17. CLIMATE

17.1 INTRODUCTION

This chapter comprises an assessment of the likely significant effect on climate associated with the construction and operational elements of the proposed project, which comprises of 11 wind turbines. A full description of the proposed project is presented in Chapter 2 (Description of the Proposed Project).

This chapter provides a baseline assessment of the setting of the proposed project in terms of climate and discusses the likely and significant effects that the construction, operation and decommissioning of the proposed project will have. Where required, appropriate mitigation measures to limit any identified likely significant negative impacts to climate are recommended.

The climate assessment comprises two elements:

- Greenhouse gas emissions assessment (GHGA) – Quantifies the direct and indirect 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 project's vulnerability to climate change and identifies adaptation measures to increase project resilience.

17.2 STATEMENT OF AUTHORITY

This chapter was prepared by Dr. Jovanna Arndt, a Principal Environmental Consultant in the Air Quality & Climate section of AWN Consulting. She holds a BSc. in Environmental Science and a Ph.D. in Atmospheric Chemistry from University College Cork. She is an Associate Member of both the Institute of Air Quality Management and the Institute of Environmental Sciences. She has been specialising in the area of air quality and climate over 9 years and has prepared air quality and climate assessments for inclusion within EIARs for residential developments such as Twenties Lane (Planning Application Ref: 22713), Cherrywood T13 (Planning Application Ref: DZ23A/0028), Corballis Donabate LRD (Planning Application Ref: LRD0017/S3), commercial and industrial developments by Dublin Airport Authority, Zoetis, Ipsen, Merck Millipore, Greener Ideas Limited and Abbvie, as well as renewable energy developments such as Codling Wind Park and the Cúil Na Móna Anaerobic Digestion Facility. She also specialises in assessing air quality impacts using air dispersion modelling of transportation schemes such as BusConnects Dublin, major Highways England Road schemes and major rail infrastructure in the form of High Speed 2 (HS2 in the UK). She has prepared air dispersion modelling assessments of emissions from data centres, energy centres and the chemical industry as part of EPA Industrial Emissions Licences for Microsoft, Greener Ideas Limited, Merck Millipore, Lilly Limerick, Chemifloc, Takeda, Kingspan and Kilshane Energy. She has also provided Air Quality Action Plan (AQAP) and Air Quality Management Area (AQMA) support to several UK councils and assessed the air quality impacts of potential Clean Air Zones in the UK.

This chapter was reviewed by Ciara Nolan. Ciara is a Principal Environmental Consultant in the Air Quality & Climate section of AWN Consulting. She holds a BSc in Energy Systems Engineering from University College Dublin and has also completed an MSc in Applied Environmental Science at UCD. She is a Member of the Institute of Air Quality Management (MIAQM) and the Institute of Environmental Science (MIEnvSc). She has over 9 years of

experience in undertaking air quality and climate assessments. She has prepared air quality and climate impact assessments as part of EIARs for residential developments including Woodbrook, Shankill (Planning Application Ref. ABP30584419), Ballygossan Park, Skerries (Planning Application Ref. LRD0010/S3), SHD Ratoath (Planning Application Ref. SH305196), SHD Rathmullen, Drogheda (Planning Application Ref. SH305552), commercial and industrial developments by Dublin Airport Authority, Abbvie, Mountpark, Pfizer, Takeda, as well as renewable energy developments such as Crockahenny Windfarm, Upperchurch Windfarm, Knocknamona Windfarm and Keerglen Windfarm. She also specialises in conducting air dispersion modelling assessments of emissions from data centres, energy centres and the chemical industry as part of EPA Industrial Emissions Licences for Echelon DC, AWS, Takea, MSD and Regeneron. She has undertaken air quality and climate impact assessments for transportation schemes, primarily regional and national road schemes, from constraints, through to route selection and EIAR stage.

17.3 Legislation, Policy and Guidance

17.3.1 International Legislation & 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.

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. These sectors must reduce emissions by 42% by 2030 compared to 2005 levels.

Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') writes into 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 55% by 2030, compared to 1990 levels.

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 (the "**EIA Directive**"). Recital (7) of the EIA Directive 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: "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): "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".*

17.3.2 National Legislation

The Climate Action and Low Carbon Development Act 2015 as amended by the Climate Action and Low Carbon Development (Amendment) Act 2021 (the "Climate Act", as amended) was enacted 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*' (the '*national transition objective*').

Section 15 of the Climate Act requires certain public bodies, including planning authorities, to exercise their functions, in so far as possible, in a manner consistent with -

- The most recent approved climate action plan;
- The most recent approved national long term climate action strategy;
- The most recent approved national adaptation framework and approved sectoral adaptation plans;
- The furtherance of the national climate objective, and
- The objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State.

The importance of Section 15 has been highlighted in the recent ruling made by the Supreme Court in Ireland regarding the Coolglass Wind Farm project (*Coolglass Wind Farm Limited v An Coimisiún Pleanála [2026] IESC 5*), delivered on 4 February 2026. The Supreme Court - dismissing the Commission's appeal from the High Court judgment of Humphreys J ([2025] IEHC 1) - confirmed that the amendments effected by the 2021 Act are of real importance and effect. The obligation under Section 15 is one not merely of process but of outcome: a decision of the Commission, if challenged, is assessed not by a rationality standard but by reference to whether it complies with the legal obligation of consistency with the climate objectives. Section 15 accordingly creates a binding and enforceable legal duty.

The fifth and most recent climate action plan, CAP25, was published in April 2025 (Government of Ireland, 2025), which is to be applied in conjunction with CAP24.

The Climate Act also provides for "carbon budgets and a decarbonisation target range for certain sectors of the economy". The 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 Climate Act 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 3 sequential budget periods, as shown in in Table 17.1. The sectorial emission ceilings for 2030 are published in CAP25 and are shown in Table 17.2. Electricity has a 75% reduction requirement and a 2030 emission ceiling of 3 Mt CO_2e (carbon dioxide equivalent).

Table 17.1: 5-Year Carbon Budgets 2021 – 2035

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.

Table 17.2: 2030 Sectoral Emissions Ceilings

Sector	Baseline (Mt CO_2e)	Carbon Budgets (Mt CO_2e)		2030 Emissions (Mt CO_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, CAP25 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

17.3.3 Policy

17.3.3.1 National Policy

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 (Government of Ireland, 2023). The updated and current CAP25, published in April 2025 (Government of Ireland, 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) (Government of Ireland, 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.

As outlined in CAP25 the target for renewables on the national grid is 80% by 2030 which includes 9 gigawatts (GW) of onshore wind energy. This is a key target and action within CAP25.

In April 2023, the Government published its *Long-Term Strategy on Greenhouse Gas Emissions Reductions* (Government of Ireland, 2024b). 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 (First Revision) 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) (Government of Ireland, 2024c) was published in June 2024 in line with the five-year requirement of the 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 sought 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 (Government of Ireland, 2024c). 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)

17.3.3.2 Local Policy

The Tipperary County Council (TCC) *Local Authority Climate Action Plan (LACAP) 2024-2029* (TCC, 2024) outlines TCC's goals to mitigate GHG emissions and plans to prepare for and adapt to climate change.

In relation to GHG emissions relevant to the Proposed project, Action No. 51 of Strategic Goal No. 4 of the LACAP states that TCC will:

*"*Advocate *for both proactive national planning policy and fit for purpose national grid infrastructure in Tipperary that will support the transition to renewable energy and to ensure that local authority planning policy is aligned with national policy change and updates as they relate to national and regional renewable energy/electricity targets, guidance and support schemes."*

Action No. 52 of Strategic Goal No. 4 states that TCC will also:

*"*Dedicate *and train a team of cross-sectoral personnel to support planning assessment of large-scale renewable energy projects/bio-energy projects and new and emerging technologies."*

The Offaly County Development Plan 2021-2027 (Offaly County Council (OCC), 2021) includes a County Wind Energy Strategy, which is a plan led approach to wind energy development in County Offaly and sets out areas 'open for consideration' for wind energy developments and considerations for the evaluation of wind energy planning applications. The plan sets out targets of 466.3 MW of wind energy by the end of the 2021-2027 plan period. At present, the County has approximately 650MW of operational or permitted renewables. These include: wind, solar, hydrogen electrolysers, biomass methanisation, and synchronous compensator. The existing, consented and 'pipeline' of additional projects may raise the total to over 1.5 GW of renewable energy, storage and grid systems services facilities in Offaly.

The Offaly County Council Climate Action Plan 2024 - 2029 (OCC, 2024) outlines OCC's goals to mitigate GHG emissions and plans to prepare for and adapt to climate change, with climate actions grouped under five key themes:

- Governance and Leadership,
- Built Environment and Transport,
- Natural Environment and Green Infrastructure,
- Communities: Resilience and Just Transition and Sustainability and
- Resource Management

Further detail regarding Offaly and Tipperary CDPs are available in Chapter 4.

17.3.3.3 Guidance

The principal guidance and best practice documents which the assessment of potential impacts on climate are based on are summarised below. The assessment has also considered best-practice national guidelines where available, in addition to international standards and guidelines relating to the assessment of climate impacts. These are summarised below:

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA, 2022);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (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 (TII, 2022);
- Transport Infrastructure Ireland (TII) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII, 2025);
- Institute of Sustainability & Environmental Professionals (ISEP) (formerly known as IEMA) Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (hereafter referred to as the ISEP GHG guidance) (ISEP, 2022);
- ISEP Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the ISEP Climate Change guidance) (ISEP, 2020a);
- ISEP GHG Management Hierarchy (hereafter referred to as the ISEP GHG Management Hierarchy) (ISEP, 2020b);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013; and
- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021).

17.4 METHODS

17.4.1 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 17.6.1).

17.4.1.1 Construction Phase

17.4.1.1.1 GHG Assessment – TII Carbon Tool

The GHG assessment has been conducted following the TII PE-ENV-01104 guidance (TII, 2022). PE-ENV-01104 (TII, 2022) recommends the calculation of the construction stage GHG emissions, including embodied carbon, using the TII Online Carbon Tool (TII, 2025). 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 TII Online Carbon Tool (TII, 2025) has been commissioned by TII to assess GHG emissions associated with road or rail projects using Ireland-specific emission factors and data. However, the tool can be used to estimate the GHG emissions from other development types such as the proposed project as a number of the material types and activities are similar. The TII Carbon Tool (TII, 2025) uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013). AWN has determined that the TII Carbon Tool (2025) provides a robust methodology as it also uses Ireland specific emissions factors and relevant, specific material options.

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).

The TII Carbon Tool has been used to assess the GHG emissions associated with the site clearance works, excavation, material transport, construction activities, construction worker travel and construction wastes for the proposed project.

The assessment commences with the high-level design, through pre-construction (i.e. site clearance), followed by the assessment of the embodied carbon associated with all materials used in the construction of the proposed project, the emissions during the construction works activities and additionally emissions related to waste generated during the construction phase. The tool also assesses on-going maintenance associated with the lifetime of the proposed project.

The construction phase of the proposed project will result in GHG emissions from the following sources:

- Site clearance activities (i.e. tree felling and peat removal) required for the proposed wind farm area, proposed grid connection route (GCR) and proposed turbine delivery route (TDR);
- Construction materials;
- Construction traffic (HGV and LGV movements for material deliveries, construction staff movements, transport of waste);
- Construction waste;
- Construction works (including excavations, fuel usage).

Information on the above elements were provided by the project teams for input into the carbon tool. Standard maintenance, as indicated through the TII Carbon Tool (TII 2025), required over the operational phase has also been considered as part of the embodied construction emissions. Precautionary estimates have been used in this assessment to provide an estimate of the GHGs associated with the proposed project, regarding proposed construction materials and exact methodologies.

17.4.1.1.2 Turbine Manufacture Lifecycle Assessment

The GHG emissions associated with the manufacture of the wind turbines themselves have been considered in the GHG assessment as follows.

Due to the flexibility sought regarding the range of design parameters associated with the wind turbines for the proposed project the make and manufacturer of the turbines to be installed has not yet been decided at this stage of the project and will be decided post consent should permission be granted. As a result, indicative information from various wind turbine manufacturers (based on experience of similar projects and publicly available information from manufacturers such as Nordex and Vestas) has been reviewed.

These LCAs are produced by the manufacturer at one specific site for specific turbine models, and consider variables such as project lifespan and local wind conditions. An LCA is not produced by the manufacturer on a project by project basis i.e. not for this proposed project. The GHG emissions are typically presented as an overall value, and detailed information for each stage is not provided. It is therefore not possible to extract only the relevant elements (such as materials for the turbines) for the proposed project and incorporate them quantitatively into this assessment. However, LCAs do provide an indication of the payback period for the turbines, which ranges from 5-8 months based on the LCAs reviewed. The proposed project is therefore expected to offset the GHG emissions associated with the turbine

manufacture in a similar time frame. This has been considered qualitatively as part of GHG assessment for the proposed project.

17.4.1.2 Operational 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 proposed 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 178,073 MWh of energy will include emissions of CO_2, nitrous oxide (N_2O) and methane (CH_4). The most recent (2025) figure for carbon intensity of electricity generation in Ireland is 226.3 gCO_2e/kWh (SEAI, 2025). The CO_2 equivalent emissions of N_2O and CH_4 have been calculated using the global warm potentials in 6th Assessment Report IPCC Guidelines.

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 operational vehicles have been scoped out of this assessment.

17.4.1.3 Decommissioning Stage

Vehicles related to the decommissioning phase will give rise to CO_2 emissions. It is not predicted that this development 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 2 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 17.4.1.1.2. As per these LCAs, the majority of the metal components that are primarily mono-material (e.g. gears, transformers, tower sections, etc.) will be recycled. It is expected that the reinforced concrete foundation bases will remain in-situ. Decommissioning has been considered as part of the turbine LCAs and payback periods (discussed in Section 17.4.1.1.2), and is typically a small proportion of the GHG emissions associated with a wind farm project. The impact of decommissioning on the proposed project's GHG emissions is therefore scoped out from further assessment.

17.4.1.4 Significance Criteria for GHGA

The Transport Infrastructure Ireland (TII) guidance document *entitled PE-ENV-01104 Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document* (TII, 2022) outlines a recommended approach for determining the significance of both the construction, operational and decommissioning phases of a development, which has been applied to this assessment.

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022) is based on the ISEP GHG guidance (ISEP, 2022) which is broadly consistent with the terminology contained within Figure

3.4 of the EPA's (2022) *'Guidelines on the information to be contained in Environmental Impact Assessment Reports'*.

The ISEP GHG guidance (ISEP, 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; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

The ISEP GHG guidance states that the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a positive effect. Where the fundamental reason for a proposed project is to combat climate change (e.g. a wind farm or carbon capture and storage project) there is a positive effect that drives the project need.

TII states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact (TII, 2022). Significance is determined using the criteria outlined in Table 17.3 (derived from Table 6.7 of PE-ENV-01104 (TII, 2022)) along with consideration of the following two factors:

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

The significance of the effect of GHG emissions on climate is assessed for the total GHG emissions across all project stages.

Table 17.3: Greenhouse Gas Assessment (GHGA) Significance Criteria

Effects	Significance Level Description	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

Effects	Significance Level Description	Description
		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	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 project (TII, 2022). The approach is based on comparing the net proposed project GHG emissions to the relevant carbon budgets (Government of Ireland, 2025). The relevant sector budgets are for Electricity, Transport, Waste and Industry. The 2030 sectoral emissions ceilings and reduction requirements relative to the 2018 baseline are detailed in Table 17.2.

17.4.2 Climate Change Risk Assessment

The CCRA phase assessment involves determining the vulnerability of the proposed project to climate change. This involves an analysis of the sensitivity and exposure of the proposed project to climate hazards which together provide a measure of vulnerability.

PE-ENV-01104 (TII, 2022) states that the CCRA is guided by the principles set out in the overarching best practice guidance documents:

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

The baseline environment information provided in Section 17.6 and input from other experts working on the proposed project (i.e. hydrologists) has been used in order to assess the likelihood of a climate risk.

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

The proposed project asset categories are assigned a level of sensitivity to climate hazards. PE-ENV-01104 (TII, 2022) provides the below list of asset categories and climate hazards to be considered. The asset categories will vary for 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.

17.4.2.1 Significance Criteria for CCRA

The assessment of vulnerability to climate change combines the outcomes of the sensitivity and exposure analysis with the aim of identifying the key vulnerabilities and potentially significant climate hazards which could impact the proposed project.

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

Vulnerability = Sensitivity x Exposure

The vulnerability assessment takes any proposed mitigation into account. Table 17.4 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale.

TII guidance (TII, 2022) 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 project 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. An assessment of construction phase CCRA impacts is only required according to the TII guidance (TII, 2022) if a detailed CCRA is required.

The screening CCRA, detailed in Section 17.7.3, did not identify any residual medium or high risks to the proposed project as a result of climate change. Therefore, a detailed CCRA for the construction, operational and decommissioning phases were scoped out.

Table 17.4: Climate Change Vulnerability Matrix

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

17.5 Difficulties Encountered

There were no difficulties encountered in compiling this assessment.

17.6 Existing Environment

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

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 positive or negative being of more significance than previously considered prior to these declarations.

Climate impacts are assessed at a national level and in relation to national targets and sectoral emission ceilings. The study area for climate is the Republic of Ireland and the baseline is determined in relation to this study area.

17.6.1 Current GHGA Baseline

Data published in July 2025 (EPA, 2025a), indicates that Ireland exceeded, without the use of flexibilities, its 2024 annual limit set under EU's Effort Sharing Decision (ESD) (406/2009/EC) by 1.03 Mt CO_2e. However, the 2024 emissions represent the second consecutive year in which Ireland's emission were below (-4.2%) 1990 levels. ETS (Emissions Trading Scheme) emissions decreased (-1.1%) and ESR (Effort Sharing Regulation) emissions decreased (-2.2%). 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 2024 total national GHG emissions, excluding LULUCF, have decreased by 2.0% on 2023 levels to 53.82 Mt CO_2e, with a 0.7 Mt CO_2e (-8.9%) reduction in electricity industries alone. This was driven by a 39.7% share of energy from renewables in 2024 and the complete phase-out of peat for electricity generation. Manufacturing combustion and industrial processes decreased by 4.6% to 6.0 Mt CO_2e in 2024 due to declines in fossil fuel usage. The sector with the highest emissions in 2024 was agriculture at 37.9% of the total, followed by transport at 20.8%. For 2024, total national emissions (including LULUCF) were 57.53 Mt CO_2e (EPA, 2025a) (Table 17.5).

The current estimates of National greenhouse gas emissions (including LULUCF) in 2024 are 12.0% below 2018, well off the National Climate ambition of a 51% reduction by 2030. The data indicate that from 2021- 2024 Ireland has used 79% (186 Mt CO_2e) of the 295 Mt CO_2e Carbon Budget for the five-year period 2021-2025. This leaves 21% of the budget available for 2025, requiring a substantial 17.5% annual emissions reduction for 2025 to stay within budget.

Table 17.5: Trends in Total National GHG Emissions 2022 - 2024

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

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

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

17.6.2 Future GHGA 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 GHG guidance (ISEP, 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 CAP25, and future CAPs, alongside binding 2030 and net zero by 2050 EU targets. In order to meet the commitments under the Paris Agreement, 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). 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 thus 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.

17.6.3 Current CCRA Baseline

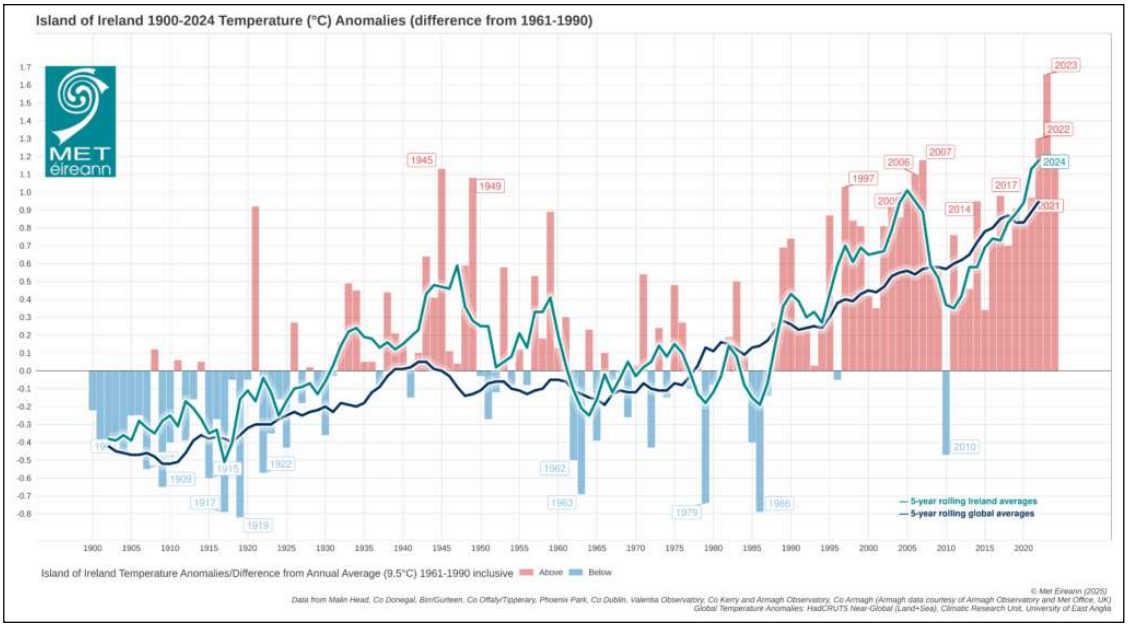
The region of the proposed project has a temperate, oceanic climate, resulting in mild winters and cool summers. The nearest Met Éireann weather and climate monitoring station which is representative of the proposed project, and which has long term 30-year (1991-2020) meteorological data, is Dublin Airport.

The data for the 30-year period from 1991 to 2020 indicates that the wettest months at Dublin Airport Meteorological 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 2024 Climate Statement (Met Éireann, 2025) states 2024's average shaded air temperature in Ireland is provisionally 10.72°C, which is 1.17°C above the 1961-1990 long-

term average. This makes 2024 the fourth warmest year on record, 0.49 °C cooler than 2023, the warmest year on record. The majority of annual rainfall totals across the country were below their Long-Term Average 1981-2010. Six stations (Mace Head, Co. Galway, Sherkin Island, Co. Cork, Dunsany, Co. Meath, Gurteen, Co. Tipperary, Athenry, Co. Galway and Finner, Co. Donegal) had their highest mean wind for August on record (record lengths ranging between 13 and 20 years). (see Figure 17-1).

Figure 17-1 – 1900-2024 Temperature (°C) Temperature Anomalies (differences from 1961-1990)



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 the June 2023. This marine heatwave contributed to the record rainfall in July.

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 means the likelihood of extreme weather events occurring has increased. This will result in longer dry periods and heavy rainfall events. Storm surges and coastal flooding are predicted to increase due to sea level rise. Compound events, where coastal surges and extreme rainfall events occur simultaneously will also increase. Met Éireann has high confidence in maximum rainfall rates increasing but not in how the frequency or intensity of storms will change with climate change.

The TCC LACAP highlights the risks that climate change poses, with risks mainly associated with extreme weather events. The TCC LACAP notes that based on the climate hazard baseline, severe windstorm and extreme precipitation events have impacted upon Tipperary County most frequently over the last 30 years. Pluvial flooding, above average surface temperatures, above average precipitation, river flooding, heatwaves and drought were common occurrences. Cold spells, heavy snowfall and an increase in Relative Sea Level have also impacted Tipperary County, but less frequently.

The OCC Climate Action Plan 2024 - 2029 highlights the risks that climate change poses, with risks mainly associated with extreme weather events. The OCC Climate Action Plan 2024 - 2029 notes that river flooding and severe windstorms were assessed as being the hazards occurring most often and with a moderate impact on County Offaly over the last 30 years.

17.6.4 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 project.

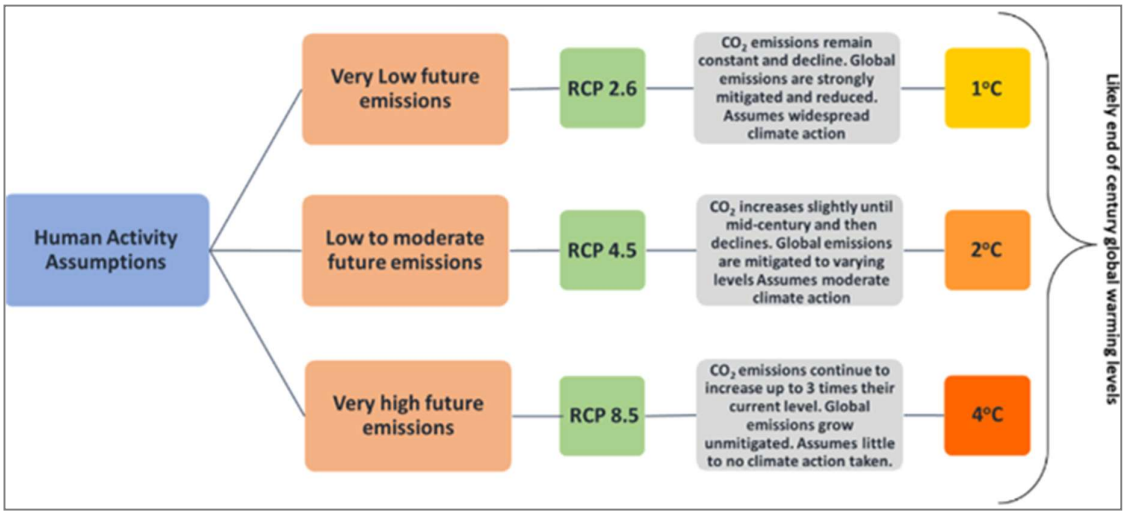
Ireland has experienced increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east including in the region where the proposed project will be located (EPA, 2021b). The EPA has compiled a list of potential adverse impacts as a result of climate change including the following which may be of relevance to the proposed project (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; and
- Changes in distribution of plant and animal species.

TII's Guidance document PE-ENV-01104 (TII, 2022) 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.

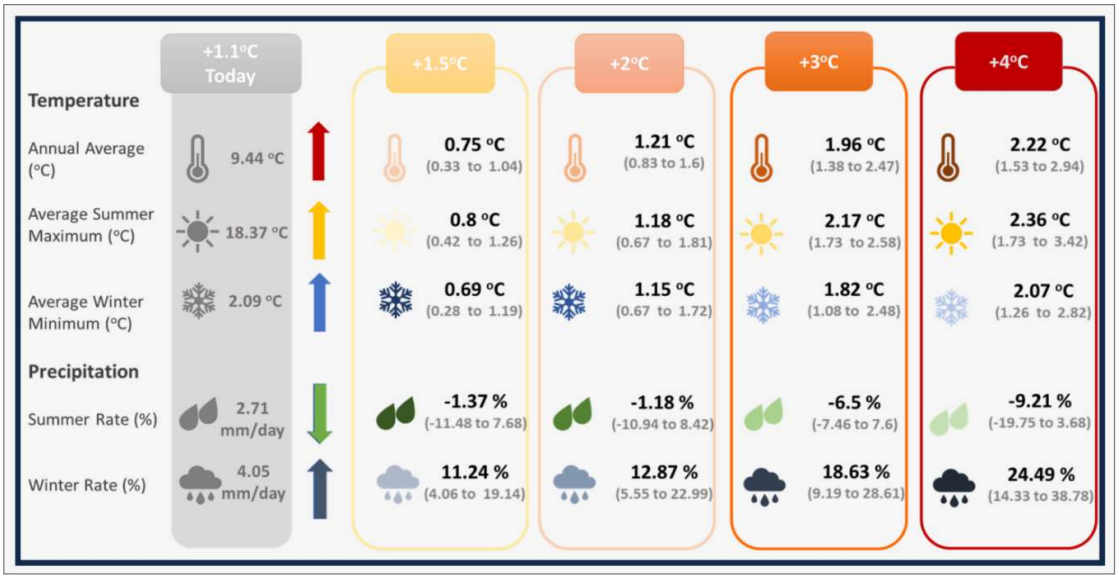
National Framework for Climate Services (NFCS) was founded in June 2022 to streamline the provision of climate services in Ireland and will be led by Met Éireann. The aim of the NFCS is to enable the co-production, delivery and use of accurate, actionable and accessible climate information and tools 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, 2024a) 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), by Met Éireann climatologists. TRANSLATE's outputs are produced using a selection of internationally reviewed and accepted models from both CORDEX and CMIP5 (Coupled Model Intercomparison Project). 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 17-2.

Figure 17-2: Representative Concentration Pathways associated emission levels from TRANSLATE project storymap (Met Éireann, 2024a)



TRANSLATE (Met Éireann, 2024a) 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, 2024a). 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 17-3). 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.

Figure 17-3: Change of climate variables for Ireland for different Global warming thresholds (Met Éireann, 2024c)



The TRANSLATE research report (Met Éireann, 2024c) 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, 2024a) 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, 2024a) 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 of the *Climate Change Assessment Synthesis Report* (EPA, 2024a) 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. Transport infrastructure is exposed to increases in sea level and flooding. For energy infrastructure, the key risks are extreme wind speeds, increased precipitation and saturated soils, given their impacts on the electricity distribution network, with flooding also of concern. For information, communications and technology (ICT) infrastructure, extreme wind speeds and increased storminess are key concerns. Failures in critical infrastructure can cascade across other sectors and present a multi-sector risk due to climate change.

The report references the EPA's *Critical Infrastructure Vulnerability to Climate Change* report (EPA, 2021a) as the most substantial research project in Ireland to date on climate change and critical infrastructure which assesses the future performance of Ireland's critical infrastructure when climate is considered. The Critical Infrastructure Vulnerability to Climate Change report states with respect to water availability and quality, that flood risk and heatwaves have a medium vulnerability index and the underground supply network has a high vulnerability to snowstorms and cold spells. However, while the vulnerability is high, the exposure is likely to reduce due to future climate change resulting in less cold weather events. The risk assessment highlights the co-dependence of the water sector to the energy sector, and how vulnerability in the energy sector may have cascading impacts.

Volume 4 (EPA, 2024a) 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.

The projections were echoed by the *Updated High-resolution Climate Projections for Ireland Research Report: 471* (EPA, 2024b) which was in broad agreement with previous research. The future autumn and winter months are projected to be up to 10% wetter, while summer is projected to be up to 8% drier.

The TCC LACAP highlights the risks that climate change poses, with risks mainly associated with extreme weather events. The TCC LACAP notes that based on the climate hazard baseline, severe windstorm and extreme precipitation events have impacted upon Tipperary County most frequently over the last 30 years. Pluvial flooding, above average surface temperatures, above average precipitation, river flooding, heatwaves and drought were common occurrences. Cold spells, heavy snowfall and an increase in Relative Sea Level have also impacted Tipperary County, but less frequently.

The risk of existing hazards such as severe windstorm and extreme precipitation events is projected to increase in the future to very frequent due to a projected increases in the frequency of very wet days (>30mm of precipitation), though due to a limited number of studies the projections for severe windstorms should be considered with caution. Pluvial flooding, above average surface temperatures, above average precipitation, river flooding, heatwaves and drought are all predicted to increase from a common occurrence to frequent.

In terms of asset damage from climate change hazards, TCC's LACAP identifies that densification of urban area has the potential to result in an increase in the number of exposed

assets and populations to river and pluvial flooding. The LACAP also notes that *"future developments will be required to utilise sustainable urban drainage systems to control the release of water runoff in a managed way"* to manage above average and extreme precipitation events. In relation to above average surface temperatures and heatwaves, the LACAP states that new building regulations, design and material will be required for use in new developments to manage the increase in these hazards. Figure 17-4 (from Appendix F of TCC's *Tier 1 Climate Change Risk Assessment*, which accompanies the LACAP) gives full details of the asset damage due to increases in future climate change hazard frequency.

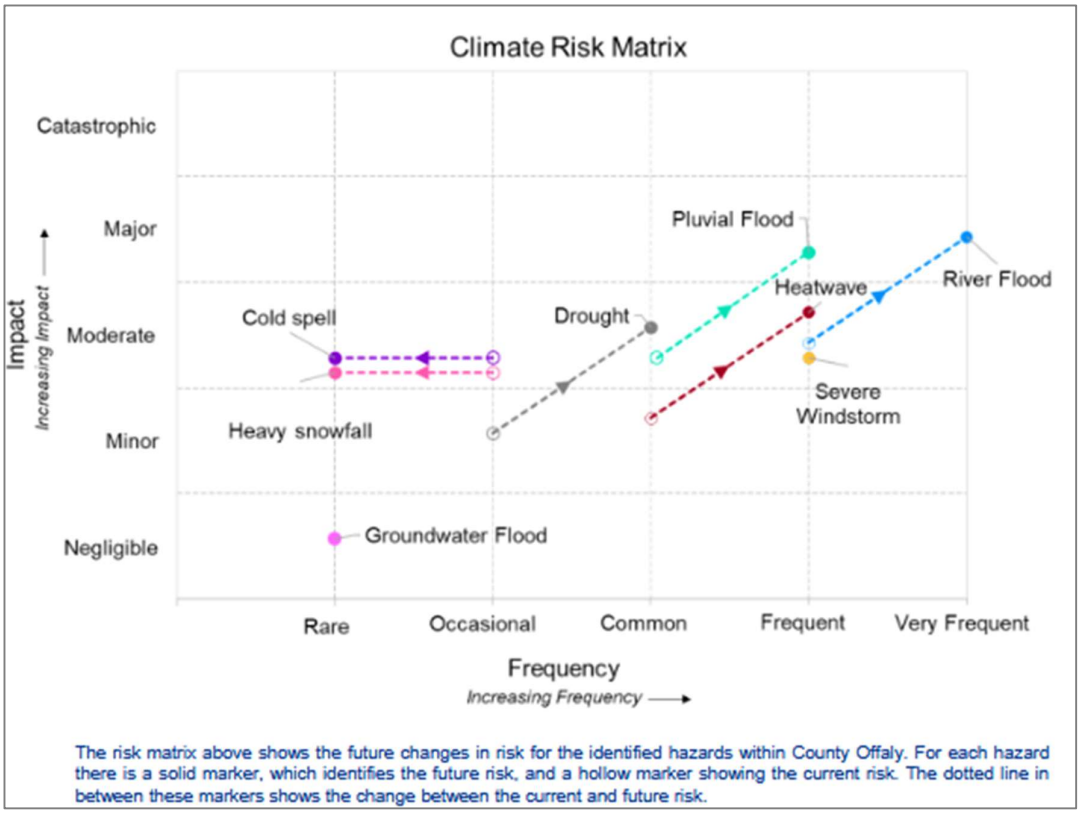
Figure 17-4: Assessment of Future Climate Hazards and in Tipperary County. (TCC, 2023)

Assessment of Future Climate Impacts - Asset Damage

Hazard No.	Hazard Type	Current Asset Damage	Projected Change	Rationale
1	River flood	Major	Major	Densification of urban areas to deliver compact growth will potentially increase the amount of properties at risk of flooding. However, the Tipperary CDP outlines an objective to ensure vulnerable developments are directed away from areas at risk of flooding. Works will also be continued with OPW to develop flood relief schemes and maintain existing defences. There is a likely increase in river flows across most of the country leading to an increase in severity of flooding (Climate Ireland).
2	Pluvial flood	Moderate	Moderate	Similarly to river flooding, densification of urban areas will potentially increase the amount of properties at risk. Adaptation and spatial planning goals include the conversion of land at risk of flooding to less vulnerable uses e.g. parks, gardens and open spaces for natural habitats (Tipperary CDP). Works will also be continued with OPW to develop flood relief schemes and maintain existing defences. When compared with an annual average rainfall of 1186mm for the period 1961-1990, the thirty year period 1990-2019 shows a 70mm or almost 7% increase in rainfall (Status of Ireland's Climate, EPA).
3	Above average precipitation	Moderate	Moderate	Future developments will be required to utilise sustainable urban drainage systems to control the release of water runoff in a managed way (Tipperary CDP). The last decade from 2006 - 2015 has been the wettest period in the period 1711- 2016 and there is evidence of an increasing trend in winter rainfall and a decreasing trend in summer rainfall (Status of Ireland's Climate, EPA). This implies there is an increase in severity in winter periods but a reduction in summer periods.
4	Extreme precipitation	Moderate	Moderate	Future developments will be required to utilise sustainable urban drainage systems to control the release of water runoff in a managed way (Tipperary CDP). When compared with an annual average rainfall of 1186mm for the period 1961-1990, the thirty year period 1990-2019 shows a 70mm or almost 7% increase in rainfall (Status of Ireland's Climate, EPA).
5	Severe windstorm	Minor	Moderate	Current predictions indicate an increase in the intensity of windstorms (Climate Ireland), increasing the impacts involved.
6	Increase in Relative Sea Level	Negligible	Negligible	Satellite observations indicate that sea levels around Ireland have increased by approximately 2-3 mm per year since the 1990s (The Status of Ireland's Climate, EPA). However, this will unlikely increase the impact.
7	Heatwave	Minor	Minor	Average surface air temperatures are expected to increase across all seasons which will likely increase the intensity of heatwaves (Climate Ireland). New building regulations and materials will be required for use in new developments to accommodate this, but there will also be an increase in the impact of heatwaves due to more compacted urban areas (Tipperary CDP).
8	Drought	Minor	Moderate	Average surface temperature are expected in increase, as well as a decrease in the levels of summer rainfall (Status of Ireland's Climate, EPA), leading to an increase in the impact of droughts.
9	Above average surface temperature	Negligible	Negligible	Average surface air temperatures across all seasons are expected to increase (Climate Ireland). New building design and materials will be introduced to accommodate hotter summers without compromising resilience to other climate changes, but densification of urban areas will potentially increase the solar radiation of urban areas (Tipperary CDP).
10	Cold spell	Minor	Minor	No changes in the assets affected. There has been a decrease in the number of frost days (temperatures below 0°C) and a shortening of the frost season duration, with projections to be in line with current trends (Climate Ireland). However, the impact remains as a minor impact.
11	Heavy snowfall	Minor	Minor	No changes in the assets affected. Snowfall is projected to decrease substantially by the middle of the century (Nolan and Flanagan), but impacts will remain the same.

The future risks of climate change hazards as identified and reproduced from in the OCC Climate Action Plan 2024 - 2029 are shown in Figure 17-5. The risk of existing hazards such as river and pluvial flooding is likely to increase in the future, while heatwaves and droughts although already experienced in County Offaly, are expected to occur more frequently due to climate change and with a greater impact on County Offaly in the future. These hazards can therefore be considered as emerging risks for the region. Although the frequency and impact of severe windstorms is thought to be unchanged in the future, these events will remain a risk for County Offaly. The risk of groundwater flooding is also unchanged in the future, however, there is uncertainty associated with how climate change will impact the occurrence of this hazard. The impact of heavy snowfall and cold spells on County Offaly remains constant, however, due to the potential decrease in hazard frequency, the overall risk of these hazards is likely to reduce in the future, resulting in less risk.

Figure 17-5: Assessment of Future Climate Hazards and in Offaly County (OCC, 2024).



17.7 Assessment of Effects

17.7.1 Do Nothing Scenario / Future Baseline

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 9 GW 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 do-nothing effect is a lost opportunity for a positive effect on climate emissions in the long term.

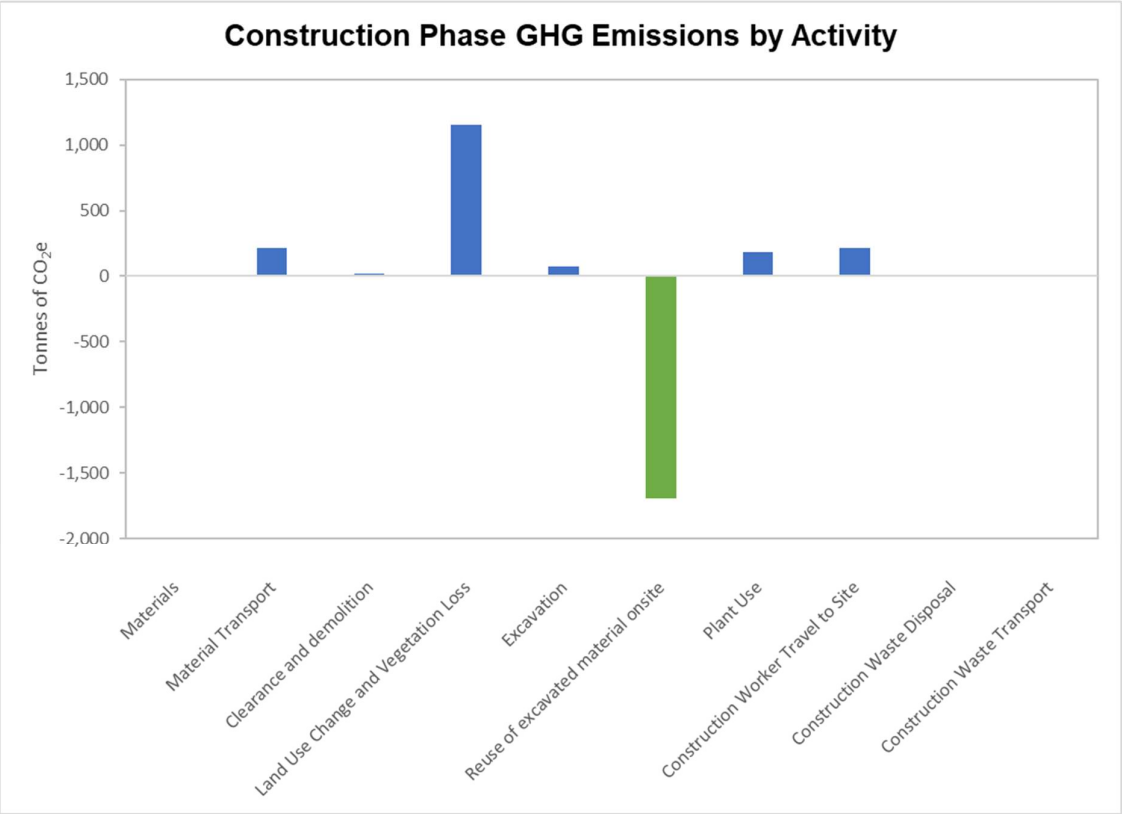
17.7.2 GHG Assessment

17.7.2.1 Construction Phase

The most significant proportion of GHG emissions are anticipated to occur during the construction phase as a result of embodied carbon in construction materials and emissions from construction activities. Figure 17-6 shows the GHG emissions for the proposed project per construction activity.

The GHG assessment has highlighted the areas where the highest embodied carbon emissions occur, specifically as a result of building materials. Land use change, through the removal of peat bog (see Chapter 8 and Appendix 8.2 PSRA for further details) and mixed forest, constitutes the majority of the total construction phase GHG emissions, at approximately 62%. Reuse of the excavated material on site (i.e. it will not require processing as a waste product) will offset the total construction phase GHG emissions by 91%.

Figure 17-6: Construction Phase Greenhouse Gas Emissions by Activity



It has been calculated that the total construction phase GHG emissions will be 173 tonnes CO_2e (see Table 17.6), which includes the GHG emissions avoided by reusing excavated material on site.

The GHG emissions from the proposed project 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 17.6 and Table 17.7. The relevant sectoral emissions for the proposed project comparison include the Industry sector, Transport sector and Waste sector. The predicted emissions for the proposed project are annualised over the assumed 35 year lifespan and then compared to the relevant sector 2030 carbon budgets. Annualising the full carbon emissions over the lifetime of the proposed project allows for appropriate comparison with annual GHG targets.

Table 17.6: Construction Phase GHG Emissions

GHG Assessment Category	Elements Considered	Predicted GHG Emissions (tCO_2e)	Predicted GHG Emissions as % of Construction Phase Total	Relevant Sector for Carbon Budget Comparison
Materials	Concrete (required for main project elements such as turbine foundations, hardstanding areas and substation)	1	0.1%	Industry

GHG Assessment Category	Elements Considered	Predicted GHG Emissions (tCO_2e)	Predicted GHG Emissions as % of Construction Phase Total	Relevant Sector for Carbon Budget Comparison
Material Transport	HGV and LGV trips	214	11%	Transport
Clearance and Demolition	Site preparation and clearance	22	1%	Industry
Land Use Change and Vegetation Loss	Removal of bog and mixed forest	1,156	68%	LULUCF
Excavation	Peat and other excavation	75	4%	Industry
	Reuse of excavated material onsite	-1,696	-91%	Industry
Plant Use	Fuel usage by plant operation (diesel generators)	180	10%	Electricity
Construction Worker Travel to Site	Car trips	217	12%	Transport
Construction Waste Disposal	Mixed construction and demolition waste	1	0.1%	Waste
Construction Waste Transport	HGV transport of waste offsite	3	0.2%	Transport
Total Construction Phase GHG Emissions		173		

In Table 17.7, GHG emissions have been compared against the carbon budget for the industry, transport and waste sectors in 2030 (Government of Ireland, 2025), 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 (20.1 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 35-year proposed project lifespan, are equivalent to 0.0001% of Ireland's total GHG emissions in 2024 and 0.0002% of Ireland's non-ETS 2030 emissions target. The estimated GHG emissions associated with transport-related activities are 0.0002% of the 2030 Transport budget, industry-related activities are -0.0001% of the 2030 Industry budget and waste-related activities are 0.000003% of the 2030 Waste budget.

Table 17.7: Estimated Construction Phase GHG Emissions Relative to Sectoral Budgets and GHG Baseline

Target/Sectoral Budget (tCO_2e)		Annualised Development GHG Emissions (tCO_2e)		% of Relevant Target/Budget
Ireland's 2024 Total GHG Emissions (existing baseline)	57,640,000	Total GHG Emissions	53	0.0001%
Non-ETS 2030 Target	27,721,670	Total GHG Emissions		0.0002%
2030 Sectoral Budget (Industry Sector)	4,000,000	Total Industry Emissions	-13	-0.0001%
2030 Sectoral Budget (Transport Sector)	6,000,000	Total Transport Emissions	12	0.0002%
2030 Sectoral Budget (Electricity Sector)	3,000,000	Total Electricity Emissions	5	0.0002%
2030 Sectoral Budget (Waste Sector)	1,000,000	Total Waste Emissions	0.03	0.000003%

17.7.2.2 Operational Phase

During the operational phase there will be no GHG emissions from the operation of the wind turbines. The estimated 61.6 to 77 MW from the turbines will generate a minimum of 178,073 MWh of renewable energy annually, assuming a 33% capacity factor. This energy production will displacement 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 17.4.1.2, the total annual GHG emission savings of the proposed project will amount to approximately 41,512 tonnes of CO_2e when the GHG emissions from the construction phase (as outlined in Section 17.7.2.1) are offset.

The estimated total GHG emissions savings, when annualised over the 35-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), 1.4% 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 CO_2e emissions by these percentages.

Table 17.8: Estimated Operational Phase Project GHG Savings

Development Emissions & Savings	tonnes CO_2e	Baseline / Relevant Target	tonnes CO_2e	% of Baseline / Relevant Target
Annual Equivalent GHG Emissions from Power Plant Producing 242 GWh	41,517			
Annualised GHG Emissions due to Construction Phase (averaged over lifespan)	5			

Development Emissions & Savings	tonnes CO_2e	Baseline / Relevant Target	tonnes CO_2e	% of Baseline / Relevant Target
Total Annual Savings Due to the proposed project (averaged over lifespan)	41,512	Ireland's Total GHG Emissions 2024 (existing baseline)	57,640,000	0.1%
		Ireland's GHG Emissions from Fossil Fuel Energy Production 2023 (existing baseline)	7,157,440	0.6%
		ETS 2030 Target (42% of 2005 ETS Level)	12,953,240	0.3%
		2030 Sectoral Budget (Electricity Sector)	3,000,000	1.4%

The proposed project will assist in the CAP25 goal of producing 80% electricity from renewables for the grid and 9 GW of onshore wind capacity, which is one of the Key Targets identified in Section 11 of CAP25. The proposed project will constitute up to 0.075 GW of that capacity and will abate Ireland's greenhouse gas emissions by approximately 41,512 tCO_2e (0.04 $MtCO_2e$) for every year of operation.

17.7.2.3 GHGA Significance of Effects

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".

The proposed project will result in GHG emissions during the construction phase; however the proposed project will minimise its impacts through design and management measures (see Section 17.8). The level of mitigation described in Section 17.8 has therefore been taken into account when determining the significance of the proposed project's GHG emissions.

The purpose of the proposed project is to assist with the development of renewable wind energy in Ireland. Renewable energy is a key component of the National Climate Objective of achieving net zero by 2050 detailed within the 2015 Climate Act (as amended).

Guidance ((TII, 2022), see Table 17.3) states that this is appropriate for a project which:

- 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.

The ISEP GHG guidance (ISEP, 2022) (which has been embraced by the updated TII Guidance (TII, 2022) in Section 6.7.2) states 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."

Irelands trajectory to net zero requires significant renewables generated from on and offshore windfarms. As the proposed project is a windfarm development it directly aligns with Ireland's net zero trajectory by 2050 and the CAP25 goal of producing 80% renewable electricity. Additionally, the production of renewable electricity will offset the GHG emissions produced during the construction of the project within the first year of its operation. According to the TII significance criteria described in Section 17.4.1.4 the significance of the GHG emissions during the construction, operational and decommissioning phases is beneficial as the net project GHG emissions will be below zero (i.e. the renewable electricity will offset GHG emissions once operational) and the project is aligned with the 2050 net zero trajectory.

The effect of the proposed project during the construction, operational and decommissioning phases, in relation to GHG emissions in terms of EPA EIAR Guidance (2022), which sets different criteria, is considered **direct, long-term, positive** and **slight**, which is **not significant** in *EIA* terms (EPA 2022).

17.7.3 Climate Change Risk Assessment

17.7.3.1 Construction & Decommissioning Phase

A detailed CCRA of the construction and decommissioning phase has been scoped out, as discussed in Section 17.4.2. However, consideration has been given to the proposed project's vulnerability to the following climate change hazards with best practice mitigation measures proposed in Section 17.8.2:

- 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; and
- Major Storm Damage – including wind damage.

17.7.3.2 Operational Phase

To determine the vulnerability of the proposed project to climate change the sensitivity and exposure of the development to various climate hazards must first be determined. Table 17.9 presents the initial qualitative climate hazards screening relevant to the proposed project due to the proposed project location and have been screened out of the assessment.

Table 17.9 Climate Hazard Screening

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 electrical 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 proposed project during both construction, operational and decommissioning phases due to the sensitivity of construction materials, site access, and site assets to water exposure.	Screen in
Fluvial flooding	There is fluvial watercourse in close proximity to the site.	Screen in
Drought	Droughts have occurred across Ireland, previously impacting water supply. Future reductions in availability would not directly impact the proposed project and its operation.	Screen out
Wildfire	The area surrounding the site is largely forestry and peat lands and vulnerable to wildfire.	Screen in
High winds and storms	Turbines, substation and other assets of the proposed project may be exposed to high winds. Historically, Ireland has experienced several notable storm events including Storm Éowyn 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 the proposed project, as it does not involve transport, aviation, or activities requiring high visibility. However, lighting of the turbines will be in place to ensure no impacts with low flying aviation	Screen out
Lightning	The proposed design is elevated and includes electrically charged components such as a substation and battery storage, making it susceptible to lightning strikes. Mitigation measures have been incorporated into the design in accordance with relevant standards to address this risk	Screen in
Landslides and Subsidence	The Geological Society of Ireland (GSI) landslide susceptibility mapping database (GSI, 2025) was reviewed to determine a moderate risk from landslides at the proposed project location. Consideration has been given to landslide and subsidence and adequate engineering measures are in place to ensure stability of turbines and assets.	Screen in

Climate-related Hazard	Hazard Screening Rationale	Screening
Sea level rise and coastal flooding	Not a coastal location	Screen out

17.7.3.2.1 Climate Vulnerability Assessment

The sensitivity and exposure of the proposed project to the screened in climate hazards must first be determined to then determine the vulnerability of the proposed project to climate change. Flooding (pluvial), extreme heat, extreme cold, wildfire, and extreme wind, have been considered as climate hazards in the context of the proposed project. The results of the vulnerability assessment are detailed in Table 17.10.

It was concluded that, with design and management mitigation in place, the proposed project does not have any significant vulnerabilities to the identified climate hazards as described in the below sections.

Table 17.10 Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (Pluvial & Fluvial)	1 (Low)	2 (Medium)	2 (Low)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low)
Extreme Cold	1 (Low)	1 (Low)	1 (Low)
Wildfire	2 (Medium)	1 (Low)	1 (Low)
Extreme Wind	1 (Low)	2 (Medium)	2 (Low)
Lightning	1 (Low)	1 (Low)	1 (Low)
Landslide and Subsidence	1 (Low)	2 (Low)	1 (Low)

Flooding

A Flood Risk Assessment (FRA) for the proposed project was undertaken by TOBIN and is submitted separately as part of the overall planning application. The FRA concluded that the site is liable to fluvial and pluvial flooding due to increased rainfall, and not at risk of coastal or groundwater flooding.

According to the FRA, based on fluvial extent mapping from the CFRAM study, four turbines and two sections of the access road are identified as being at risk of flooding during both 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) fluvial flood events. All these turbine locations show increased flood extents under the Mid-Range Future Scenario (MRFS), indicating a potential escalation in flood risk over time. The FRA recommends that all critical infrastructure is constructed to a minimum freeboard of 46.5mOD to adapt to this risk.

The hardstanding areas of the turbines will be raised and ensure that the turbines are not located in any localised depressions, therefore reducing the pluvial flood risk to the at risk areas. Surface water arising on the proposed wind farm will be managed by a dedicated stormwater drainage system in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates

The drainage design for the proposed project has been adequately designed with an additional 20% climate change allowance. This additional 20% accounts for the medium risk

Representative Concentration Pathway (RCP) 4.5 future scenario, allowing an additional 30% would account for the high risk RCP8.5 future scenario. Therefore, the exposure of the project is considered as 'medium' for flood risk. However, the FRA has indicated that the overall risk to the proposed project as a result of fluvial and pluvial flooding is minimal with the appropriate design adaptation in place (see FRA for full details).

Overall, it can be concluded that the proposed project has a worst-case low vulnerability due to potential future flooding.

Extreme Wind

In relation to extreme winds, the turbines, overhead lines and meteorological mast are 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, with storms in RCP8.5 likely to be even 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 proposed GCR will be buried underground so protected from extreme winds. Extreme winds are not considered to pose a significant risk to the other elements of the proposed project, such as the BESS and substation.

Lightning and Electrical Storms 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 potential increase in electrical storms due to future climate change. The proposed project design includes a lightning protection mast for the substation and auxiliary assets, while each turbine is equipped with lightning protection to safeguard generators and associated systems. Based on the submitted design specifications, these measures are considered sufficient to reduce vulnerability, and the overall risk of lightning impact is deemed low.

Hail is not deemed to pose a significant risk to the turbines, BESS and associated infrastructure such as the substation. In addition, fog is unlikely to have a negative effect on the turbines however lighting of the turbines will be in place to ensure no impacts with low flying aviation.

Wildfires

In relation to wildfires, the *Think Hazard!* tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) (2023), indicates that the wildfire hazard is classified as 'medium' for the Tipperary and Offaly areas. This means that there is between a 10% to 50% chance of experiencing weather that could support a hazardous wildfire that may pose some risk of life and property loss in any given year. Future climate modelling indicates that there could be an increase in the weather conditions which are favourable to fire conditions, these include increases in temperature and prolonged dry periods. However, land clearance activities will be conducted as required (see Chapter 2 Description of the Proposed Project and Chapter 8 Land, Soils and Geology for more detail) on proposed wind farm site which will remove materials with a high potential for fire creating a buffer and fire breaks in the proximity of turbines. Wildfire may cause issues with pavement softening for access roads. This would be classed as a negative event that may require repair work. However, it is unlikely to require emergency repair works given the level of access required to the proposed wind farm site. Additionally, systems will be in place to prevent impacts from wildfires to the turbines including removal of trees near the

turbines. Overall it can be concluded that the proposed project is of low vulnerability to wildfires.

Landslides

Landslide susceptibility mapping developed by Geological Survey Ireland (GSI, 2024) indicates that the proposed project location is within areas of low to moderately high susceptibility to landslides. However, there is no history of landslides within the proposed wind farm site boundary (GSI, 2024). The risk of landslide may become more pronounced with climate change in both RCP4.5 and RCP8.5 due to heavy rain fall and drought cycles which can increase the likelihood of a landslide. However, these risks have been taken into consideration within the design (see Chapter 8 Land, Soils and Geology for more detail) and have been accounted for with the foundation design and turbine location choices. The proposed wind farm site is therefore of low vulnerability to landslides.

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. While 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 proposed GCR and additional sensitive electrical systems will be buried or not exposed for thermal protection, and substation cooling systems will be designed for RCP4.5 and RCP8.5 scenarios with capacity for future upgrades. Overall, extreme temperatures are not considered a significant risk.

Summary

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

17.7.3.3 CCRA Significance of Effects

As per TII guidance (TII, 2022), the significance of effect has been determined with design mitigation taken into consideration. There are no significant risks to the proposed project as a result of climate change. In accordance with the EPA EIAR Guidelines (2022), the significance of likely effects as a result of climate change is direct, long-term, negative and imperceptible. This is overall not significant.

17.8 Mitigation Measures

17.8.1 GHGA

17.8.1.1 Construction Phase

While there are no likely significant effects pre-mitigation from the proposed project and mitigation measures are therefore not required, the following mitigation measures will be implemented in accordance with best practice, where practicable and will also take the final detailed design into account.

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. Best practice measures to reduce the embodied carbon of the construction works will be implemented:

- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled;
- The use in construction plant and equipment of sustainably sourced Hydrotreated Vegetable Oil (HVO) as a 100% replacement of fossil fuels, depending on market availability. Any generators on site will be a minimum of hybrid models (internal combustion paired with solar panels), and fully electric construction plant will be used if commercially available;
- The replacement, where feasible, of standard concrete containing Portland cement concrete with an alternative concrete mix with lower associated embodied carbon, as per the Climate Action Plan. This will be a minimum of 30% GGBS replacement, or concrete with equivalent or lower associated embodied carbon;
- Procurement contracts will ensure that material choices with lower associated embodied carbon relative to standard construction materials are considered favourable during tender;
- Materials will be reused on site;
- 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;
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the GHG emissions associated with the site;
- Opportunities for materials reuse will be incorporated within the extent of the proposed project including the use of reclaimed asphalt and recycled aggregate, which will reduce the virgin material needs; and
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

17.8.1.2 Operational Phase

During the operational phase of the proposed project, the works onsite will be limited to maintenance associated with the proposed wind farm and BESS components. 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.

17.8.2 CCRA

17.8.2.1 Embedded Mitigation

A number of measures have been adopted as part of the project design, primarily in terms of reducing risk to the project from climate change hazards. These have been discussed in detail previously in Section 17.7.3, and are summarised as follows:

- All critical infrastructure is constructed to a minimum freeboard of 46.5mOD and the drainage design for the proposed project has been adequately designed with an additional 20% climate change allowance;
- Lightning protection for the turbines and meteorological mast will be provided for, following relevant standards;

- The turbines shall be designed to the appropriate standards to account for the high wind loadings; and
- High quality, durable building materials will be selected for the proposed project to reduce their sensitivity to extreme temperatures.

However, a project's climate resilience benefits from review of climate hazards and management of their impacts during the detailed design, construction and operation. The proposed project will be constructed having taken the most up to date Eurocodes, design practices and climate data into account to maximise resilience of the project against climate change hazards.

17.8.2.2 Construction Phase

In terms of impact on the proposed project due to climate change, during construction the Contractor will mitigate against the effects of extreme rainfall/flooding through site risk assessments, and method statements. Risk assessments may require the cessation of works in certain conditions such as fog for crane operation or in a flood event. The Contractor will 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 and the Contractor will ensure that these are complied with. During construction, the Contractor will mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

17.9 Residual Effects

The proposed project will result in GHG emissions during the construction phase, however the proposed project will minimise its impacts through design and management measures (see Section 17.8). 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".

The purpose of the proposed project is to assist with the development of renewable wind energy in Ireland. Renewable energy is a key component of the National Climate Objective of achieving net zero by 2050 detailed within the Climate Act. Guidance ((TII, 2022), see Table 17.3) states that this is appropriate for a project which:

- 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.

Ireland's trajectory to net zero requires significant renewables generated from on and offshore windfarms. The ISEP GHG guidance (ISEP, 2022) (which has been embraced by the updated TII Guidance (TII, 2022) in Section 6.7.2) states 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."

The effect of the proposed project in relation to GHG emissions in terms of EPA EIAR Guidance (2022), which sets different criteria, is considered **direct, long-term, positive** and **slight**, which is **not significant** in *EIA* terms (EPA, 2022).

In relation to climate change vulnerability, it has been assessed that there are no significant risks to the proposed project as a result of climate change. The residual effect of climate change on the proposed project is considered **direct, long-term, negative** and **imperceptible**, which is overall **not significant** in EIA terms.

The following table summarises the identified likely significant residual effects during the construction phase of the proposed project following the application of mitigation measures.

Table 17.11: Summary of Effects Post Mitigation

Likely Significant Effect in accordance with EPA Terminology	Quality	Significance	Extent	Probability	Duration	Type
GHG emissions and savings from construction and operational	Positive	Slight - Not significant	National	Likely	Long-term	Direct
Climate change and related vulnerability of the proposed project	Negative	Imperceptible - Not significant	Local	Likely	Long-term	Direct

17.10 Cumulative Effects

With respect to the requirement for a cumulative assessment the ISEP (2022) and 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".

As per the above, the cumulative impact of the proposed project in relation to GHG emissions is as assessed in Section 17.7.2 and is considered direct, long-term, positive and slight, which is overall not significant in EIA terms.

17.11 CONCLUSION

This chapter of the EIAR has assessed the potential environmental effects on climate, focusing on:

- The potential 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.
- 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 proposed project, and no significant effects on the proposed project itself as a result of climate change hazard.

17.11.1 Greenhouse Gas Assessment

The impact of GHG emissions during the construction, operational and decommissioning phases on climate was 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 was based on the proposed 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 estimated minimum output of 61.6 MW from the proposed project will generate 178 GWh annually, which will amount to annual GHG emission savings of approximately 41,512 tCO_2e at the 2025 carbon intensity, which is equivalent to 1.4% of the total carbon budget for the electricity sector in 2030 (Government of Ireland, 2025).

The proposed project will significantly assist in the CAP25 goal of producing up to 80% renewables for the grid and the key actions of installing at least 9 GW 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 proposed 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 20 Mt CO_2eq total cannot be achieved unless there is early delivery of a significant volume of the installed onshore wind capacity targets required by CAP25. The proposed project should therefore be considered an essential installation in aiding Ireland's legal climate compliance and combatting the national climate emergency.

The proposed project is therefore in line with both national and local policy (described in Section 17.3.3) of supporting Ireland's transition to renewable energy and renewable energy/electricity targets.

The impact of GHG emissions from the proposed project aligns with Ireland's GHG trajectory to net zero by 2050. This is therefore considered a "beneficial" effect according to PE-ENV-01104 (TII, 2022), where a *"project's net GHG impacts are below zero and cause a reduction in atmosphere GHG concentration, the project has gone well beyond existing and emerging policy*

requirements and is well 'ahead of the curve' for Ireland's trajectory towards net zero, and provides a positive climate impact". This equates to a direct, positive, long-term and slight effect on climate, according to the EPA guidelines (EPA, 2022), which is not significant in EIA terms.

In summary there are no likely significant effects on climate as a result of the construction, operational and decommissioning phases of the proposed project.

17.11.2 Climate Change Risk Assessment

The vulnerability of the proposed project to climate change was assessed by the CCRA, in line with 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 proposed project to climate hazards which together provide a measure of vulnerability.

Sensitive elements of the proposed project included drainage, access roads, buildings, underground utilities, turbines, BESS, foundations, and cables. Climate hazards included flooding (coastal, pluvial or fluvial), extreme temperatures, drought, wind, fog, lightning, waves, and coastal erosion.

Mitigation measures for sensitive elements, such as flood protection and SuDS, wind turbine design and control during high winds and lightning protection measures have been incorporated into the design and the vulnerability analysis of the proposed project.

Having taken these into account, this results in a worst-case low vulnerability to climate change hazards. In accordance with the EPA EIAR Guidelines (2022), and with the design mitigation in place, the significance of effect on the proposed project as a result of climate change are direct, negative, long-term and imperceptible, which is not significant in EIA terms.

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

17.11.3 Compliance with Section 15 of the Climate Action and Low Carbon Development Act 2015

Section 15 of the Climate Act, sets out the duties imposed by certain bodies, including local authorities and An Coimisiún Pleanála, 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."

This chapter demonstrates how the proposed project is consistent with the objectives of Section 15 of the Climate Act. The chapter has carried out a greenhouse gas emissions assessment and assessed the proposed project's resilience/adaptation to climate change.

- Greenhouse Gas Emissions Assessment – This assessment considers the proposed project's GHG emissions over its lifetime (see Section 17.7.2). The assessment analyses these emissions in the context of the relevant carbon budgets, targets and policies to ensure consistency with the most recent approved climate action plan and the most recent approved national long term climate action strategy, and with measures in furtherance of the national climate objective. This complies with subsections 15 (1) (a), (b), and (d) of the Act.
- Climate Change Vulnerability Assessment – This assessment identifies the impact of a changing climate on the proposed project and receiving environment in the context of the most recent approved national adaptation framework and approved sectoral adaptation plans. The assessment considers the proposed project's vulnerability and adaption to climate change and identifies adaptation measures to increase resilience, as discussed in Section 17.7.3.2. This covers sections 15(1)(c) and (e) of the Act.

The proposed project pursues the furtherance of the national climate objective and the objective of mitigating greenhouse gas emissions and adapts to the effects of climate change in the State as far as practicable as required by section 15(1)(d) and(e) of the Acts.

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