible, instead using rock and where concrete is required, a low carbon option (such as a 25% Ground Granulated Blast Furnace Slag (GGBS)) will be procured. The dredged material is a result of the construction of the required navigable channel dredged down to a minimum of -10m Chart Datum (CD) water depth which is essential for vessel movements into and out of the Proposed Development.

In addition to the data added to the TII Carbon Tool, emissions associated with marine vessels required during the construction phase have been included in Table 24.6. Service operation vessels (SOV) and auxiliary tug vessels will be required to assist with the construction phase and therefore the emissions associated with their fuel has also been considered (Marine Benchmark, 2020). An assumption has been made that the vessels are powered by a marine heavy fuel oil, which has an emission rate of emission factor of 3.15 tonnes CO_2/tonne fuel (Marine Benchmark, 2020). These movements make up a significant part of the carbon associated with transport emissions.

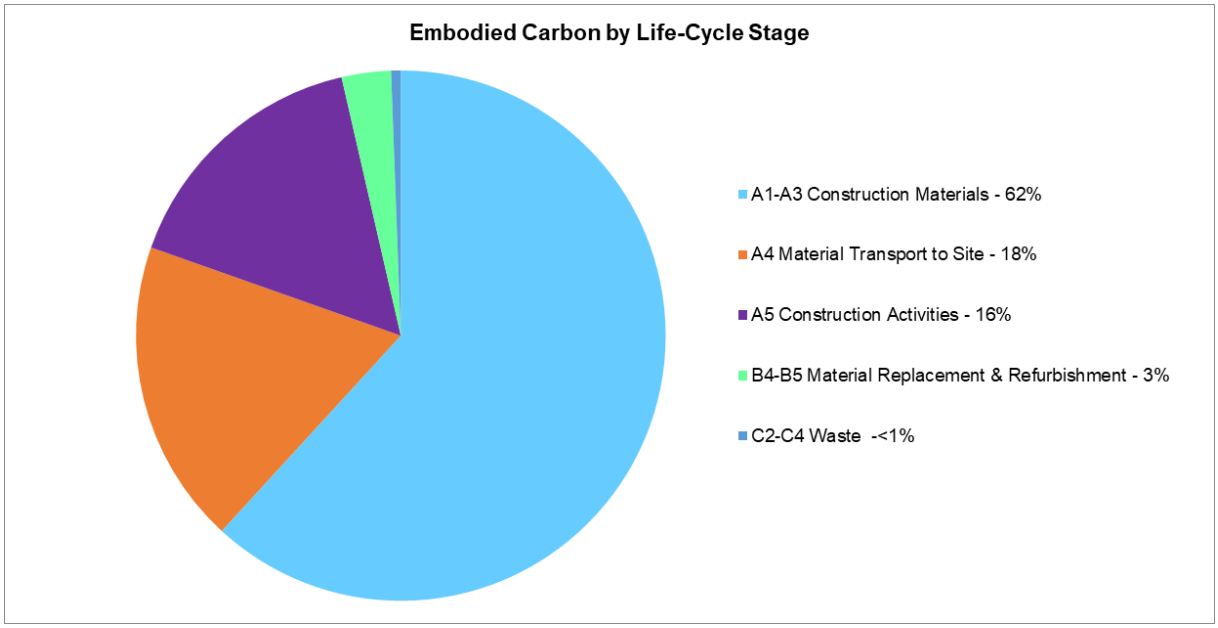


Figure 24.5: Embodied Carbon by Lifecycle Stage

It has been calculated that the total construction phase embodied carbon (including maintenance and replacement of materials over the development lifetime) will be 115,800 tonnes CO_2e (see Table 24.6). The GHG emissions from the development as a total cannot be compared against one specific sector 2030 carbon budget. The emissions are broken down into different assessment categories, and these must be compared separately to the relevant sectoral emissions budget which are detailed in Table 24.6. The relevant sectoral emissions for the Proposed Development comparison include the Industry sector, Transport sector, Electricity sector and Waste sector.

The predicted emissions for the Proposed Development are annualised over the assumed 120-year lifespan and then compared to the relevant sector 2030 carbon budgets. Annualising the full carbon emissions over the lifetime of the development allows for appropriate comparison with annual GHG targets.

Table 24.6: GHG Assessment Results

Lifecycle Stage	Source	tCO_2e	Sector	% of Relevant Budget (Annualised)
A1-A3	Materials	72,258	Industry	0.015%
A4	Material Transport	829	Transport	0.000115%
	Construction Worker Travel to Site	202	Transport	0.00003%
	Vessel Movements Construction	20,475	Transport	0.002844%
A5	Clearance and demolition	2	Industry	0.0000004%
	Excavation	4,381	Industry	0.0009%
	Construction Water Use	0.045	Industry	0.00000001%
	Plant Use	14,153	Electricity	0.003931%
B4-B5	Maintenance Material	3,486	Industry	0.001%

Lifecycle Stage	Source	tCO_2e	Sector	% of Relevant Budget (Annualised)
C3 - C4	Construction Waste Disposal	8	Waste	0.0000%
C2	Construction Waste Transport	6	Transport	0.000001%
Total CO_2 (Tonnes)		115,800		

The predicted GHG emissions (as shown in Table 24.7) can be averaged over the full lifespan of the Proposed Development to give the predicted annual emissions to allow for direct comparison with national annual emissions and targets.

In Table 24.7, GHG emissions have been compared against the carbon budget for the industry, transport and waste sectors in 2030 (DECC, 2024). They have also been measured against Ireland's total GHG emissions in 2023 and against Ireland's EU 2030 target of a 30% reduction in non-ETS sector emissions based on 2005 levels (33 Mt CO_2e) (set out in Regulation EU 2018/842 of the European Parliament and of the Council).

The estimated total GHG emissions, when annualised over the 120-year Proposed Development lifespan, are equivalent to 0.0016% of Ireland's total GHG emissions in 2023 and 0.0029% of Ireland's non-ETS 2030 emissions target.

Table 24.7: Estimated GHG Emissions Relative to Sectoral Budgets and GHG Baseline

Target/Sectoral Budget (tCO_2e)		Annualised Development GHG Emissions	% of Relevant Target/Budget
Ireland's 2023 Total GHG Emissions (existing baseline)	60,620,000	Total GHG Emissions	0.0016%
Non-ETS 2030 Target	33,000,000	Total GHG Emissions	0.0029%
2030 Sectoral Budget (Industry Sector)	4,000,000	Total Industry Emissions	0.016%
2030 Sectoral Budget (Transport Sector)	6,000,000	Total Transport Emissions	0.00014%
2030 Sectoral Budget (Waste Sector)	1,000,000	Total Waste Emissions	0.003931%

It should be noted that this is an estimate of the emissions associated with the project for the EIAR. The assessment has identified the areas where the greatest carbon impacts will occur and further consideration on how to reduce carbon impacts is to be conducted at detailed design phase. This can be done by selection of lower carbon alternative material types, choice of fuels and construction techniques.

24.6.3 OPERATIONAL PHASE IMPACTS

The Proposed Development is designed to deliver a renewable energy hub and facilitate the construction and operation of offshore windfarms. The majority of the operational phase impacts are associated with these activities, the direct activities of the Proposed Development being minor.

24.6.3.1 OPERATIONAL PHASE MAINTENANCE MATERIALS

Operational phase maintenance of the construction materials has been included with the construction phase assessment. Where additional maintenance or operational phase activities, such as waste management or replacement of materials, are required then low carbon principals in line with the recommendations from the most recent local and national Climate Action Plan will be applied.

24.6.3.2 OPERATIONAL PHASE VESSEL MOVEMENTS

The Proposed Development will facilitate vessel (cargo, service operation, crew transfer, cable maintenance and auxiliary vessels) movements during its operational stage (see Table 24.8: Predicted Vessel Movements). The majority of the movements are to construct or maintain offshore windfarms, which will each be assessed in their own project-specific EIAR's, and are not directly connected to the operation of the Proposed Development, however the purpose of the Proposed Development is to facilitate them.

It is estimated that annual emissions from the vessel movements are 6,568 tonnes CO_2e. This value will fluctuate depending on the vessel movements required but also the energy source for powering vessel moments. Changes in technologies may facilitate a change away from fossil fuel towards more climate friendly alternatives in the coming years.

Table 24.8: Predicted Vessel Movements: Predicted Vessel Movements

Vessel type	Number of Vessels	Number of Days Operational Annually
Cargo	30	1.5
Service Operation Vessel	15	2
Crew Transfer Vessel	8	220
Cable maintenance vessel	5	5
Auxiliary vessel	20	2

24.6.3.3 OPERATIONAL PHASE TRAFFIC

There is the potential for increased traffic volumes to impact climate during the operational phase. The change in traffic was reviewed against the PE-ENV-01106 screening criteria (TII, 2022c). The traffic associated with the Proposed Development in isolation is considered insignificant and will not substantially change the local traffic in the area with the Proposed Development in place. However, the Proposed Development may support traditional port operations (e.g. Roll-On Roll-Off cargo operations) in periods where there is no offshore renewable energy project demand for the development, though the primary use of the facility will be for ORE operations. The traffic associated with this potential future use of the development will remain below the TII screening criteria and a detailed climate assessment of traffic emissions is not required. This is discussed further in Chapter 18: Air Quality.

There are no further likely significant operational phase impacts associated with the Proposed Development.

24.6.3.4 GREENHOUSE GAS ASSESSMENT SIGNIFICANCE OF EFFECTS

In line with TII (TII, 2022a) and IEMA guidance (IEMA, 2022), the impact of GHG emissions associated with a Proposed Scheme on climate should be assessed over its lifetime, rather than for individual phases. The overall impact of the Proposed Development on climate due to GHG emissions is therefore discussed in Section 24.8, where the mitigation is also taken into account.

24.6.4 CLIMATE CHANGE RISK ASSESSMENT

24.6.4.1 CONSTRUCTION STAGE

Consideration has been given to the Proposed Development's vulnerability to the following climate change hazards with best practice mitigation measures proposed in Section 24.6.4.2.

- 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
- Major Storm Damage including wind damage.

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. 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.

Throughout detailed design and construction phase, guidance documents such as the EU Commission *Technical Guidance on Adapting Buildings to Climate Change* (European Commission 2021a), LETI emergency design guide (LETI 2020), and the latest IPCC report will inform design detail decisions. In addition, the second generation of Eurocodes design standards are due to be published which will take account of future climate change. If detailed design is ongoing upon their publication the design should take account of updated design standards, material recommendations and climate adaptation requirements.

24.6.4.2 OPERATIONAL PHASE

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 irrespective of the project location. Table 24.9 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 project 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 24.4. The results of the vulnerability assessment are detailed in Table 24.9.

Table 24.9: Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flood (coastal, pluvial or fluvial)	1 (Low)	3 (High)	3 (Medium Risk)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low Risk)
Extreme Cold	1 (Low)	2 (Medium)	2 (Low Risk)
Drought	1 (Low)	2 (Medium)	2 (Low Risk)
Wind	1 (Low)	2 (Medium)	2 (Low Risk)
Wildfire	1 (Low)	1 (Low)	1 (Low Risk)
Fog	1 (Low)	2 (Medium)	2 (Low Risk)
Lightning & Hail	1 (Low)	1 (Low)	1 (Low Risk)
Landslides	1 (Low)	1 (Low)	1 (Low Risk)

The sensitivity and exposure of the area was determined with reference to a number of online tools and with input from the various discipline specialists on the project team.

Flood Risk

Given the location of the Proposed Development, coastal flood risk due to sea level rise and wave overtopping is considered a hazard. The design team have considered this within the design and reduced the sensitivity of the assets within the Proposed Development by grey (i.e. engineering design) and soft actions (i.e. management plans). This includes the height of the quay, which is above the high-end future scenario (or RCP8.5) of 1m of sea level rise projected by the OPW from the current sea level. The quay deck is designed at +4.2mOD (Malin). The current highest astronomical tide (HAT) level, which is the highest tide predicted to occur at a specific location, is +0.9mOD. With this taken into consideration the quay can be considered to have an additional 3.3m of freeboard at HAT, which is significantly above the projected sea level rises for the high-end future scenarios.

The High-End Future Scenario (HEFS) maps represent a projected future scenario for the end of century (circa 2100) and include allowances for projected future changes in sea levels and glacial isostatic adjustment (GIA). In addition, given the nature of the Proposed Development the

infrastructure is designed to facilitate some overtopping by waves during either an extreme high tide event or a storm.

A management plan will be put in place for the operational stage to ensure that in the event of a tidal or storm event, which has the potential to impact of the materials stored at the hub, any sensitive elements are removed or stored in a suitable manner to protect them.

In addition, the drainage risk calculations include an additional 30% for future climate change, which is in line with high-end future scenarios for climate change (RCP8.5). The management plan will also include a procedure for when the car parks will require closure due to potential for overtopping.

While the exposure of the Proposed Development to sea level rise and tidal events will increase with climate change resulting in a high exposure, the combination of grey and soft mitigation limits ensure the sensitivity remains low, i.e. an adverse event that can be absorbed by taking business continuity actions, as the project is aware of the likely increasing future exposure and has adapted to it.

Erosion

With respect to coastal erosion, the works being undertaken for the Proposed Development will protect the current shoreline from erosion. Rock armour, which is being used as part of the construction for the Proposed Development, is frequently used as a material to prevent or slow coastal erosion. The sensitivity of the Proposed Development to coastal erosion is therefore considered low.

Extreme Temperatures

When considering the sensitivity of the Proposed Development to extreme temperatures, both hot and cold conditions, a range of -10 to +35 degrees Celsius has been considered. This temperature range is in line with projections made by Met Éireann. The design team has confirmed that with respect to the operational phase the materials will not be significantly impacted by fluctuations within this range. High quality, durable building materials will be selected for the Proposed Development which reduce their sensitivity. Access roads and car parks have the potential to have some limited impacts during heat waves as damage to pavement, e.g. softening, traffic-related rutting, migration of liquid asphalt, roadway buckling, is known to occur at approximately 32 degrees Celsius.

Management plans will be put in place in the event of extreme heat wave events to ensure internal roads are not affected by vehicles driving on them during road softening events. This will ensure the sensitivity of the asset is minimised to low. The proximity to the coast usually ensures that extreme temperature conditions are reduced slightly from inland.

Wind Exposure

The quay itself is not sensitive to wind exposure, which will become more extreme with climate change, however projections are not yet available from Met Éireann. The wind events are likely to coincide with flood risk events from overtopping of the quay by waves and the operational phase management plans will be designed to consider mitigation for these events with respect to the storage of materials at the hub and mechanisms to ensure materials are not at risk. All buildings will

be designed to accommodate the higher wind loadings which are likely to occur in both RCP4.5 and RCP8.5.

Landslides

The site is considered flat, as can be seen in site sections - surrounding lands are similar in plain makeup, with no steep slopes or forested areas which indicates a low risk for landslides.

Wildfire

Wildfire is not a significant risk to the Proposed Development due to the surrounding industrial and urban nature. The rail line acts as a natural fire break reducing the likelihood of any large fires. There is some natural grassland to the southwest however the area is limited and unlikely to be a significant source of wildfire threat. In addition, the nature of the quays materials and construction results in a low potential for combustion.

Lighting & Hail

With respect to lightning and hail, there are no significant operational phase risks. Where required, such as taller buildings, lightning protection systems will be put in place.

Fog

With respect to risk from fog, the coastal location of the Proposed Development may result in sea fog events occurring. However, these can be managed through operational procedures for fog events and correct lighting. Fog, therefore, does not post significant risk to the Proposed Development activities and is considered low risk.

Risk Summary

Overall, the Proposed Development has a worst-case medium vulnerability due to potential future flooding. However, this is a known risk at this location and primary mitigation has been built into the project design in order to minimise the vulnerability of the asset, with management plans to be put in place in order to further add resilience to the operational phase.

24.6.4.3 CCRA SIGNIFICANCE OF EFFECTS

With primary mitigation built into the project design in place, there are no significant risks to the Proposed Development as a result of climate change. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect of the impacts to the Proposed Development as a result of climate change are *direct, long-term, adverse* and *slight*, which is overall *not significant* in EIA terms.

24.6.5 CUMULATIVE EFFECTS AND OTHER INTERACTIONS

With respect to the requirement for a cumulative assessment the IEMA (IEMA, 2022) and TII (TII, 2022a) guidance on which the assessment is based states that:

> *"the identified receptor for the GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable. By presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland's ability to meet its*

national carbon reduction target. This assessment approach is considered to be inherently cumulative".

The Proposed Development, or a similar development at another location, is required to assist with the development of offshore wind energy in Ireland. Offshore renewable energy is a key component of the National Climate goal of achieving net zero by 2050 detailed within the 2021 Climate Act and therefore the Proposed Development can be considered cumulatively beneficial.

24.7 MITIGATION MEASURES FOR CLIMATE

In respect of climate, primary mitigation concerns the reuse of materials and other by-products where viable. The Proposed Development has been designed in a manner to reuse materials where feasible, minimising waste and the need for imported materials. The Proposed Development includes the beneficial re use of dredged spoil within the design, which significantly reduces the need to import additional rockfill material. In addition to the energy saved to extract the rockfill material, transportation emissions are reduced both from the rockfill material but also the transportation that would be required to ship the dredged spoil material to a suitable location at sea for it to be released as a waste material.

In respect of climate, as a tertiary mitigation, it is demonstrated that the Proposed Development is aligned with requirements under the Local and National Climate Action Plan (section 24.2 refers).

24.7.1 SECONDARY MITIGATION

24.7.1.1 CONSTRUCTION PHASE MITIGATION MEASURES

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. The following secondary mitigation measures are recommended to reduce the embodied carbon of the construction works:

- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials that can be reused/recycled, in compliance with the Circular Economy and Miscellaneous Provisions Act 2022
- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods
- Ensure all plant and machinery are well maintained and inspected regularly
- Reconsideration of the design to reduce materials required. The volume of concrete required has been minimised within the design, with a choice to use the dredged spoil and rockfill material as a more sustainable alternative. Minimisation of carbon intensive materials within the design is considered a primary mitigation measure and higher on the IEMA hierarchy of mitigation with respect to carbon
- The replacement, where feasible, of concrete containing Portland cement with a low carbon concrete as per the Climate Action Plan. An example of a replacement material is a 25% ground granulated blast furnace slag (GGBS) although other options also apply and provided that they have an embodied carbon that is as low or lower, then they are suitable for the final design with respect to the carbon assessment

- The Proposed Development will minimise wastage of materials due to poor timing or over ordering on site thus helping to minimise the embodied carbon footprint of the Proposed Development
- The use in construction plant and equipment of sustainably sourced Hydrotreated Vegetable Oil (HVO) as a 100% replacement of fossil fuels. HVO use is considered a stepping stone towards the use of electric construction plant as it becomes available in the market
- Procurement contracts will ensure that lower carbon choices are considered favourable during tender
- Where practicable, opportunities for materials reuse will be incorporated within the extent of the Proposed Development including the use of reclaimed asphalt and recycled aggregate, which will reduce the virgin material needs
- Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport.

24.7.1.2 OPERATIONAL PHASE MITIGATION MEASURES

In addition to the primary mitigation built into the project design which has been discussed, the following mitigation measures will also be put in place during the operational phase. These policies are designed to align with the Proposed Development with CAP24 and the national climate target of a trajectory to net zero by 2050:

- Nearly Zero-Energy Buildings
- Require operations to achieve high recycling rates with an aspiration to achieve zero waste directly to landfill
- Promote the use of bicycles (including push bikes, electric bikes, and cargo bikes), public transport, electric vehicles and shared mobility options as an alternative to car use among employees by creating and maintaining facilities (both inside and outside of buildings) that support such options, including secure and accessible bicycle parking, shared mobility parking, and charging stations, as appropriate, with a view to achieving the National Transport Authority's Smarter Travel Mark
- Should any vehicles be required for the operation of the Proposed Development, only zero-emissions vehicles will be procured (purchase or lease) from the end of 2022 and act as an international leader in this area. An exception applies where the vehicle is exempt under European Communities (Clean and Energy-Efficient Road Transport Vehicles) (Amendment) Regulations (S.I. 381 of 2021)
- Incorporate appropriate climate action and sustainability training (technical and behavioural, including green procurement training) into learning and development strategies for staff
- Ensure all senior management (P.O. level or equivalent and above) complete a climate action leadership training course

- Implement Green Public Procurement, using the Environmental Protection Agency (EPA) *Green Public Procurement Guidance* and criteria and Office of Government Procurement's online *Green Public Procurement Criteria Search* tool as resources
- Comply with the public sector requirement to not install heating systems that use fossil fuels after 2023, in (1) new buildings, and (2) "major renovation" retrofit projects as defined in the Energy Performance of Buildings Directive (EPBD) unless at least one of the following exceptions applies
- The fossil-fuel use is only through using electricity from the grid
- Primary mitigation has been built into the project design to address the vulnerability of the Proposed Development to climate change and have been considered in the assessment reported in Section 24.6.4. Monitoring will include the ongoing management of adaptation and resilience of the Operational Phase in order to measure effectiveness. If monitoring of adaptation and resilience measures indicates the measures are not effective, and climate is impacting on the construction of the Proposed Development, then they should be reviewed and updated
- The design working life of the Proposed Development is based on the current generation of Eurocodes which include climate data that is 10-15 years old. During the operation and maintenance of infrastructure, it will be essential to revisit the available climate data and any critical assumptions. This can be carried out at regular intervals (e.g. 5-10 years) as part of the asset management to address evolving climate risks. Monitoring will include the ongoing management of adaptation and resilience of the Operational Phase in order to measure their effectiveness. If monitoring of adaptation and resilience measures indicate that the measures are not effective and climate is impacting on the construction of the Proposed Development, then they should be reviewed and updated
- The Proposed Development will maintain a Major Incident Management and Severe Weather Team Plan for the Proposed Project to ensure the critical infrastructure is protected during operation from the impacts of severe weather
- Infrastructure to support the traditional port operations (e.g. Roll-On Roll-Off cargo operations) will facilitate the specific needs of electric cars and freight. These needs will change over the design lifespan of the project as there is a greater uptake of electric vehicles. For example, the uptake of hydrogen vehicles is expected to rise closer to 2030. In addition, other technologies may emerge.

24.8 RESIDUAL EFFECTS

24.8.1 CONSTRUCTION PHASE RESIDUAL EFFECTS

The impacts of the Proposed Scheme on climate due to GHG emissions should be considered for the development as a whole, over its lifetime, rather than for individual phases, in line with TII (TII, 2022a) and IEMA (IEMA, 2022) guidance. The residual impacts of the Proposed Development on climate due to Construction Phase GHG emissions, post mitigation, is therefore discussed below in Section 24.8.2 alongside residual Operational Phase impacts.

24.8.2 OPERATIONAL PHASE RESIDUAL EFFECTS

The Proposed Development will result in some impacts to climate through the release of GHGs, however the Proposed Development aims to minimise it's impacts through design and management measures. TII reference the IEMA guidance (2022) which states that the crux of assessing significance 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".*

The Proposed Development's purpose is to assist with the development of offshore wind energy in Ireland. Offshore renewable energy is a key component of the National Climate goal of achieving net zero by 2050 detailed within the 2021 Climate Act. Ireland plans to have 37GW of offshore wind by 2050 in order to meet our carbon neutral by 2050 target. Should the Offshore Renewable Energy (ORE) not be provided in any location, the construction of offshore windfarms and the clean renewable power which replaces power generated from fossil fuels would be delayed or prevented.

As per the assessment criteria in Table 24.3, the residual impact of the Proposed Development in relation to GHG emissions is considered ***direct, long-term, adverse*** and ***slight*****,** which is overall ***not significant*** in EIA terms based on the information available at the time of compiling this assessment.

In relation to climate change vulnerability, it has been assessed that there is a low risk as a result of the majority of future climate change hazards with the exception of flooding which has a medium risk. However, the sensitivity of the Proposed Development's assets has been mitigated by ensuring the quay height is significantly above the RCP8.5 projected sea level rise level by 2100. The risk of the Proposed Development to future climate change will require periodical updates and active management to ensure the Proposed Development remains resilient to future climate impacts.

24.9 MONITORING

Material use, reuse and waste will be monitored during the construction phase to minimise the embodied carbon within the Proposed Development.

Design mitigation measures for the vulnerability of the Proposed Development to climate change have been incorporated into the design and taken account of in the assessment reported in Section 24.6.4. Monitoring will include the ongoing management of adaptation and resilience of the Operational Phase in order to measure effectiveness. If monitoring of adaptation and resilience measures indicates the measures are not effective and climate is impacting on the construction and operation of the Proposed Development, then they should be reviewed and updated.

The design working life of the Proposed Development is based on the current generation of Eurocodes which include climate data that is 10-15 years old. During the operation and maintenance of infrastructure, it will be essential to revisit the available climate data and any critical assumptions. This can be carried out at regular intervals (e.g. 5-10 years) as part of the asset management to address evolving climate risks. Monitoring will include the ongoing management of adaptation and resilience of the Operational Phase in order to measure their effectiveness. If monitoring of adaptation and resilience measures indicates the measures are not effective and climate is impacting on the construction of the Proposed Development, then they should be reviewed and updated.

24.10 SUMMARY

This chapter of the EIAR has assessed the potential environmental impacts on climate from the construction and operation phases of the Proposed Development, the assessment is summarised in Table 24.10.

Table 24.10: Summary of Potential Effects

Potential Effect	Construction/ Operation	Beneficial /Adverse/ Neutral	Extent (Site/Local/ National / Transboundary)	Short term/ Long term	Direct/ Indirect	Permanent / Temporary	Reversible / Irreversible	Significance of Effect (according to defined criteria)	Proposed mitigation	Residual Effects (according to defined criteria)
Construction – materials, construction activities, waste, transport and water use result in greenhouse gas (GHG) emissions and have the potential to impact a highly sensitive environment as Ireland currently exceeds its GHG emission targets.	Construction	Adverse	National	Long-Term	Direct and Indirect	Permanent	Irreversible	Moderate adverse, long-term and significant	Design and management mitigation in order to minimise the requirement for embodied carbon within the construction.	Slight adverse, long-term and not significant - TII (TII 2022a) and IEMA (IEMA, 2022) guidance states that the impacts of the Proposed Project on climate due to GHG emissions should be considered for the development as a whole, over its lifetime, rather than for individual elements or phases.
Operational phase energy, material maintenance and waste requirements from the operation of the Proposed Development.	Operation	Adverse	National	Long-Term	Indirect	Permanent	Irreversible	Moderate adverse, long-term and significant	Efficient management and minimisation of ongoing energy, material maintenance and waste from the operation of the Proposed Development.	
Facilitation of Ireland to construct and operate offshore windfarms which assist in Ireland Net Zero carbon target for 2050.	Operation	Beneficial	National	Long-Term	Indirect	Permanent	Irreversible	Beneficial, long-term and significant	Efficient management of the Proposed Development to ensure elements under the Proposed Developments control offshore windfarms can be constructed and maintained.	
Climate change has the potential to cause weather related hazards to occur with more frequency and impact operation.	Operation	Adverse	National	Long-Term	Direct and Indirect	Temporary to Permanent depending on specific risk. i.e. sea level rise is permanent, but a fog may be temporary	Reversible	Adverse	Infrastructure and assets must minimise vulnerability to future climate change. Consideration for effects of extreme temperature on materials. Detailed design inclusion of additional risks posed by future climate change hazards up to 2100 for RCP4.5 and RC8.5	Medium Risk due to exposure to flood risk from coastal location.

24.11 REFERENCES

BSI (2023). Publicly Available Specification (PAS) 2080:2023 on Carbon Management in Infrastructure. 2023.

Civil Engineering Standard Method of Measurement (CESSM) (2013) Carbon and Price Book database.

Construction Industry Federation (2021) Modern Methods of Construction

Department of Environment, Climate and Communications (DECC) (2023a) Climate Action Plan (CAP) 2024

Department of Environment, Climate and Communications (DECC) (2023b) Long-term Strategy on Greenhouse Gas Emissions Reductions (draft)

Department of Environment, Climate and Communications (DECC) (2024) National Adaptation Framework (NAF)

Department of Environment, Climate and Communications (DECC) (2025) Climate Action Plan (CAP) 2025

EPA (2020a) State of the Irish Environment Report (Chapter 2: Climate Change)

EPA (2020b) Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach'

EPA (EPA) (2021a) Critical Infrastructure Vulnerability to Climate Change Report No. 369

EPA (EPA) (2021b) Critical Infrastructure Vulnerability to Climate Change Report no. 369

EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

EPA (2024) Ireland's Climate Change Assessment Synthesis Report

EPA (2025a) Ireland's Final Greenhouse Gas Emissions 1990-2023

EPA (2025b) Ireland's Greenhouse Gas Emissions Projections 2024-2055

EPA (2025c) National Climate Change Risk Assessment Main Report

EPA (2025d) National Climate Change Risk Assessment Summary for Policymakers

EPA (2025e) National Climate Change Risk Assessment Technical Report

European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment

European Commission (2014) 2030 Climate and Energy Policy Framework

European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report

European Commission (2017) Guidance on the preparation of the Environmental Impact Assessment Report

European Commission (2021a) Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027

European Commission (2021b) 2030 EU Climate Target Plan

European Commission (2021b) Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change.

European Union (2018) Regulation 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013

Government of Ireland (2015) Climate Action and Low Carbon Development Act

Government of Ireland (2019) Climate Action Plan 2019

Government of Ireland (2020) Climate Action Plan 2021

Government of Ireland (2021) Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021)

Government of Ireland (2022) Climate Action Plan 2022

Government of Ireland (2023) Long-term Strategy on Greenhouse Gas Emissions Reductions

IEMA (2020a) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation

IEMA (2020b) GHG Management Hierarchy

IEMA (2022) Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance

LETI (2020) Climate Emergency Design Guide

Marine Benchmark (2020) Research Brief 11/2020 Maritime CO_2 Emissions

Met Éireann (2023a). Ireland's 30-year Climate Averages. Available from: https://www.met.ie/climate/30-year-averages

Met Éireann (2023b) TRANSLATE: One Climate Resource for Ireland. [Online] Available at: https://www.met.ie/science/translate

Met Éireann (2024a) Met Éireann's 2023 Climate Statement

Met Éireann (2024b). TRANSLATE research report.

Standard Method of Measurement (CESSM) (2013) Carbon and Price Book database

TII (2022a) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document

TII (2022b) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document

TII (2022c) PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects

TII (2022d) TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107

TII (TII) (2022c) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document

United Nations / Framework Convention on Climate Change (2015) Adoption of the Paris Agreement, 21st Conference of the Parties, Paris: United Nations

Wexford County Council (2024) Wexford County Council Climate Action Plan 2024 – 2029.

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