



GALETECH
ENERGY SERVICES

Islandmore Wind Farm

Environmental Impact Assessment
Report

Chapter 9: Climate

Islandmore Wind Farm Limited

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9.1 INTRODUCTION

This chapter comprises an assessment of the likely significant effects on climate associated with the Islandmore Wind Farm ('the project'), which comprises 10 no. wind turbines and associated ancillary infrastructure.

The chapter assess the project's climatic baseline and discusses the significant effects that the project is likely to have during construction, operation and decommissioning. Where required, appropriate mitigation measures to minimise significant adverse climate impacts are recommended.

The climate assessment comprises two elements:-

- Greenhouse gas emissions assessment (GHGA) – Quantifies the greenhouse gas (GHG) emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets, and policy to contextualise magnitude; and,
- Climate change risk assessment (CCRA) – Identifies the impact of a changing climate on a project and receiving environment. The assessment considers a project's vulnerability to climate change and identifies adaptation measures to increase project resilience.

9.1.1 STATEMENT OF AUTHORITY

The assessment was undertaken, and the chapter compiled, by Ciara O'Connor. Ciara is a Junior Environmental Consultant in the Air Quality and Climate section of AWN Consulting, a Trinity Consultants Company. She holds a BSc in Environmental Science from University College Cork. She has completed air quality and climate impact assessments as part of EIARs for residential developments and renewable energy developments.

This chapter was reviewed by Lee Shelton. Lee is a Principal Environmental Consultant in the Air Quality & Climate section of AWN Consulting, a Trinity Consultants Company. Lee is a Chartered Environmentalist with 11-years' experience in environmental assessment and holds a BSc (Hons) in Environmental Protection from Scotland's Rural College through the University of Edinburgh. Lee has a specialism in air quality assessment having worked on a number of projects requiring the quantification of emissions specific to local air quality, a skill transferrable to climate assessment. Lee undertook some of the earliest climate assessments undertaken in the UK transport sector such as those for the Design Manual for Roads and Bridges Stage 2 assessment for the A47 Improvements at Tuddenham and Guyhirn in England and latterly was involved in the Midlands Connect Transport Carbon Quantification in England. Lee's recent climate assessments include numerous large residential developments in Ireland, major transport infrastructure, windfarms and anaerobic digestion plant. Lee specialises in air quality dispersion modelling and assessment of emissions, odour and accidental releases, emission inventories, air quality and odour monitoring and geographical information systems.

9.1.2 DESCRIPTION OF THE PROJECT

In summary, the project comprises the following main components as described in **Chapter 3: -**

- 10 no. wind turbines, 3 no. with an overall height of 185m and 7 no. with an overall height of 150m;

- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure and forestry felling;
- Works to the public road network along the turbine component haul route; and,
- 110kV electricity substation and installation of c. 7km of underground electricity line to facilitate connection of the wind farm to the existing Tonroe 110kV electricity substation at Ballaghaderreen, County Roscommon.

The project is located in north County Roscommon; c. 2km north of Ballaghaderreen, c. 13km east of Charlestown (Co. Mayo) and c. 6km southwest of Gorteen (Co. Sligo); and is located in close proximity to the county boundaries between counties Roscommon, Sligo and Mayo.

It is envisaged that turbine components will be transported from the Port of Galway through the counties of Galway, Mayo and Roscommon to the project site utilising, predominately, motorway and national roads.

A full description of the project is presented in **Chapter 3**.

9.2 METHODOLOGY

9.2.1 LEGISLATION, POLICY AND GUIDANCE

In common with all environmental legislation, climate legislation in Ireland is driven primarily by international agreements or European Directives that are then transcribed into domestic law by the Government of Ireland. This is then interpreted through European and domestic policy instruments that clarify aspects, objectives, targets and requirements described in the legislation.

9.2.1.1 Legislation

The *United Nations Paris Agreement* (United Nations, 2015) treaty binds signatory nations to a commitment to hold global average temperature increase well below 2°C above pre-industrial levels with efforts to limit the increase to 1.5°C below pre-industrial levels. Signatories commit to Nationally Determined Contributions (NDCS) which are self-defined climate pledges made by countries in response to climate change, which also includes the direction of finance. Adaptation to the adverse impacts of climate change and lowering of greenhouse gas emissions should be undertaken in an equitable manner so as not to disadvantage populations on lower incomes or those most at risk from climate change.

Regulation (EU) 2026/667 of the European Parliament and of the Council of 11 March 2026; establishing the framework for achieving climate neutrality and amending Regulations (EC) No 2021/1119, 401/2009 and (EU) 2018/1999 (European Parliament and Council, 2021); follows from the Paris Agreement and writes into EU law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas (GHG) emissions by at least 90% by 2040, compared to 1990 levels. These targets are also applied to member states.

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (European Parliament and Council, 2014), acknowledges that climate change will play a crucial role in the sustainable

development of society. Directive 2014/52/EU requires assessment of the impact of specific types of new development on the climate. There is a requirement for the quantification of greenhouse gases from a development, and an assessment of the risk posed to specific types of new development by the adverse effects of climate change.

The *Climate Action and Low Carbon Development Act 2015 (as amended)* (Government of Ireland, 2015) ('the 2015 Act') enables Ireland "to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050". This is referred to in the 2015 Act (as amended) 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.

Section 15 of the 2015 Act sets out the duties imposed by certain bodies, including local authorities and An Coimisiún Pleanála. This section was amended by the *Climate Action and Low Carbon Development (Amendment) Act 2021* (Government of Ireland, 2021) ('the 2021 Act') and states:-

"(1) A relevant body shall, in so far as practicable, perform its functions in a manner consistent with—

(a) the most recent approved climate action plan,

(b) the most recent approved national long term climate action strategy,

(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,

(d) the furtherance of the national climate objective, and

(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."

The 2021 Act provides the framework for Ireland to achieve a climate resilient and climate neutral economy by the end of the year 2050. The 2021 Act allows for the setting of carbon budgets and sectoral emissions ceilings to apply to sectors of the economy whilst promoting climate justice and just transition to the climate resilient and climate neutral economy. Carbon budgets are determined based on the requirements for reductions in GHG described in EU Regulation 2018/842. The 2021 Act should be read together with the 2015 Act, and together are referred to in this report as 'the Climate Act'.

9.2.1.2 Policy

The *European Green Deal* published by the European Commission in December 2019 provides an action plan which aims for the EU to achieve climate neutrality by 2050. The deal highlights a reduction in emissions of 55% in comparison to 1990 levels by 2030 and 90% by 2040. The deal outlines plans for a just and fair transition to a climate neutral society through funding and social investment, carbon pricing, the Emissions Trading Scheme, green industry, the circular economy and stakeholder engagement in the processes at every level.

The *2021 EU Strategy on Adaptation to Climate Change* (European Commission, 2021a) 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...”

The latest iteration of the Government of Ireland's *Climate Action Plan* (CAP25) (Government of Ireland, 2025a) was published in 2025 updating many of the suggested measures and actions required to achieve carbon budgets and sectoral emissions ceilings from CAP24, (Government of Ireland, 2024a). Both CAP24 and CAP25 should be read together. The plans taken together provide the roadmap for halving Ireland's emissions by 2030 and achieving carbon neutrality by 2050. The CAP25 advances sector-specific measures including decarbonising the residential building sector. This includes the complete phase-out of fossil fuel heating for both new builds and retrofits. CAP25 details the 5-year carbon budget periods, shown in **Table 9.1**, and the Sectoral Emissions Ceilings, shown in **Table 9.2**, as required by the Climate Act.

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO ₂ e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO ₂ e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO ₂ e	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 9.1: Carbon Budgets for the CAP25 5-Year Periods

Sector	Baseline (Mt CO ₂ e)	Carbon Budgets (Mt CO ₂ e)		2030 Emissions (Mt CO ₂ e)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, a new approach aligned with the EU LULUCF Regulation has been adopted.			
Total	68				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	295	200	-	51

Table 9.2: CAP25 Sectoral Emission Ceilings for 2030

The *Long-Term Strategy on Greenhouse Gas Emissions Reductions* (Government of Ireland, 2023) provides the indicative pathways beyond 2030 on how Ireland will transition towards carbon neutrality by 2050. The strategy is intended to bridge the

gap between the short-term objectives of the Climate Action Plans and the longer-term objectives of EU Climate Law and Ireland's National Climate Objective, which aims to achieve, by no later than 2050, a transition to a climate-resilient, biodiversity-rich, environmentally sustainable, and climate-neutral economy.

The *National Planning Framework (First Revision)* (Government of Ireland, 2025b) specifies policies relevant for the project: -

- 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; and,
- National Policy Objective 71: Support the development and upgrading of the national electricity grid infrastructure, including supporting the delivery of renewable electricity generating development.

Climate Change Vulnerability Policy

The *Second National Adaptation Framework (NAF)* (Government of Ireland, 2024b) outlines a comprehensive, whole-of-government and whole-of-society approach to climate adaptation. Its core objective is to enhance Ireland's resilience to a wide range of climate risks, including extreme weather events, flooding, drought, biodiversity loss, sea level rise, and rising temperatures. The NAF sets out the roles of the Taoiseach, Government and non-governmental organisations, incorporates an evidence base for climate change and incorporates sectoral and local requirements and indicators for adaptation planning.

In relation to the built environment, the NAF states in Chapter 3, that “*deepening of adaptation considerations in the planning and building standards processes is considered the most appropriate way of increasing the resilience of the built environment*”. Within the NAF, it is stated that there is a risk of damage to buildings and structures from severe weather events such as high winds and intense rainfall. New development should accommodate predicted future climate change impacts without requiring major redesign or redevelopment in the future, which may be costly and inefficient. This will require facilitating innovative building design, new materials and standards (to accommodate hotter summers while withstanding changes in precipitation patterns and more intense storms for example).

The *National Climate Change Risk Assessment (NCCRA)* (Environmental Protection Agency, 2025) was required as part of the 2021 CAP. The NCCRA approached the risk assessment through: -

- 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;

- Sensitivity - refers to the degree to which a system or asset is affected by climate hazards. It reflects how vulnerable something is to changes such as temperature extremes, flooding, or drought, based on its physical, functional, or ecological characteristics;
- Vulnerability - the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity; and,
- Risk - the potential for adverse consequences for human or ecological systems.

Compilation of the NCCRA was undertaken using scenarios from the fifth *Intergovernmental Panel on Climate Change Assessment Report* (AR5). The NCCRA used a high concentration scenario resulting a predicted average global temperature increase of 4.3°C by 2100 (RCP8.5) generally accepted as an extreme worst-case scenario, and a moderate scenario (RCP4.5) where emissions are predicted to peak by 2040 and then decline resulting in an average global temperature increase of between 2.5°C and 3°C. Both scenarios are considered conservative for Ireland as they assume that emissions targets are not met.

Local policy

The Roscommon County Council (RCC) *County Roscommon Local Authority Climate Action Plan 2024–2029* (RCC, 2024) outlines RCC's objectives to mitigate greenhouse gas emissions and strategies to prepare for and adapt to climate change. The plan encompasses actions across 6 no. thematic areas: Energy & Buildings, Transport, Flood Resilience, Nature-Based Solutions, Circular Economy & Resource Management, and Citizen Engagement. This aligns with the Government's National Climate Objective, which aims to achieve, by no later than 2050, a transition to a climate-resilient, biodiversity-rich, environmentally sustainable, and climate-neutral economy.

Renewable energy and decarbonisation objectives are addressed in the RCC *Climate Action Plan* through actions such as: -

- BET4: Promote the development of suitable alternative energy projects in appropriate areas, including on degraded lands in RCC ownership (e.g. historic landfill sites) and particularly those developed and run by communities aligned with the SEC programme and in accordance with the adopted RCC *Renewable Energy Strategy*;
- NEGI(ix): Establish and coordinate appropriate links between the LA and external bodies to mobilise action in the areas of agriculture and renewable energy; and,
- CRT1: Identify gaps in support for communities in achieving their climate ambition in the areas of placemaking, economic development and employment generation, agriculture, mobility, tourism and heritage, social enterprise, retail, commerce, industry, waste management and the circular economy and renewable energy development.

RCC (RCC, 2024) also suggests that the frequency and intensity of some hazards (e.g., river and pluvial flooding, heatwaves and drought) will increase while others will remain the same (e.g., severe windstorms and groundwater flooding). Some hazards are expected to decrease in frequency, such as cold spells and heavy snowfalls.

9.2.1.3 Guidance

The following guidance is considered relevant to this assessment: -

- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (hereafter referred to as the EPA Guidelines) (Environmental Protection Agency, 2022);
- *Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report* (hereafter referred to as the EU Guidance) (European Commission, 2017);
- Transport Infrastructure Ireland (TII) *PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document* (Transport Infrastructure Ireland, 2022);
- Transport Infrastructure Ireland (TII) *GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document* (Transport Infrastructure Ireland, 2025);
- Institute of Sustainability and Environmental Professionals (ISEP) (formerly known as Institute of Environmental Management & Assessment (IEMA)) *Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance Edition 2.1* (hereafter referred to as the ISEP 2026 GHG Guidance) (Institute of Sustainability & Environmental Professionals, 2026);
- ISEP *Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation* (hereafter referred to as the ISEP 2020 EIA Guide) (Institute of Sustainability & Environmental Practitioners, 2020a);
- ISEP *GHG Management Hierarchy* (hereafter referred to as the ISEP 2020 GHG Management Hierarchy) (Institute of Sustainability & Environmental Practitioners, 2020b);
- *Carbon Management in Infrastructure and Built Environment - PAS 2080* (The British Standards Institution, 2023); and,
- *Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027* (European Commission, 2021b)

9.2.2 GREENHOUSE GAS ASSESSMENT

9.2.2.1 Construction Phase

The assessment of GHG emissions resulting from the construction phase is quantified using the categories described in BS EN 15978. These 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 associated carbon impacts that arise) from transforming the raw materials into construction products.
- Construction (Category A4 to A5)
These carbon impacts arise from transforming 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 (Transport Infrastructure Ireland, 2022) recommends the calculation of the construction stage embodied carbon using the TII Online Carbon Tool or an appropriate alternative tool. 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 CAP25 goal of achieving carbon neutrality by 2050.

The TII Online Carbon Tool has been commissioned by TII to assess GHG emissions associated with road or rail projects in Ireland. The TII Carbon Tool uses emission factors from recognised sources including, but not limited to: -

- Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database;
- Circular Ecology ICE v4.0 ICE DB Advanced V4.0; and,
- Circular Ecology ICE v4.1 ICE DB Advanced V4.1

The tool can be applied to a variety of developments, not just road or rail and aligns with PAS 2080.

The TII Carbon Tool was utilised to estimate the GHG emissions associated with the non-building elements of the project including construction activities, land clearance activities and construction wastes.

As described in **Chapter 3**, design flexibility has not been sought for this project, and the Vestas V136-4.5MW (7 no.) and Vestas V162-7.2MW (3 no.) turbines have been selected for installation. The Vestas V162-7.2MW turbines will be 185m in height, with a hub height of 104m and a rotor sweep of 162m. The Vestas V136-4.5MW turbines will have a hub height of 82m, a rotor diameter of 136m and an overall tip height of 150m. On this basis, the Lifecycle Carbon Assessment (LCA) for the Vestas V136-4.5MW and Vestas V162-7.2MW (Vestas, 2022) wind turbines have been obtained from public information published by Vestas and used as a proxy.

The LCAs for the Vestas V136-4.5MW and Vestas V162-7.2MW quantifies the power consumption associated with the production, operation, transport and end-of-life of the wind turbines. The Vestas V136-4.5MW LCA was calculated for a specific sample 100MW wind farm scenario made up of 24 no. turbines under medium wind conditions (average 8.5m/s), with additional sensitivity scenarios. The Vestas V162-7.2MW was modelled as part of a 99.2 MW (100 MW) onshore wind farm comprising 16 no. turbines under low wind conditions (7.4 m/s average wind speed). For the purposes of this assessment, the data provided in the LCAs should be considered as proxy data for

the calculation of embodied carbon. The assessment also quantifies the greenhouse gas emissions associated with the production, operation, transport and end-of-life of the wind turbines on the basis of the embodied carbon per unit of energy generated for the modelled scenario. The energy balance associated with the wind power production during its lifetime and the energy associated with the manufacturing, operation, transport, dismantling and disposal was calculated on the modelled site-specific basis as the energy balance is based on the expected GWh of production during its lifetime. The GHG balance is expressed in terms of the time taken for the energy consumed by the turbine through its full life cycle to be repaid in terms of wind energy exported to the electricity grid compared to the equivalent fossil fuel powered electricity generation and is reported in the LCA in gCO₂e/kWh generated. The embodied carbon for the turbines was calculated on this basis.

The Vestas V136-4.5MW LCA reports that the typical payback period for the type of turbine specified is approximately 6.1-months for the scenario modelled in the LCA, however it can be as little as 2-months for some installations. For this assessment, a conservative assumption of 6.1-months is assumed.

The Vestas V162-7.2MW LCA net energy payback period is 6.5 months under the baseline low-wind scenario. Using the alternative primary energy method, the payback period can be as low as approximately 2-months. For this assessment, 6.5-months is assumed.

Whilst the LCA included a list of materials included within each individual turbine, it was not possible to locate emission factors for all of the materials, therefore a calculation of embodied carbon on this basis was not undertaken.

9.2.2.2 Operation Phase

There will be no greenhouse gas emissions from the operation of the wind turbines. However, due to the displacement of electricity which otherwise would have been produced from fossil fuels, there will be a net benefit in terms of greenhouse gas emissions. The savings are calculated and compared to Ireland's 2030 sectoral emissions ceilings.

In order to quantify these GHG savings from the project relative to fossil fuel energy production, the GHG emissions produced by a typical fossil fuel plant generating the equivalent amount of energy (based on the carbon intensity of electricity generation in Ireland (SEAI, 2024)) has been calculated. The GHG emissions associated with an equivalent fossil fuel plant generating 222,592 MWh of energy will include emissions of CO₂, nitrous oxide (N₂O) and methane (CH₄). The most recent (2025) figure for carbon intensity of electricity generation in Ireland is 226.3 gCO₂e/kWh (SEAI, 2025). The CO₂ equivalent emissions of N₂O and CH₄ have been calculated using the global warming potentials as set out in IPCC AR6 Synthesis Report Summary for Policymakers (IPCC, 2023).

Vehicular traffic is often a dominant source of greenhouse gas emissions as a result of developments. However, due to the relatively low volume of vehicles required for maintenance activities during operation (see **Chapter 14** for more detail), emissions from operation phase vehicles have been scoped out of this assessment.

9.2.2.3 Decommissioning Phase

Vehicles related to the decommissioning phase will give rise to CO₂ emissions. It is not assessed that this project will involve the use of a significant number of vehicles during

the decommissioning phase. Therefore, emissions from vehicular traffic and have been scoped out of this assessment.

In the decommissioning phase, the turbines are dismantled and the site is remediated to the agreed state (see **Chapter 3** for more detail). End-of-life recycling of metals will be carried out at the wind farm in order to reduce the climate impact, as per the LCAs reviewed and discussed in **Section 9.2.2.1**. As per the LCAs, the majority of the metal components that are primarily mono-material (e.g. gears, transformers, tower sections, etc.) will be recycled. It is assumed that the reinforced concrete foundation bases will largely remain in-situ; however, some material may be excavated and used as fill elsewhere within the site for reinstatement purposes. Decommissioning has been considered as part of the turbine LCAs and payback periods (discussed in **Section 9.2.2.1**), and is typically a small proportion of the GHG emissions associated with a wind farm project. The impact of decommissioning on the project's GHG emissions is therefore scoped out from further assessment.

9.2.2.4 Significance Criteria

The significance of the impacts of GHG emissions on the climate is an area of scientific consensus that is described clearly in the IPCC AR5 reports, and as such all GHG emissions are considered to contribute adversely towards climate change.

In accordance with ISEP and TII guidance, the significance of the effects of GHG emission resulting from a given project is based on how it contributes to the overall GHG emissions within the sectoral and national carbon budgets and whether that project contributes or not to the CAP25 objective for Ireland to achieve carbon neutrality by 2050, that is that a project contributes to reducing GHG emissions. This process requires an assessment of the quantified GHG emissions against the sensitivity of receptors (Ireland's national GHG targets or National Climate Objective), qualification of the potential measures that might mitigate against GHG emissions, and a degree of professional judgement that takes account of the balance of all of these factors. Both the ISEP and TII guidance documents are explicit in this concept.

ISEP Supplementary Guidance (2026) (*Assessing Greenhouse Gas Emissions and Evaluating their Significance*) highlights the importance of mitigation in determination of significance, committing the project to go further than minimum regulatory compliance. This is particularly relevant in the context of the severity of the climate situation and potential exceedance of the 1.5°C Paris Agreement target as described in **Section 9.2.1.1**. It explains that it is no longer sufficient for developments to comply with national policies or regulatory standards as mitigation and achieve non-significant effects. It determines that embodied carbon must be addressed, and generalised measures found in a CEMP cannot be relied upon to materially reduce significance. Where no sufficient and meaningful mitigation is proposed which supports an applicable 1.5°C or net zero compatible trajectory, beyond minimum compliance with current regulations, this would typically indicate a major or moderate, significant adverse effect.

The ISEP points set out above and the TII definitions set out in **Table 9.3** below are well aligned but the ISEP goes a step further in requiring mitigation beyond 'good practice'.

Acknowledging the ISEP 2026 guidance, the primary criteria used in determining the significance of effects on climate are those set out in the TII guidance and the 2022 ISEP guidance. Where possible, additional mitigation beyond current regulatory requirements have also been included to further reduce the likely effect on climate.

In order to streamline the process and provide accountability, the criteria outlined in PE-ENV-01104 (Transport Infrastructure Ireland, 2022) (which are based on the 2026 ISEP guidance and are 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'), are used together with the following factors:-

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

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 has 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.

Table 9.1: TII Significance Criteria for Greenhouse Gas Assessment

9.2.3 CLIMATE CHANGE RISK ASSESSMENT

The Climate Change Risk Assessment (CCRA) involves determining the vulnerability of the project to climate change. This requires an analysis of the sensitivity and exposure of the project to climate hazards which together provide a measure of vulnerability, as follows: -

- Step 1: First an initial, high level climate screening of physical hazards is carried out based on location and type of development. This is a qualitative screening intending to only proceed with relevant hazards;
- Step 2: The project asset categories must be assigned a level of sensitivity to climate hazards. PE-ENV-01104 (TII, 2022) provides the list of asset categories

and climate hazards to be considered, as per the below. 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; and,
- Climate Hazards: Flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning and hail; landslides; fog.

Following this, all asset categories are assessed on their sensitivity to climate change. 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; and,
 - 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.
- Step 3: 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; and,
 - Step 4: Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability:-
 - Vulnerability = Sensitivity x Exposure

9.2.3.1 Significance Criteria for CCRA

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

The vulnerability assessment at this stage excludes mitigation. **Table 9.2** details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale.

The PE-ENV-01104 guidance notes 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 project can be considered to be not significant.

However, following the embedding of mitigation measures, 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. According to PE-ENV-01104, an assessment of construction phase CCRA effects is only required if a detailed CCRA is required. Where a CCRA for the construction phase is not required, best practice mitigation against climate hazards should still be recommended.

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

Table 9.2: Vulnerability Matrix

9.3 DESCRIPTION OF EXISTING ENVIRONMENT

9.3.1 CURRENT GHG BASELINE

Data published in July 2026 (Environmental Protection Agency, 2026a), indicates that Ireland exceeded, without the use of flexibilities, its 2025 annual limit set under EU's Effort Sharing Regulation (ESR) (EU 2018/842) by 5.01 MtCO₂e. However, the reported emissions for 2025 represent the third consecutive year in which Ireland's emissions were below 1990 levels by 5.5%. Emissions Trading Scheme (ETS) emissions have decreased by 52.4% or 11.8 MtCO₂e compared to 2005 and ESR emissions decreased by 11.8% or 5.6 MtCO₂e. Ireland is now a net 3,198 ktCO₂e distant from its target under the ESR.

The EPA estimates that 2025 total national GHG emissions, excluding LULUCF, have decreased by 2.3% on 2024 levels to 52.65 MtCO₂e. The sector with the highest emissions in 2025 was agriculture at 38.7% of the total, followed by transport at 22.0%. For 2025, total national emissions (including LULUCF) were 55.16 MtCO₂e (**Table 9.1**). Agriculture emissions decreased by 0.2% in 2025, primarily due to a 3.3% reduction in cattle herd numbers. However, a 12.7% increase in fertilizer nitrogen lessened the impact of the herd reduction on emissions. Greenhouse gas emissions from the transport sector decreased by 1.5% in 2025, the increase in the use of biofuels contributed to the majority of this emission reduction in addition to the increasing number of electric vehicles on Irish roads. Emissions from the energy industries sector decreased for the fourth consecutive year by 7.1% in 2025. This reduction can be attributed to an increase in imported electricity as well as increased renewable generation. Renewables accounted for 40.6% of electricity generation in 2025.

The current estimates of national greenhouse gas emissions (including LULUCF) in 2025 are 14.5% below 2018 levels, at considerable variance from the national ambition of a 51% reduction by 2030. The data indicate that from 2021 to 2025 Ireland has used 99.6% or 293.9 MtCO₂e of the 295 MtCO₂e Carbon Budget for the five-year period 2021-2025. This leaves 1.1 Mt CO₂e of the budget available to be carried over into budget 2 for 2026-2030. In order to achieve Ireland's climate ambition of a 51% reduction by 2030, annual emission reductions of over 10% are required for the next 5-years.

In relation to compliance with the sectoral emissions ceilings (SECs), the provisional GHG emissions estimates (see Error! Reference source not found.) indicate that 4 no.

sectors, Buildings (Residential), Buildings (Commercial and Public), Agriculture and Other, have stayed within their sectoral emissions ceilings. The other three sectors, Electricity, Transport and Industry have exceeded their sectoral emissions ceilings. The EPA states that the National Climate Objective of a 51% reduction by 2030 will be unattainable unless every sector meets its indicative percentage reduction target.

Sector <i>Note 1</i>	2021	2022	2023	2024	2025	Total	% Budget 2021-2025 Used	Annual % Change 2023-2024
MtCO₂e								
Electricity	9.82	9.62	7.50	6.89	6.30	40.12	40	100.3%
Transport	11.19	11.88	11.93	11.78	11.61	58.40	54	108.1%
Buildings (Residential)	6.71	5.62	5.23	5.49	5.21	28.26	29	97.4%
Buildings (Commercial and Public)	1.42	1.38	1.34	1.44	1.39	6.97	7	99.6%
Industry	7.25	6.82	6.47	6.20	6.00	32.74	30	109.1%
Agriculture	21.97	21.78	20.72	20.44	20.40	105.30	106	99.3%
Other <i>Note 2</i>	1.82	1.85	1.73	1.64	1.75	8.79	9	97.6%
LULUCF	2.87	2.47	2.97	2.51	2.51	13.33	-	N/A
Total including LULUCF	63.05	61.42	57.89	56.38	55.16	293.90	295	99.6%
<i>Note 1 Reproduced from latest emissions data from the EPA (EPA, 2026).</i>								
<i>Note 2 Other includes Petroleum refining, F-Gases and Waste (emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste).</i>								

Table 9.5: Trends in Total National GHG Emissions 2021 – 2025

9.3.2 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, 2022) and ISEP (ISEP, 2022) guidance, 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 CAP25, 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 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 ETS and non-ETS 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 2026, the EPA released the report *Ireland's Greenhouse Gas Emissions Projections 2025-2030* (EPA, 2026b), 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 12.7% 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 23.4% by 2030, still short of the 42% reduction target.

The EPA GHG emissions projections report for 2025-2030 (EPA, 2026b) states that Ireland is not on track to meet the 51% emissions reduction target by 2030 (compared to 2018). Full implementation of a wide range of policies and plans across all sectors that deliver carbon savings is required to achieve a projected reduction of 25%.

The estimates of GHG emissions from the EPA for the 2021–2025 period indicate that the first carbon budget for 2021–2025 will be met but that Budget period 2 (2026-2030) of 200MtCO₂e is expected to be exceeded by 53 to 81MtCO₂e.

9.3.3 CURRENT CCRA BASELINE

9.3.3.1 Climate Hazard Screening

Table sets out a qualitative assessment of climate hazards relevant to the project. This high-level screening ensures focus is given to relevant climate hazards throughout the remainder of the assessment. The initial climate hazard list is taken from TII PE-ENV-01104.

Climate-related Hazard	Hazard Screening Rationale	Screening
Extreme Heat Temperatures	High temperatures are a key consideration for both construction and long-term operation of the proposed project. Heat and thermal expansion can damage materials, road surfaces, and auxiliary systems such as electrics while also affect the lifecycle of assets.	Screen in
Extreme Cold Temperature	Snow and ice events pose significant risks to health, safety, and site operations. Road access may be disrupted, and low temperatures can affect assets such as fuel tankers, workers, and infrastructure. Freeze-thaw cycles may cause cracking in concrete and road surfaces, requiring snow clearance and ice management.	Screen in
High precipitation and pluvial flooding	Surface water remains a key vulnerability for any project during both construction and operational phases due to the sensitivity of construction materials, site access, and site assets to water exposure therefore it is screened in.	Screen in
Fluvial flooding	The project site is in close proximity to a number of lower-order watercourses; however, there have been no historical floods at the site and all project infrastructure are located in Flood Zone C, and is therefore screened out (see Annex 7.2, Volume II).	Screen out

Drought	Droughts have occurred across Ireland, previously impacting water supply. However, future reductions in availability would not directly impact the project and its operation.	Screen out
Wildfire	The risk of wildfire is mitigated through the project design and, particularly, the felling of forestry in the immediate vicinity of infrastructure and around the wind turbines. The wildfire hazard for County Roscommon is classified as 'medium' (GFDRR, 2026) but there have not been any wildfires in close proximity to the site and it is not listed as a risk in <i>Roscommon County Action Plan 2024-2029</i> and therefore can be screened out.	Screen out
High winds and storms	Turbines, substation and other assets of the project may be exposed to high winds. Historically, Ireland has experienced several notable storm events including Storm Éowyn (2025) and Storm Darragh (2024), which caused widespread damage across Ireland. These storms often bring heavy rainfall and flood warnings, increasing overall risk.	Screen in
Fog	Fog is not considered a significant hazard for this development, as it does not involve transport, aviation, or activities requiring high visibility and is therefore screened out.	Screen out
Lightning	The project is elevated, contains tall structures and includes electrically charged components such as a substation, making it susceptible to lightning strikes, so is screened in.	Screen in
Landslides and Subsidence	A peat stability risk assessment has been completed and confirms that, having regard to the topographical and geological conditions; there is no risk of ground instability or landslides and is therefore screened out.	Screen out
Sea level rise and coastal flooding	Sea level rise and coastal flooding can lead to permanent loss of land and property. The site is c. 73km from the coast therefore can be screened out.	Screen out

Table 9.6: Climate Hazard Screening

9.3.3.2 Extreme Temperatures and Precipitation

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. This baseline data is derived from the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA5 data reanalysis and presented on the World Bank Group Climate Change Knowledge Portal (World Bank Group, 2026b) which includes observed data from local meteorological weather stations across Ireland from 1950-2023. This data is reanalysed to model a complete picture of Irelands historical climate. This method has been chosen to ensure data can be analysed at the daily level and harmoniously compared with future scenarios. The baseline time-period referred to in this assessment was from 1991-2020 and is specific to the county of Roscommon.

Climate averages for the 30-year period from 1991-2020 are shown in **Figure 9.1**. The data show that there are 2 no. peaks in precipitation, one occurring in the period May to September peaking in August at 100.2mm, and another wetter period from October to January with December being the wettest month on average with rainfall of 103.2mm. The period from February to June experiences rainfall below the average for the year (92.8mm). December is when the wettest days occur with daily average maximum rainfall of 33.9mm. The driest month is April with 81.3mm of rainfall which is below the annual average.

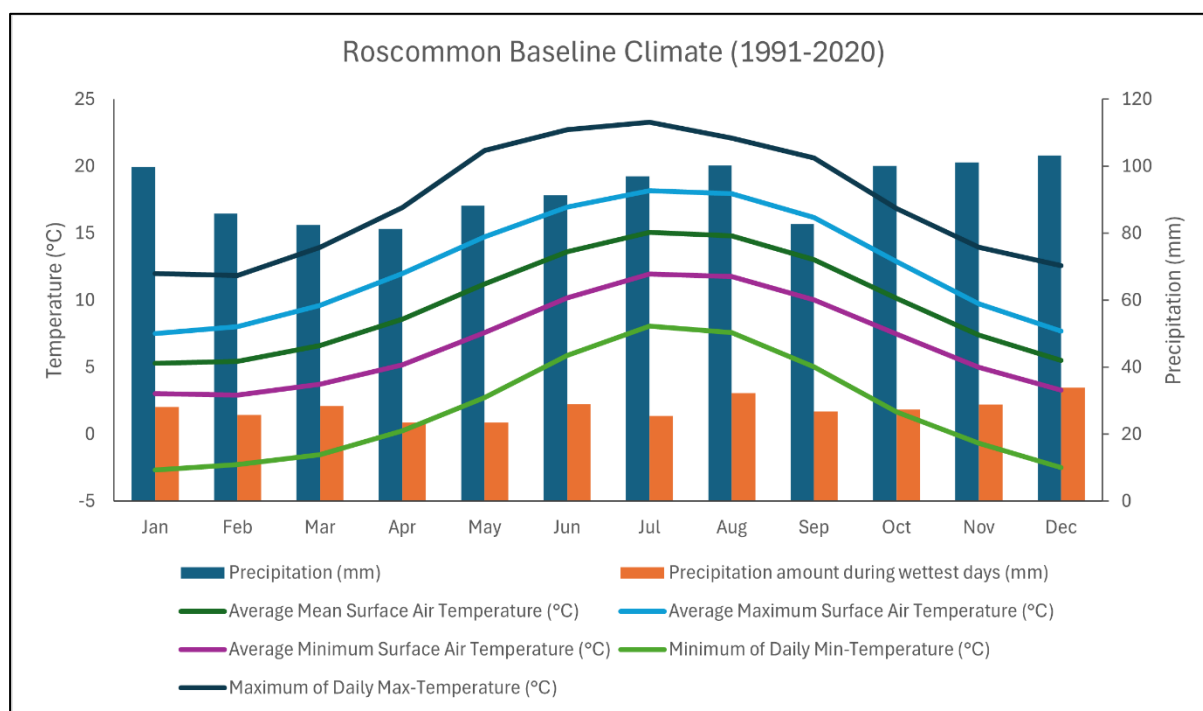


Figure 9.1: Climate Averages for Roscommon, Ireland, for the period 1991-2020

July is the warmest month on average with a mean surface air temperature of 15.1°C. July also experiences the average maximum surface air temperature (18.2°C) and the daily maximum temperature (23.3°C). January is the coldest month on average with a mean average surface temperature of 5.3°C and recording the daily minimum temperature (-2.7°C), however the average minimum surface air temperature of 2.9°C occurs in February.

9.3.3.3 Wind and Storms

At Belmullet during the period 1991-2020, the average wind speed was 12.5-knots (23.2kph), the average windiest month being January at 14.8-knots (27.4kph). Historically, the highest absolute gust of 86.0knots (159.3kph) was recorded in February 2014 during Storm Darwin. With reference to recent extreme weather events in Ireland, storm Éowyn hit the island in January 2025 and recorded a 10-minute mean wind speed of 142kph in Galway, with the highest gust being 184kph. Four weather stations broke their highest gust records during this storm and 2 no. stations reached hurricane force 12 on the Beaufort scale.

Later in the year, storm Amy also resulted in strong winds such that 5 no. recording stations broke their records for 10-minute mean wind speeds. Overall, there were 5 no. named storms to hit Ireland in 2025.

9.3.3.4 Wildfire

According to the Think Hazard tool (GFDRL, 2026), wildfire hazard for County Roscommon is classified as 'medium'. The GFDRL Think Hazard (2026) dataset records a 10% to 50% increase in conditions that could lead to wildfire under current climate predictions. Wildfires have the potential to cause property damage and to adversely affect or damage utilities and transport links serving the project. The RCC *Climate Action Plan 2024-2029* makes minimal mention of wildfire.

9.3.3.5 Landslides

The site location has no record of previous historical landslides and has a low susceptibility to the risk of future landslides (GSI, 2026). A site-specific *Geotechnical & Peat Stability Report* (Fehily Timoney, 2026) has been prepared (**Annex 6.2 [Volume II]** of the EIAR) and concludes that “the Site has an acceptable margin of safety, is suitable for the proposed project and is considered to be at low risk of peat failure.”

9.3.4 FUTURE CCRA BASELINE

The current global climate is in a state of extreme flux. This is illustrated in the latest IPCC AR6 Synthesis Report Summary for Policymakers (IPCC, 2023) using the climate stripes representation pioneered by Professor Ed Hawkins of the University of Reading, reproduced in **Figure 9.2**.

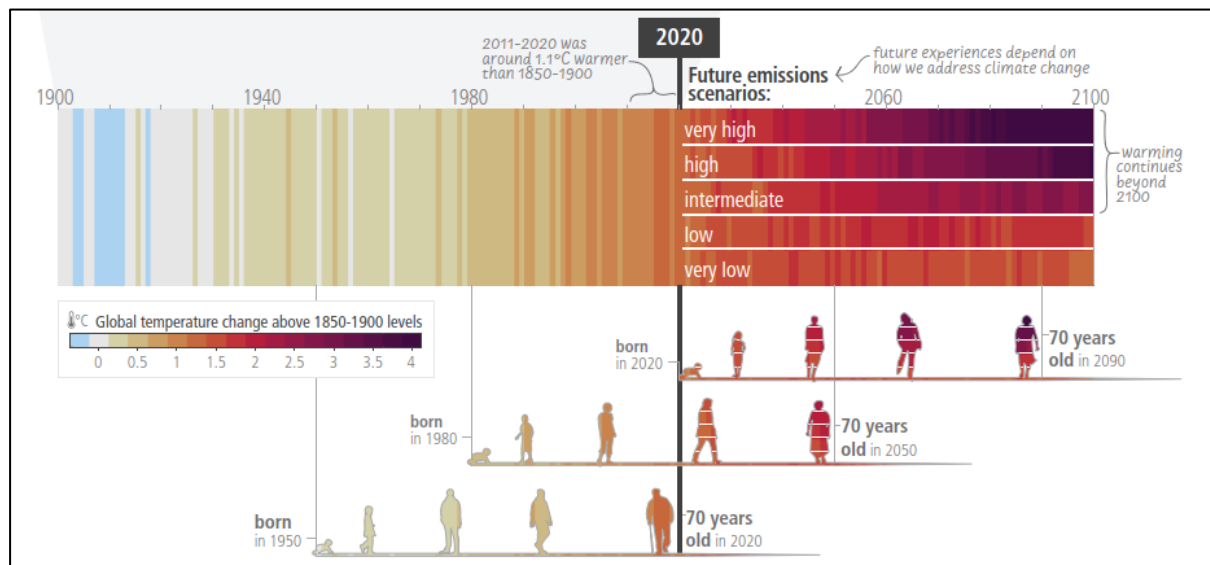


Figure 9.2: Global Climate Change Representation (IPCC, 2023)

Figure 9.2 shows that global average temperatures are already substantially above the 1850-1900 baseline level, and potential increases under future emissions scenarios are also presented.

The United Nations reported that 2024 was the first calendar year to exceed the 1.5°C average increase (United Nations, 2026) with an average temperature 1.55° above the 1850-1900 average. Whilst this is not an indication of a definite exceedance of the 1.5°C Paris Agreement commitment, as there will be some natural variation in the coming years, however it is a clear indication that the climate is continuing to significantly warm.

In addition, the CMIP6 climate model predicts a severe weakening of the Atlantic Meridional Overturning Current (AMOC) due to ocean surface warming and glacial meltwater entering the system from the Greenland ice sheets that is known to be highly influenced by anthropogenic emissions. Normally this current has a stabilising effect on the climate in Ireland, however a weakening or cessation of the ocean current would have profound consequences for Ireland in terms of overall climate stability and the magnitude of temperature extremes. Recent observations have been coupled with prediction models (Observational constraints project a ~50% AMOC weakening by the end of this century, 2026) that show AMOC weakening that is far greater than predicted in CMIP6. A weakening or cessation of flow within AMOC

is projected to have severe implications to Ireland's climate. The climate would be similar to that experienced in regions at comparable latitudes to Ireland, which do not benefit from the moderating influence of the AMOC, such as parts of Canada or southern Siberia, with markedly colder winters, hotter summers, and greater seasonal variability.

The CMIP7 model is now available for scientific use and is based on a new set of global emissions scenarios that differ from CMIP6. The highest emission scenario is now lower than in CMIP6 whilst the lowest emission scenario now results in temperature changes that exceed the 1.5°C change that was part of the Paris Agreement. The highest emission scenario still results in substantial climate change above 4°C by 2100. CMIP7 results are expected to be published for public use later in 2026.

9.3.4.1 Climate Change Impacts and Projections for Ireland

Ireland is already experiencing increased annual rainfall in the north and west, with more variable patterns in the south and east (EPA, 2021b). Key risks identified by the EPA relevant to Ireland: -

- Increased likelihood of more frequent and intense North Atlantic low-pressure systems bringing high rainfall and high winds;
- More intense rainfall periods which may lead to pluvial flooding and elevated fluvial levels; and,
- Longer dry spells and increased temperatures will elevate the risk of wildfire.

9.3.4.2 Climate Modelling and Planning

International best practice and national policy such as the NCCRA (2024), IPCC (2023), and Transport Infrastructure Ireland (TII, 2022) recommends using 2 no. emission scenarios to project future climate change. This includes a moderate and high emission scenarios (RCP4.5 and RCP8.5) for future planning. These Representative Concentration Pathways (RCPs) reflect varying levels of global climate mitigation explained below: -

- RCP4.5 (a 'moderate' scenario) represents an approximate 2.4°C increase in global average temperatures (1.7-3.2°C). It assumes moderate mitigation efforts leading to stabilisation of emissions by mid-century and is generally aligned with current policies for emission reduction; and,
- RCP8.5 (a 'worst case'/high emissions scenario) represents an approximate 4.3°C increase in global average temperatures (3.2-5.4°C) and assumes continued high emissions with minimal mitigation. This high-end scenario is useful for understanding potential effects of current emission trends continue. Consequently, this scenario will result in the highest level of physical risk for Ireland, and therefore the greatest requirement for adaptation.

This climate change assessment uses the latest climate change projections standardised and bias corrected for Ireland available through the EPA and the TRANSLATE project (EPA, 2025e).

9.3.4.3 Key Findings from Climate Projections

Table provides a detailed comparison of baseline and future climatology across a medium (RCP4.5) and high emissions scenario (RCP8.5) up to 2100. Key projected changes include:-

- Average maximum temperatures rising by over 1°C and overall mean temperatures increasing 1.0°C and 1.5°C by mid-century under RCP4.5 and RCP8.5 respectively;
- Annual precipitation rising by 46mm with maximum 1-day rainfall increasing by 6mm;
- Fewer frost days (15 days >0°C); and,
- Increased number of heatwaves (5 consecutive days >25°C).

This will result in longer dry periods and heavy rainfall events. 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.

Impacts and effects resulting from climate change hazards will evolve and have the potential to include increases in global temperatures and increases in the intensity and frequency of rainfall days per year combined with increases in the intensity and frequency of low-pressure systems in the north Atlantic during the winter storm period. Therefore, it is expected that the climate over the project site in will evolve over time and consideration is needed with respect to this within the design of the project.

Overall 10m mean windspeed is projected to decrease marginally (~<1%) across all seasons of the year with a high degree of certainty (EPA, 2025c).

Climate Hazard	Indicator	Baseline	RCP4.5		RCP8.5	
		(1976-2005)	(2040-2070)	(2071-2100)	(2040-2070)	(2071-2100)
Temperature	Mean temp (°C)	9.7	10.8 (+1.1)	11.2 (+1.5)	11.2 (+1.6)	12.5 (+2.8)
	Mean Max temp (°C)	13.3	14.4 (+1.1)	14.8 (+1.5)	14.8 (+1.5)	16.0 (+2.7)
	Mean Min temp (°C)	6.1	7.2 (+1.2)	7.6 (+1.6)	7.7 (+1.6)	8.9 (+2.9)
	Average of Daily Max temp (°C)	25.1	26.9 (+1.9)	27.9 (+2.8)	27.5 (+2.5)	28.3 (+3.2)
	Frost Days (Nr.)	34.5	20.0 (-14.5)	15.7 (-18.7)	15.4 (-19.0)	7.3 (-27.1)
Precipitation and Flooding	Annual precipitation (mm)	819	856 (+4%)	877 (+7%)	877 (+7%)	912 (+10%)
	Max 1-day (mm)	37	45 (+17%)	45 (+19%)	47 (+21%)	51 (+28%)
Storms and high winds	Storm Frequency and Average speed	On Average 8 named storms annually with speeds exceeding 100 kph ^{Note 1}	Winter storm frequency is projected to increase, with a possible extension of the storm season. While the intensity of individual storms cannot be accurately projected, storm wind speeds are likely to remain above 100 km/hr.			
	(Descriptive)					
	Max gust Speed ^{Note 2}					
		84 knots (155 kph)				
Wildfire	Qualitative (Descriptive)	Medium	Rising temperatures and prolonged dry spells are projected to elevate wildfire risk.			

Drought	Absolute Drought	Rare	Marginal increase	Increased Likelihood	Increased Likelihood	Increased Likelihood
	(≥15 days with less than 1mm of rain)					
Lightning	Qualitative (Descriptive)	Occurring during summer periods	This hazard may modestly increase in the future due to more favourable conditions, such as rising temperatures and extended warm periods beyond the traditional summer season			
Note-1: Data from combined Met Éireann, UK Met Office and Dutch Meteorological services.						
Note-2: Data from Belmullet weather station (~98km from site), 1991-2020						

Table 9.7: Future Climate Change Summary of Projections under both RCP scenarios taken from the EPA Climate Ireland Translate Projections

9.4 DESCRIPTION OF LIKELY EFFECTS

9.4.1 GREENHOUSE GAS ASSESSMENT

9.4.1.1 Construction Phase

The results of the GHGA are shown in **Table .** This includes both the outputs from the OneClick LCA tool and the TII Carbon Tool. Construction/ Installation process make up the majority of GHG emissions for the project, accounting for approximately 80% of the total construction phase GHG emissions. The second highest contribution comes from construction materials at 14%.

It has been calculated that the total construction phase embodied carbon for the project will be 10,923 tonnes CO₂e as shown in **Table .**

Stage	GHG Assessment Category	Predicted GHG Emissions (tCO ₂ e)	Predicted GHG Emissions as % of Project Total	Relevant Sector for Carbon Budget Comparison
A1-A3	Materials	1,533	0.001	Industry
A4	Material Transport	614	<0.001	Transport
A5	Land Use Change and Vegetation Loss	6,653	-	LULUCF
	Clearance and Demolition	9	<0.001	Industry
	Excavations	268	<0.001	Industry
	Construction energy	427	<0.001	Electricity
	Construction worker travel to site	116	<0.001	Transport
	Construction water	3	<0.001	Industry
	Construction Waste Disposal	1,255	0.003	Waste
	Construction Waste Transport	38	<0.001	Transport
B4 - B5	Operational transport	3	<0.001	Transport
	Operational Waste Transport	4	<0.001	Transport
Total		10,923		

Table 9.8: GHG Assessment Results

In **Table 9.9**, GHG emissions have been compared against the carbon budget for the industry, transport, and waste sectors in 2030 (DECC, 2024), against Ireland's total GHG emissions in 2024, and against Ireland's EU 2030 target of a 42% reduction in non-ETS

sector emissions based on 2005 levels (27.7MtCO₂e) (set out in Regulation EU 2018/842).

The estimated total GHG emissions annualised over the 40-year project lifespan are shown in **Table 9.9** and are a small fraction of the sectoral budgets.

Target/Sectoral Budget (tCO ₂ e)		Annualised Development GHG Emissions (tCO ₂ e)		% of Relevant Target/Budget
Ireland's 2024 Total GHG Emissions (existing baseline)	57,646,201	274	Total GHG Emissions	<0.001
Non-ETS 2030 Target	27,721,670			0.001
2030 Sectoral Budget (Industry Sector)	4,000,000	46	Total Industry Emissions	0.001
2030 Sectoral Budget (Transport Sector)	6,000,000	27	Total Transport Emissions	<0.001
2030 Sectoral Budget (Electricity Sector)	3,000,000	11	Total Electricity Emissions	<0.001
2030 Sectoral Budget (Waste Sector)	1,000,000	34	Total Waste Emissions	0.003

Table 9.9: Estimated GHG Emissions Relative to Sectoral Budgets and GHG Baseline

9.4.1.2 Operation Phase

During the operation phase, there will be no GHG emissions from the operation of the wind turbines. The estimated 53.1MW from the turbines will generate 163GWh of renewable energy annually, assuming a 35% capacity factor. This energy production will displace electricity which otherwise would have been produced from fossil fuels and therefore will be a net benefit in terms of greenhouse gas emissions.

As per the methodology in **Section 9.2.2.2**, the total annual GHG emission savings of the proposed project will amount to approximately 36,243tCO₂e, once the GHG emissions from the construction phase (as outlined in **Section 9.4.1.1**) have been considered.

The estimated total GHG emissions savings for 53.1MW, when annualised over the 40-year proposed project lifespan, are equivalent to 0.1% of Ireland's total GHG emissions in 2024 (and 0.6% of GHG emissions from equivalent fossil fuel energy production), 1.2% of the total carbon budget for the electricity sector in 2030 and 0.3% of Ireland's ETS 2030 emissions target (Government of Ireland, 2025) i.e. the proposed project has the potential to reduce Ireland's CO₂e emissions by these percentages.

Development Emissions & Savings	tonnes CO ₂ e	Baseline / Relevant Target	tonnes CO ₂ e	% of Baseline / Relevant Target
Annual Equivalent GHG Emissions from Power Plant Producing 163 GWh	36,516			
Annualised GHG Emissions due to Construction Phase (averaged over lifespan)	273			
Total Annual Savings Due to the proposed project (averaged over lifespan)	36,243	Ireland's Total GHG Emissions 2024 (existing baseline)	55,163,780	0.1%
		Ireland's GHG Emissions from Fossil Fuel Energy	6,589,560	0.6%

		Production 2024 (existing baseline)		
		ETS 2030 Target (42% of 2005 ETS Level)	12,953,240	0.3%
		2030 Sectoral Budget (Electricity Sector)	3,000,000	1.2%

Table 9.10: Estimated Operational Phase Project GHG Savings

9.4.1.3 Decommissioning Phase

As described above, decommission phase effects have been scoped out from further assessment.

9.4.1.4 GHGA Significance of Effects

The TII and ISEP guidance states that the following 2 no. factors should be considered when determining significance: -

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

Therefore, prior to mitigation, any impact to climate as a result of GHG emissions arising from the construction and operation of the project is considered significant.

9.4.2 CLIMATE CHANGE RISK ASSESSMENT

9.4.2.1 Construction Phase

Whilst the project is likely to be exposed to potential weather extremes due to climate change during the construction phase, the likely length of the construction phase and its transient nature means that a detailed CCRA of this phase is scoped out.

The following non-exhaustive list of risks has been identified: -

- Flood Risk due to increased precipitation and intense periods of rainfall. This includes fluvial and pluvial flooding affecting unfinished structures or access tracks/hardstandings;
- Increased temperatures potentially causing drought, wildfires and prolonged periods of hot weather potentially affecting setting concrete or cement, dust suppression and construction worker health and safety;
- Reduced temperatures resulting in ice or snow potentially affecting setting concrete or cement, landscaping and construction worker health and safety; and,
- Major storm damage including wind damage potentially affecting landscaping, stored materials, vertical infrastructure and construction worker health and safety

9.4.2.2 Operation Phase

Sensitivity Analysis

Table presents the initial qualitative Sensitivity Analysis relevant to the project. The aim of the sensitivity analysis is to identify which climate hazards are relevant to the specific type of project, irrespective of its location (TII, 2022).

Climate Vulnerability Assessment

As set out in **Table** , the sensitivity of the project to the climate hazards is assessed irrespective of the project location.

Table 9.11, below, quantifies the sensitivity of the project to the climate hazards on a scale of high (3), medium (2) and low (1). Once the sensitivity has been determined, the exposure of the project to each of the climate hazards is determined, this reflects on 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 project to each of the climate hazards.

Climate Hazard	Sensitivity	Exposure	Vulnerability
Extreme heat	1 (Low)	2 (Medium)	2 (Low)
Extreme cold	1 (Low)	1 (Low)	1 (Low)
High precipitation and pluvial flooding	1 (Low)	2 (Medium)	2 (Low)
Lightning	1 (Low)	2 (Medium)	2 (Low)
High winds and storms	1 (Low)	2 (Medium)	2 (Low)

Table 9.11: Climate Vulnerability Assessment

Extreme Temperatures (Heat & Cold)

Extreme temperatures, both hot and cold, can affect building materials and infrastructure; however, the project will use materials that comply with current standards and are designed to withstand projected climate extremes. Cold events are expected to decline, reducing the risk of cracking from freeze-thawing of road surfaces and deterioration of auxiliary systems and infrastructure. Additionally, potential heat-related impacts such as road surface softening during heatwaves and deterioration of electrical equipment and short circuiting are also unlikely as projected extremes are not expected to reach these thresholds. Nonetheless such impacts will be mitigated through contingency plans.

The risk of wildfire is mitigated through the project design and, particularly, the felling of forestry in the immediate vicinity of infrastructure and around the wind turbines. The wind turbines and electricity substation are each designed to withstand extreme weather conditions. Overall, extreme temperatures are not assessed as likely to be a significant risk.

Lightning

Wind turbines are inherently susceptible to lightning strikes; therefore, they are designed with integrated protection systems. Mitigation measures have been incorporated to address this vulnerability and the likely increase in electrical storms due to future climate change. The project design includes lightning protection for the substation and auxiliary assets, while each turbine is equipped with lightning protection to safeguard generators and associated systems. Based on the design specifications, these measures are considered sufficient to reduce vulnerability, and the overall risk of lightning impact is assessed as likely to be low.

Extreme Wind

In relation to extreme winds, the wind turbines shall be designed to the appropriate standards to account for the relevant wind loadings. Auto shut off technology is

installed within the turbines if wind speed is too high and has the potential to damage the turbines.

With future climate change, storms are likely to become more extreme and storms in RCP8.5 are likely to be more extreme than in RCP4.5. Given the nature of their use, the turbines are designed to be placed in high wind environments and therefore significant research has gone into their ability to withstand extreme wind loadings. The grid connection infrastructure (electricity line) will be buried underground so protected from extreme winds. There are no overhead lines or met mast associated with the long-term operation of the project and, consequently, no related wind vulnerability is anticipated.

Summary

Overall, the project has, at most, low vulnerabilities to the identified climate hazards. Therefore, no detailed risk assessment is required.

CCRA Significance of Effects

In the absence of design mitigation, there is a medium risk to the project as a result of climate change. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect of the impacts to the project as a result of climate change are direct as climate extremes have a direct physical effect on buildings and infrastructure, long-term due to the response times of the climate in relation to changes in anthropogenic emissions, negative as climate extremes have been shown to damage or adversely affect infrastructure, and moderate due to the medium vulnerability of the project to the effects of climate change, which is overall significant in EIA terms.

9.4.2.3 Decommissioning Phase

As described above, decommissioning phase effects have been scoped out from further assessment.

9.4.3 CUMULATIVE EFFECTS

In accordance with guidance from the ISEP (Institute of Sustainability & Environmental Professionals, 2022) and TII (Transport Infrastructure Ireland, 2022), the climate is not constrained by project, regional or national boundaries and therefore the GHG assessment has been presented in the context of the national and sectoral carbon budgets for the whole of Ireland and the ability of the project to assist or impede the national relevant targets. Given the contribution of such targets to the global efforts to reduce the impact of society upon the climate, the assessment is considered to be inherently cumulative. Therefore, the above assessment of the project alone is also assessed to be relevant for the cumulative assessment.

9.4.4 DO-NOTHING IMPACT

The 'Do-Nothing Scenario' represents the worst-case outcome for global and Irish GHG reduction and replicates a global future economic growth and developed fuelled by GHG emissions with minimal to no GHG reduction. This scenario scientifically is represented in SSP5 8.5 (RCP8.5)

With respect to climate, the Do-Nothing scenario will not assist the CAP25 goal of delivering 80% of the national grid electricity by renewable sources and 9GW of onshore wind capacity by 2030. Producing 80% renewables for the grid will reduce emissions from electricity and will also allow electrification of other sectors such as

transport and heat and reduce emissions in these sectors too. Therefore, the doing nothing effect is a lost opportunity for a beneficial effect on climate emissions in the long term.

9.5 MITIGATION & MONITORING MEASURES

9.5.1 CONSTRUCTION PHASE

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. During the construction phase, the following best practice measures shall be implemented to prevent significant GHG emissions and reduce effects on climate:-

- Procurement of low carbon materials, the majority of GHG emissions from a construction project are associated with embodied carbon within materials. It is understood and accepted that market availability and price mean that it is difficult to commit to alternatives at this early stage in the project's development cycle; however, alternative options are set out below:-
 - Concrete: GGBS (Ground granulated blast-furnace slag), 30% lower clinker content cement, or better, where practicable;
 - Fibre reinforced concrete or similar instead of steel reinforcement;
 - Steel: recycled or electric arc foundry steel, cross laminated timber;
 - Bricks and aggregates: reclaimed or recycled;
- Re-use of materials on site e.g. excavated material;
- Use of EVs during construction;
- Use of mains electricity or batteries during construction rather than diesel generators; and,
- All plant adheres to Euro Stage V or better and all vehicles are Euro VI/Euro 6 (Euro 7 for new vehicles will commence late 2026).

In terms of impact on the project due to climate change, during construction, the Contractor will be required to mitigate against the effects of extreme rainfall/flooding through site risk assessments, method statements and good site management practise. The Contractor will also be required to mitigate against the effects of extreme wind/storms, temperature extremes through site risk assessments, method statements and good site management practise. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction. During construction, the Contractor will be required to mitigate against the effects of fog, lightning and hail through site risk assessments and method statements.

9.5.2 OPERATION PHASE

During the operation phase of the project, activities will be limited to maintenance of the wind farm infrastructure. Although the intensity of activity will be only a small fraction of the construction phase, all employees and contractors that are on site will ensure that machinery used is properly maintained and is switched off when not in use to avoid unnecessary exhaust emissions from maintenance traffic, plant and machinery.

9.5.3 DECOMMISSIONING PHASE

No specific measures are assessed as being required for the decommissioning phase.

9.5.4 CUMULATIVE EFFECTS

No specific mitigation is proposed in respect of cumulative effects.

9.5.5 MONITORING

Monitoring and reporting of the embodied carbon in the construction phase will be conducted. The aim of monitoring will be to seek further ways to minimise climate impacts. Monitoring will include contractual obligations, in line with the most recent Climate Action Plan and sectoral targets, for the successful tenderer to ensure that the project stays in line with updated aims. Commitments to monitor GHG emissions during the construction phase will also be secured through the final Construction Environmental Management Plan (CEMP). Monitoring will include embodied carbon of construction materials, water usage, power and fuel usage, and waste generation (including reuse and recycling rates). Where monitoring shows that the project is not meeting its targets, further mitigation will be put in place.

Monitoring shall also include reviewing potentially extreme weather events which may cause damage during construction. The appointed Contractors' Environmental Management System (EMS) will include measures to address risks during such events i.e. flooding.

9.6 RESIDUAL EFFECTS

9.6.1 GHGA RESIDUAL EFFECTS

The TII guidance states that the following 2 no. factors should be considered when determining significance: -

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

TII reference the ISEP 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".

As set out in **Table 9.1**, the project will negatively impede Ireland's trajectory to achieving net zero by 2050 as GHG emissions produced during the construction and operation phases will contribute a small fraction towards the national and sectoral budgets. However, the project will minimise its effects through design and management measures (see **Section 9.5**). The level of mitigation described in **Section 9.5** has therefore been taken into account when determining the residual significance of the proposed project's GHG emissions.

Based on the above reasoning, according to the TII significance criteria, the residual significance of the GHG emissions during the construction and operation phases is minor adverse. The ISEP GHG guidance (ISEP, 2022) (which has been embraced by the updated TII Guidance (TII, 2022) in Section 6.7.2) describes minor adverse as follows:-

"A minor adverse not significant impact is described with: A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A 'minor adverse' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050."

In addition, the TII guidance (2022) describes minor adverse as: -

- 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.

In accordance with the EPA Guidelines (EPA, 2022), the above criteria equates to an impact of GHG emissions during the construction phase of a direct effect due to its presence, that is long-term as a result of the atmospheric lifetime of GHG emissions, negative due to the emission of GHGs and slight based on the reduced contribution of GHG emissions to Ireland's national trajectory to net zero, due to the outlined mitigation measures. Overall, the effect on the climate is considered to be not significant in EIA terms.

In accordance with the EPA Guidelines (EPA, 2022), the above criteria equates to an impact of GHG emissions during the operation phase of a direct effect due to its presence, that is long-term as a result of the estimated lifetime of the structures and atmospheric lifetime of GHG emissions, positive due to the reduced emission of GHGs and slight based on the reduced contribution of GHG emissions to Ireland's national trajectory to net zero, due to the outlined mitigation measures. Overall, the impact on the climate is considered to be not significant in EIA terms.

9.6.2 CCRA RESIDUAL EFFECTS

With design mitigation in place, there are no residual risks to the project as a result of climate change. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect to the project as a result of climate change are direct as climate extremes have a direct physical effect on buildings and infrastructure, long-term due to the response times of the climate in relation to changes in anthropogenic emissions, negative as climate extremes have been shown to damage or adversely affect infrastructure, and not significant due to the low vulnerability of the project to the effects of climate change once mitigation measures have been embedded; which, overall, is not significant in EIA terms.

9.6.3 CUMULATIVE RESIDUAL EFFECTS

As described above, the climate is not constrained by project, regional or national boundaries and therefore the GHG assessment has been presented in the context of the national and sectoral carbon budgets and the ability of the project to assist or impede the national relevant targets. Given the contribution of such targets to the

global efforts to reduce the impact of society upon the climate, the assessment is considered to be inherently cumulative.

In addition, the traffic data provided for the quantification of operational GHG emissions includes committed developments as far as they can be advised, and as such is considered to be cumulative.

In light of these assessments, the residual cumulative impact of the project in relation to GHG emissions is considered direct, long-term, positive and slight, which is overall not significant in EIA terms.

9.7 SUMMARY

This chapter has assessed the likely environmental effects on climate, focusing on:-

- The likely greenhouse gas emissions during the construction and operational phases of the project;
- The offsetting of GHG emissions through renewable electricity generation, which will contribute to reducing Ireland's reliance on fossil fuels;
- The vulnerability of the project to climate change, including considerations for increased rainfall and other projected climate impacts; and,
- The long-term benefits of the project in helping Ireland achieve its Climate Action Plan targets and the National Climate Objective of Net Zero by 2050.

Overall, there are no significant effects on climate as a result of the project, and no significant effects on the project itself as a result of climate change hazard.

9.7.1 GREENHOUSE GAS ASSESSMENT

The impact of GHG emissions during the construction and operation phases on climate has been assessed in line with TII guidance PE-ENV-01104 (TII, 2022) and ISEP GHG guidance (ISEP, 2022), which states that the significance of the impact of GHG emissions is based on the project's net impact over its lifetime.

The GHG assessment considered the GHG emissions arising from embodied carbon in materials, material transportation, water usage, fuel usage, site excavation, waste disposal, and the carbon savings from the operation of the proposed project.

The output of 53.1MW from the project will generate 163GWh annually, which will amount to annual GHG emission savings of approximately 36,243tCO₂e at the 2025 carbon intensity, which is equivalent to 1.2% of the total carbon budget for the electricity sector in 2030 (Government of Ireland, 2025).

The project will assist in the CAP25 goal of producing up to 80% renewables for the grid and the key actions of installing at least 9GW of onshore wind energy. CAP25 states that *"rapid and significant reductions in GHG emissions are required if we are to meet the 2015 Paris Agreement Goals"*. The project, through its GHG emissions savings potential, will make a significant contribution both annually and over its lifetime to Ireland meeting its legal obligations under EU climate law to achieve the net carbon zero target for 2050. Additionally, Ireland's carbon budget for electricity between 2026 and 2030 of 20MtCO₂e total cannot be achieved unless there is early delivery of a significant volume of the installed onshore wind capacity targets required by CAP25. The project should therefore be considered an essential installation in aiding Ireland's legal climate compliance and combatting the national climate emergency.

The impact of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050. This equates to a direct, positive and long-term effect on climate, according to the EPA guidelines (EPA, 2022), which is not significant in EIA terms.

In summary, no significant climate effects are assessed as likely as a consequence of the project.

9.7.2 CLIMATE CHANGE RISK ASSESSMENT

The vulnerability of the project to climate change has been assessed by the CCRA, in line with EPA National Climate Change Risk Assessment Guidance (2025), TII guidance PE-ENV-01104 (TII, 2022), European Commission Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021–2027 (European Commission, 2021a) and ISEP guidance Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (ISEP, 2020a). This involved an analysis of the sensitivity and exposure of the project to climate hazards which together provide a measure of vulnerability.

Sensitive elements of the project include drainage infrastructure, access tracks, substation buildings, underground utilities, wind turbines, and foundations. Climate hazards include flooding (pluvial), extreme temperatures, wind, wildfire, and lightning.

Having taken these into account, a worst-case low vulnerability to climate change hazards has been assessed. In accordance with the EPA EIAR Guidelines (2022), and with the project's design mitigation in place, the effect on the project during the construction phase as a result of climate change are direct, negative, long-term and not significant, which is not significant in EIA terms. The effect on the project during the operation phase as a result of climate change is direct, negative, long-term and not significant, which is not significant in EIA terms.

In summary there are no likely significant effects on the project as a result of climate change hazards.

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