# 10 CLIMATE CHANGE

## 10.1 INTRODUCTION

This chapter assesses the likely climate impacts associated with the proposed Phase 1F residential development at Portmarnock, Co. Dublin. A full description of the development is available in Chapter 3 (Description of the Proposed Development).

This chapter was completed by Aisling Cashell. Aisling is an Environmental Consultant in the Air Quality & Climate section of AWN Consulting. She holds a BA and MAI in Civil, Structural and Environmental Engineering from Trinity College Dublin. She is a Member of the Institute of Engineers Ireland (MIEI). She has two years of experience in undertaking air quality and climate assessments. She has prepared air quality and climate impact assessments as part of EIARs for for residential, commercial and industrial developments, as well as renewable energy developments. 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.

This chapter was reviewed by Dr. Jovanna Arndt, a Senior 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 8 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.

## 10.2 GUIDANCE LEGISLATION AND POLICY

### 10.2.1 Guidance

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

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022); and
- Environmental Impact Assessment Directive Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017).

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

- Transport Infrastructure Ireland (TII) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022a);
- Transport Infrastructure Ireland (TII) PE-ENV-01105: Climate Assessment Standard for Proposed National Roads (TII, 2022b);

- Transport Infrastructure Ireland (TII) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII, 2025);
- Institute of Environmental Management & Assessment (IEMA) Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (hereafter referred to as the IEMA 2022 GHG Guidance) (IEMA, 2022);
- Institute of Environmental Management & Assessment Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the IEMA 2020 EIA Guide) (IEMA, 2020a);
- Institute of Environmental Management & Assessment GHG Management Hierarchy (hereafter referred to as the IEMA 2020 GHG Management Hierarchy) (IEMA, 2020b);
- Institute of Environmental Management & Assessment Principles Series: Climate Change Mitigation & EIA (IEMA, 2010);
- Carbon Management in Infrastructure and Built Environment - PAS 2080 (BSI, 2023); and
- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021).

### 10.2.2 Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (as amended) (Government of Ireland, 2015) was enacted (the 2015 Act). The purpose of the 2015 Act was to enable Ireland "*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*" (Section (3.(1) of No. 46 of 2015). This is referred to in the 2015 Act as the *'National Transition Objective'*. The 2015 Act made provision for a national mitigation plan and a national adaptation framework. In addition, the 2015 Act provided for the establishment of the Climate Change Advisory Council, with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The CAP 2019 outlined the status across key sectors including Electricity, Transport, Built Environment, Industry, and Agriculture, and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The CAP 2019 also detailed the required governance arrangements for implementation, including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council, and greater accountability to the Oireachtas. The Government published the second CAP in November 2021 (Government of Ireland, 2021a) with further updated CAPs in December 2022 (Government of Ireland, 2022) and December 2023 (DECC, 2023a). The fifth and most recent CAP, was published in April 2025 (Government of Ireland, 2025).

Following on from Ireland declaring a climate and biodiversity emergency in May 2019, and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Climate Action and Low Carbon Development (Amendment) Act 2021 (Government of Ireland, 2021b) (hereafter referred to as the 2021 Climate Act) was enacted on 23 July 2021, giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act (Government of Ireland, 2021b) is to provide for the approval of plans "*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*". The 2021 Climate Act also provides for "*carbon budgets and a decarbonisation target range for certain sectors of the economy*". The 2021 Climate Act defines the carbon budget as "*the total amount of greenhouse gas emissions that are permitted during the budget period*".

In relation to carbon budgets, the 2015 Act (as amended) states "*a carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years*

*commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'Budget Period')*".



A carbon budget is defined as the total amount of greenhouse gas emissions that are permitted during the budget period. The carbon budget is to be produced for three sequential budget periods (Table 10.1). The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceilings, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published in CAP25 (Table 10.2) (DECC, 2025).

| 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 10.1:** 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

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

**Table 10.2:** Sectoral Emission Ceilings 2030

### 10.2.3 Policy

#### 10.2.3.1 Greenhouse Gas Policy

In 2024, the Government published its *Long-Term Strategy on Greenhouse Gas Emissions Reductions* (DECC, 2023b). This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050, achieving the interim targets set out in the CAP.

In December 2023, CAP24 was published, establishing key actions to deliver a 51% reduction in GHG emissions by 2030 (compared to 2018 levels) and achieve climate neutrality by 2050 (DECC, 2023a). The updated and current CAP25, published in April 2025, 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), the development of mandatory Climate Action Roadmaps, and enhanced emissions monitoring and reporting across government operations. 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. 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.

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. Transport emissions increased by 0.3%. Electric vehicles and the use of biofuels are stated as the best means of transport emission reductions in the medium-term.

The Fingal County Council (FCC) Climate Action Plan 2024-2029 (FCC and Codema, 2024) outlines FCC's goals to mitigate GHG emissions and plans to prepare for and adapt to climate change. The FCC Climate Action Plan states that FCC aims to reduce car dependency by encouraging modal shifts from cars to active travel and more sustainable modes, including public transport and cycling. FCC states that it wishes to work with the relevant transportation bodies to introduce measures to achieve modal shifts.

10.2.3.2 Climate Change Risk Policy

The second National Adaptation Framework (NAF) (DECC, 2024) was published in June 2024, in line with the five-year requirement of the 2015 Act, as amended. The plan provides a whole of government and society approach to climate adaptation in Ireland to reduce Ireland's vulnerability to climate change risks including extreme weather events, flooding, drought, loss of biodiversity, sea level rise and increased temperatures. Like 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."*

In relation to the built environment, the NAF states in Chapter 3, "*deepening of adaptation considerations in the planning and building standards processes is considered the most appropriate way of increasing the resilience of the built environment*". Within the NAF it mentions that there is a risk of damage to buildings and structures from severe weather events such as high winds and intense rainfall. New development should accommodate predicted future climate change impacts without requiring major redesign or redevelopment in the future, which may be costly and inefficient. This will require facilitating innovative building design, new materials and standards (to accommodate hotter summers while withstanding changes in precipitation patterns and more intense storms for example) according to the NAF (DECC, 2024).

The National Climate Change Risk Assessment (NCCRA) was published in May 2024 (EPA, 2024b). The NCCRA was required to be developed under Action 457 from the 2021 CAP (Government of Ireland, 2021). Action 457 seeks to "*further develop Ireland's national climate change risk assessment capacity to identify the priority physical risks of climate change to Ireland*". The NCCRA uses definitions of the risk determinants from the Intergovernmental Panel on Climate Change (IPCC) Risk Framework (IPCC 2023):

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

When considering risk, the NCCRA assesses 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 the greatest requirement for adaptation.

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

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

The FCC Climate Action Plan highlights the risks that climate change poses to the transportation network, with risks mainly associated with extreme weather events. The FCC Climate Action Plan notes that cold spells and flooding (pluvial, fluvial coastal, etc) and have the greatest future risk when both the likelihood and consequence are accounted for. Increases in flooding will cause an inundation of residential properties, damages to commercial buildings and premises, and disruption of transport networks.



## 10.3 ASSESSMENT METHODOLOGY

The climate assessment is divided into two distinct sections:

- **Greenhouse Gas Emissions Assessment (GHGA)** Quantifies the greenhouse gas (GHG) emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude.
- **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.

### 10.3.1 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 (Section 10.4).

#### 10.3.1.1 Construction Phase

The GHG assessment accounts for various components relating to the project during different life stages to determine the total impact of the development on climate. The reference study period (i.e. the assumed building life expectancy) for the purposes of the assessment is 60 years. Embodied carbon refers to the sum of the carbon needed to produce a good or service. It incorporates the energy needed in the mining or processing of raw materials, the manufacturing of products and the delivery of these products to site. The purpose of the embodied carbon assessment is to engage the design team in the consideration of embodied carbon at an early stage in the development and mitigate embodied carbon. This engagement aims to ensure carbon savings are made and to assist in aligning the project to Ireland's CAP goal of Net Carbon Zero by 2050.

Embodied carbon emissions are attributed to four main categories, taken from BS EN 15978. The categories are:

- **Product Stages (category A1 to A3)** The carbon emissions generated at this stage arise from extracting the raw materials from the ground, their transport to a point of manufacture and then the primary energy used (and the associated carbon impacts that arise) from transforming the raw materials into construction products. These stages have been included within the scope of this assessment.
- **Construction (category A4 to A5)** These carbon impacts arise from transporting the construction products to site, and their subsequent processing and assembly into the building. This has been included within the scope of the assessment.
- **In-Use Stages (category B1 to B5)** This covers a wide range of sources from the embodied carbon emissions associated with the operation of the building, including the materials used during maintenance, replacement and refurbishment. Category B6 and B7 refer to operational emissions. In-Use Stages are not included in the assessment scope of this study. Material refurbishment and replacement throughout the lifetime of the development (category B4 – B5) has been included within this assessment.

- **End of Life Stages (category C1 to C4)** The eventual deconstruction and disposal of the existing building at the end of its life takes account of the on-site activities of the demolition contractors. No 'credit' is taken for any future carbon benefit associated with the reuse or recycling of a material into new products. This stage as not included within the scope of this study.



PE-ENV-01104 (TII, 2022a) recommends the calculation of the construction stage embodied carbon using the TII Online Carbon Tool (TII, 2024a). The TII Online Carbon Tool (TII, 2024) has been commissioned by TII to assess GHG emissions associated with road or rail projects in Ireland. The TII Carbon Tool (TII, 2024) uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013), which can be applied to a variety of developments, not just road or rail. The tool aligns with PAS 2080. The TII Carbon Tool was utilised to estimate the GHG emissions associated with the non-building elements of the proposed development including construction activities and construction wastes and demolition wastes.

Embodied carbon refers to the sum of the carbon needed to produce a good or service. It incorporates the energy needed in the mining or processing of raw materials, the manufacturing of products and the delivery of these products to site. The purpose of the embodied carbon assessment is to engage the design team in the consideration of embodied carbon at an early stage in the development and mitigate embodied carbon. This engagement aims to ensure carbon savings are made and to assist in aligning the project to Ireland's CAP goal of Net Carbon Zero by 2050. TII also state that the use of other, alternative carbon tools is permissible for developments.

The Carbon Designer for Ireland tool was used to quantify the GHG emissions associated with the building elements of the proposed development. The Irish Green Building Council in partnership with One Click LCA Ltd have developed the Carbon Designer for Ireland tool (One Click LCA Ltd, 2023) for use on Irish specific building projects. The Carbon Designer tool is promoted by the EPA and the Land Development Agency. OneClickLCA is certified to EN 15978, EN 15978, ISO 21931 – 1 & ISO 21929, and data requirements of ISO 14040 & EN 15804, and is LEED, BREEAM and PAS 2080 aligned. It allows users to assess the carbon impact of buildings at an early stage using typical default materials and values. Inputs to the tool include the gross floor area and number of stories above ground level along with the building frame type.

The GHG assessment was completed by AWN Consulting using the schedule of areas for the proposed development and building volume estimates as provided by the project architects for the proposed development. These inputs were used to quantify the embodied carbon associated with the building elements, using the Carbon Designer for Ireland tool. In the absence of detailed information at this stage, the assessment adopted a typical building typology approach, with material assumptions based on standard values within the tool. To ensure consistency and comparability, data from the previously Phase 1E of the development was used as a reference baseline, with adjustments applied to reflect the updated design and scale of the proposed Phase 1F.

#### 10.3.1.2 Operational Phase

##### 10.3.1.2.1 Traffic Emissions

Emissions from road traffic associated with the proposed development have the potential to emit carbon dioxide ($CO_2$) which will impact climate.

The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022b), states that road links meeting one or more of the following criteria can be defined as being affected by a proposed development and should be included in the local air quality assessment, and the climate assessment. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic:

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;

- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5 m or greater.

There are no road links that meet the screening criteria. Therefore, a detailed assessment of traffic emissions has been scoped out. There is no predicted significant impact to climate from traffic related $CO_2$ emissions.



#### 10.3.1.2.2 Operational Phase Energy Use

The EU Guidance (European Commission, 2013) also states that indirect GHG emissions because of a development must be considered, which include emissions associated with energy usage. A Building Life Cycle Report was prepared by Fallon Design Consulting Engineers, in relation to the proposed development. This document is submitted separately with this planning application. The report outlines several measures which have been incorporated into the design of the development, which will have the benefit of reducing the impact to climate where possible during operation.

### 10.3.1.3 Significance Criteria for GHGA

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

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022a) is based on IEMA guidance (IEMA, 2022) which is consistent with the terminology contained within Figure 3.4 of *'Guidelines on the information to be contained in Environmental Impact Assessment Reports'* (EPA, 2022).

The 2022 IEMA Guidance (IEMA, 2022) sets out the following principles for significance:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. Therefore, the significance of a project's emissions should 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.

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

TII (TII, 2022a) states that professional judgement must be considered when contextualising and assessing the significance of a project's GHG impact. In line with IEMA Guidance (IEMA, 2022), TII state that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

Significance is determined using the criteria outlined in Table 10.3 (derived from Table 6.7 of PE-ENV-01104 (TII, 2022a)) along with consideration of the following two factors:

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

- The level of mitigation taking place.



| Effects | Significance level Description | Description |
|---|---|---|
| **Significant Adverse** | Major Adverse | • The project's GHG impacts are not mitigated.<br>• The project has not complied with do-minimum standards set through regulation, nor provided reductions required by local or national policies; and<br>• No meaningful absolute contribution to Ireland's trajectory towards net zero. |
| | Moderate Adverse | • The project's GHG impacts are partially mitigated.<br>• The project has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and<br>• 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.<br>• The project has complied with existing and emerging policy requirements; and<br>• Fully in line to achieve Ireland's trajectory towards net zero. |
| | Negligible | • The project's GHG impacts are mitigated beyond design standards.<br>• The project has gone well beyond existing and emerging policy requirements; and<br>• Well 'ahead of the curve' for Ireland's trajectory towards net zero. |
| **Beneficial** | Beneficial | • The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration.<br>• The project has gone well beyond existing and emerging policy requirements; and<br>• Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact. |

**Table 10.3:** GHGA Significance Criteria for GHGA

Ireland's carbon budgets can also be used to contextualise the magnitude of GHG emissions from the proposed development (TII, 2022a). The approach is based on comparing the net proposed development GHG emissions to the relevant carbon budgets (DECC, 2023a). With the publication of the Climate Action Act in 2021 and the Climate Action Plan 2024, sectoral carbon budgets have been published for comparison with the net GHG emissions from the proposed development over its lifespan. The aim of the carbon budgets is to ensure we are on a trajectory to meet the National Climate Objective of Net Zero by 2050.

### 10.3.2 Climate Change Risk Assessment



The Climate Change Risk Assessment (CCRA) involves determining the vulnerability of the proposed development to climate change. This requires an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability.

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

- 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) (IEMA, 2020).

The baseline environment information provided in Section 10.4, future climate change modelling and input from other experts working on the proposed development (i.e. hydrologists) should be used to assess the likelihood of a climate risk.

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

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

- **Assets 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. Asset sensitivity considers design mitigation measures

- **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, e.g. 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 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 several 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 several 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 (Table 10.4).

10.3.2.1 Significance Criteria for CCRA

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

*Vulnerability = Sensitivity x Exposure*

The vulnerability assessment takes any proposed mitigation into account. Table 10.4 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale. A risk that is low or medium is classed as not significant, while a high or extreme risk is classed as a significant risk.

TII guidance (TII, 2022a) and the EU Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. Therefore, the impact from climate change on the proposed development can 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.

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

**Table 10.4:** Vulnerability Matrix

The screening CCRA, detailed in Section 10.6.1, did not identify any residual medium or high risks to the proposed development due to climate change. Therefore, a detailed CCRA for the construction and operational phase were scoped out.

While a CCRA for the construction phase was not required, best practice mitigation against climate hazards is still recommended in Section 10.7.

## 10.4 RECEIVING ENVIRONMENT

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

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

### 10.4.1 Current GHGA Baseline

Data published in July 2025 (EPA, 2025), 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 (-7.4%) and ESR (Effort Sharing Regulation) emissions decreased (-0.5%). Ireland's target is an emission reduction of 626 kt of $CO_2e$ by 2030 on an average baseline of 2016 to 2018.

The EPA estimate that 2024 total national GHG emissions, excluding LULUCF, have decreased by 2.0% on 2023 levels to 53.75 Mt $CO_2$e, with a 0.7 Mt $CO_2$e (-8.9%) reduction in electricity industries alone. This was driven by a 39.6% 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 $CO_2$e 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 21.7%. For 2024, total national emissions (including LULUCF) were 57.65 Mt $CO_2$e (EPA, 2025) (Table 12.6).

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 82.5% (186 Mt $CO_2$e) of the 295 Mt $CO_2$e Carbon Budget for the five-year period 2021-2025. This leaves 17.5% of the budget available for 2025, requiring a substantial 10.3% annual emissions reduction for 2025 to stay within budget.



**Table 10.5:** Trends in Total National GHG Emissions 2021 – 2024

| Sector *Note 1* | 2021 | 2022 | 2023 | 2024 | Total Budget (Mt $CO_2$e) (2021-2025) | % Budget 2021-2025 Used | Annual Change 2023 to 2024 |
|---|---|---|---|---|---|---|---|
| Electricity | 9.89 | 9.69 | 7.57 | 6.95 | 40 | 85.25% | -8.19% |
| Transport | 11.09 | 11.76 | 11.80 | 11.65 | 54 | 85.74% | -1.27% |
| Buildings (Residential) | 6.87 | 5.75 | 5.35 | 5.61 | 29 | 81.31% | 4.86% |
| Buildings (Commercial and Public) | 1.44 | 1.45 | 1.39 | 1.49 | 7 | 82.43% | 7.19% |
| Industry | 7.09 | 6.62 | 6.31 | 6.01 | 30 | 86.77% | -4.75% |
| Agriculture | 21.94 | 21.78 | 20.72 | 20.41 | 106 | 80.05% | -1.50% |
| Other *Note 2* | 1.86 | 1.93 | 1.81 | 1.63 | 9 | 80.33% | -9.94% |
| LULUCF | 4.63 | 3.98 | 3.89 | 3.89 | – | – | 0 |
| **Total including LULUCF** | 64.82 | 62.99 | 58.83 | 57.64 | 295 | 82.81% | -2.04% |

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

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).

### 10.4.2 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, 2022a) and IEMA Guidance (IEMA, 2022), the future baseline is a trajectory towards net zero by 2050, "*whether it* [the project] *contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

The future baseline will be determined by Ireland meeting its targets set out in the CAP25, and future CAPs, alongside binding 2030 EU targets. The European Union (EU) enacted *Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013* (hereafter referred to as the Regulation) (European Union, 2018) to meet the commitments under the Paris Agreement. The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. The Regulation was amended in April 2023 and Ireland must now limit its greenhouse gas emissions by at least 42% by 2030. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and includes GHG emissions from transport, residential and commercial buildings and agriculture.

In May 2025, the EPA released the report *Ireland's Greenhouse Gas Emissions Projections 2024-2055* (EPA, 2025), 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.



### 10.4.3 Current CCRA Baseline

The region of the proposed development has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Dublin Airport is the nearest, representative, weather and climate monitoring station to the proposed development with meteorological data recorded for the 30-year period from 1991 to 2020. The historical regional weather data for Dublin Airport meteorological station is representative of the current climate in the region of the proposed development. The data for the 30-year period from 1991 to 2020 indicates that the wettest months at Dublin Airport meteorological station were November and December, and the driest month on average was June (Met Éireann, 2025a). July was the warmest month with a mean temperature of 15.4 Celsius. January was the coldest month with a mean temperature of 5.2 Celsius.

Met Éireann's 2023 Climate Statement (Met Éireann, 2025b) states 2023's average shaded air temperature in Ireland is provisionally 11.20°C, which is 1.65°C above the 1961-1990 long-term average. Before this, 2022 was the warmest year on record; however, 2023 was 0.38°C warmer (Figure 10.1).

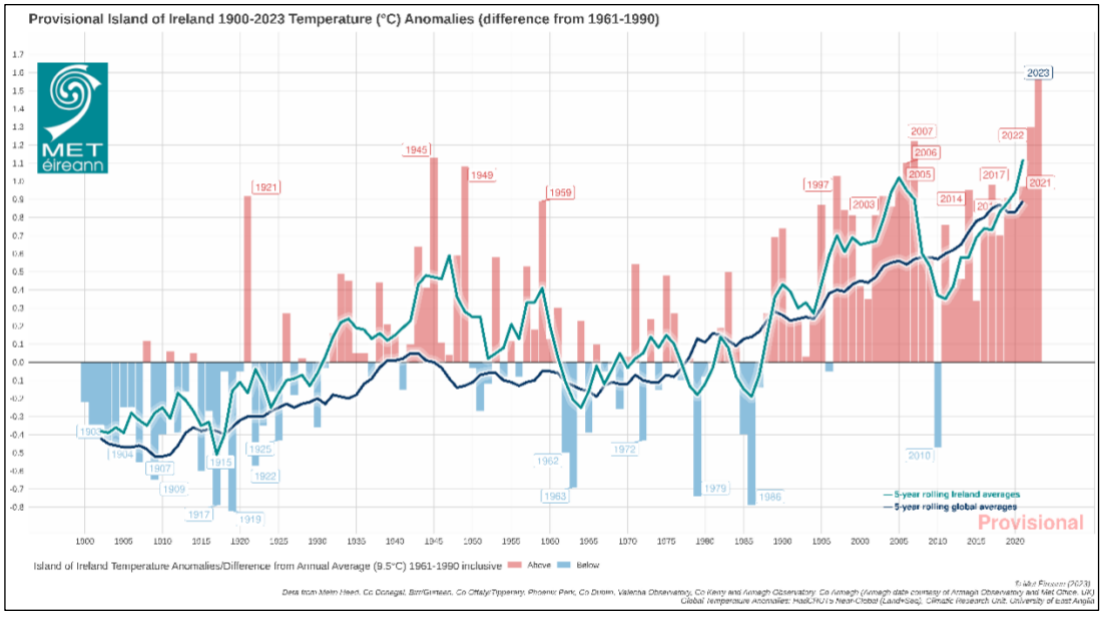



**Figure 10.1:** 1900-2023 Temperature (°C) Temperature Anomalies (Differences from 1961-1990)

The year 2023 also had above average rainfall; this included the warmest June on record and the wettest March and July on record. Record high sea surface temperatures (SST) were recorded since April 2023, which included a severe marine heatwave to the west of Ireland during June 2023. This marine heatwave contributed to the record rainfall in July.

Met Éireann's 2024 *Climate Statement* (Met Éireann, 2025b) states that 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 or 0.55°C above the most recent 1991-2020 long-term average. This is the 4$^{th}$ warmest year on record with 2023 breaking previous records. Seven of the top ten warmest years have occurred since 2005. Record high sea surface temperatures (SST) were recorded in 2022, and in 2024 continued at or near record high levels. 2024 was overall drier than average; however, there were many instances of heavy or intense rainfall which led to flooding events. This trend is predicted to continue

with climate change with an increase in both dry periods and heavy rainfall events. Considering the extraordinary data, Met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters. The record temperatures mean the likelihood of extreme weather events occurring has increased. This will result in longer dry periods and heavy rainfall events. Storm surges and coastal flooding will occur 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.



### 10.4.4 Future CCRA Baseline

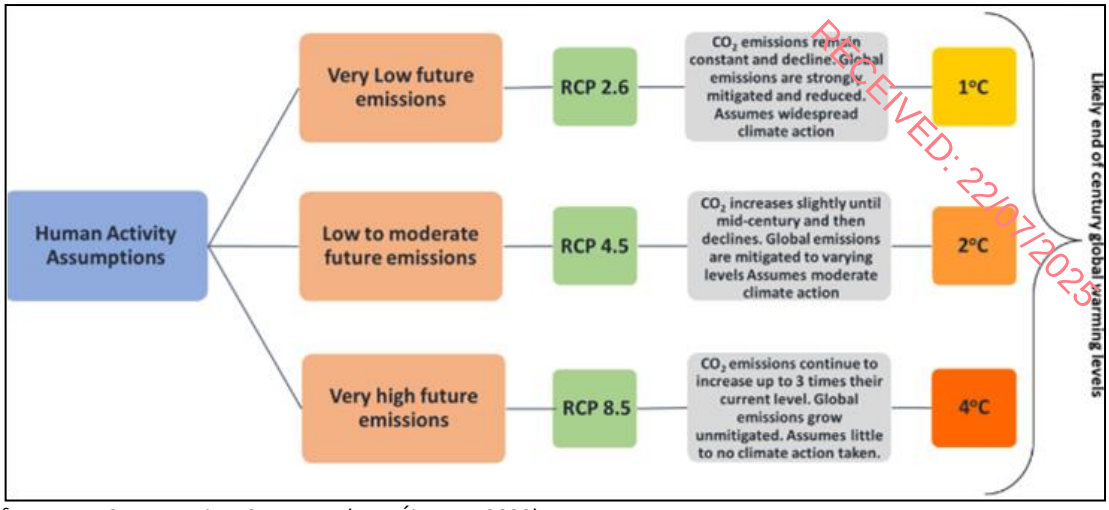
Impacts due to climate change will evolve with a changing future baseline, changes have the potential to include increases in global temperatures and increases in the number of rainfall days per year. Therefore, it is expected that the baseline climate will evolve over time and consideration is needed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

Ireland has seen increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east including in the region where the proposed development will be located (EPA, 2021). The EPA have compiled a list of potential adverse impacts due to climate change including the following which may be of relevance to the proposed development (EPA, 2021):

- 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, 2022a) 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.

The 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, 2023) has been led by climate researchers from University of Galway – Irish Centre for High End Computing (ICHEC), and University College Cork – SFI Research Centre for Energy, Climate and Marine (MaREI), supported by Met Éireann climatologists. TRANSLATE's outputs are produced using a selection of internationally reviewed and accepted models from both CORDEX and CMIP5. Representative Concentration Pathways (RCPs) provide a broad range of possible futures based on assumptions of human activity. The modelled scenarios include for *'least'* (RCP2.6), *'more'* (RCP4.5) or *'most'* (RCP8.5) climate change (Figure 10.2).



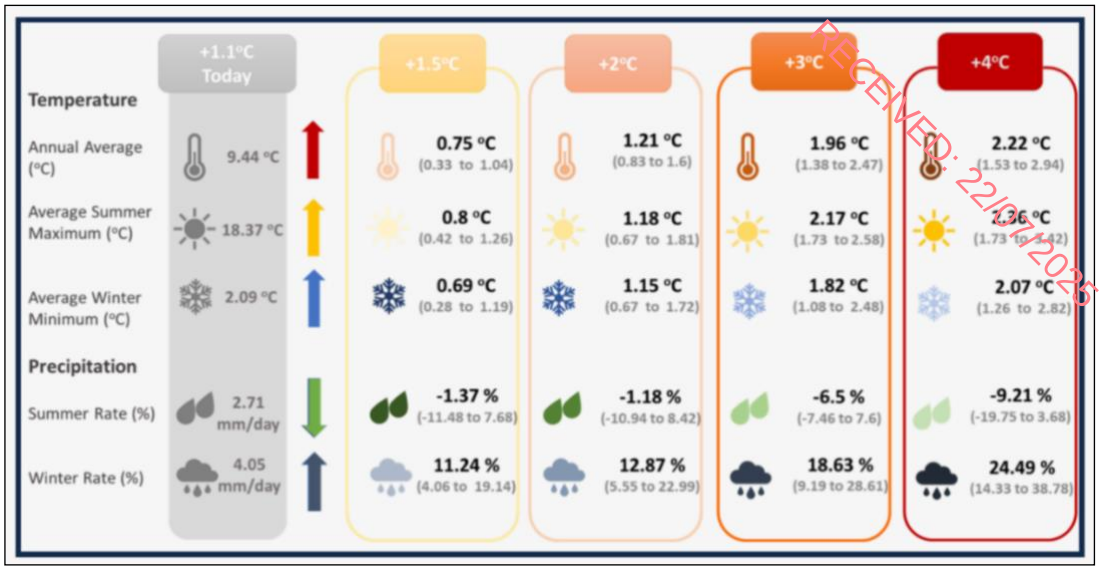



Source TRANSLATE Project Storymap (Met Éireann, 2023)

**Figure 10.2:** Representative Concentration Pathways Associated Emission Levels

TRANSLATE (Met Éireann, 2023) 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, 2023). 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% (Source TRANSLATE Project Storymap (Met Éireann, 2023)

Figure 10.3). Future projects also include a 10-fold increase in the frequency of summer nights (values > 15°C) by the end of the century, a decrease in the frequency of cold winter nights and an increase in the number of heatwaves. A heatwave in Ireland is defined as a period of 5 consecutive days where the daily maximum temperature is greater than 25°C.






Source TRANSLATE Project Storymap (Met Éireann, 2023)

**Figure 10.3:** Change of Climate Variables for Ireland for Different Global Warming Thresholds

The TRANSLATE research report (Met Éireann, 2023) finds that night-time temperatures will warm more than day-time temperatures, with temperature 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, 2024c) 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, 2024c) 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 affecting critical infrastructure along the coastline. Projections of changes in storminess are highly uncertain and translate into large uncertainties in future frequency and intensity of extreme waves.

Volume 3 (EPA, 2024e) discusses how water supplies will face growing pressures resulting in increased water demand and hcw options need to be developed, including potential new sources. The report states the key role of critical infrastructure for delivering public services, economic development and

a sustainable environment. These are exposed to a range of climate extremes. Failures in critical infrastructure can cascade across other sectors and present a multi-sector risk due to climate change.



The report references the EPA's *Critical Infrastructure Vulnerability to Climate Change* report (EPA, 2021) 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 and the energy sector, and how vulnerability in the energy sector may have cascading impacts.

Volume 4 (EPA, 2024c) 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, 2024d), 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.

## 10.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

### 10.5.1 Proposed Development

The proposed development will comprise a mix of residential units; public open space including southern Monument Park which formed part of the Racecourse Park development; vehicular access to serve the development is proposed off Monument View; and all associated and ancillary site development, infrastructural, landscaping and boundary treatment works. A full description of the development is available in Chapter 3: Description of Proposed Development.

#### 10.5.1.1 Construction Phase

During the construction stage the main source of climate impacts will be because of GHG emissions and embodied carbon associated with the proposed construction materials and activities for the proposed development.

#### 10.5.1.2 Operational Phase

During the operational phase vehicle emissions from traffic accessing the site have the potential to release $CO_2$ and other GHGs which will impact climate. In addition, operational energy use will result in GHG emissions. The vulnerability of the proposed development in relation to future climate change must also be considered during the operational phase.

## 10.6 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

### 10.6.1 Greenhouse Gas Assessment

#### 10.6.1.1 Construction Phase

The most significant proportion of GHG emissions tends to occur during the construction phase due to embodied carbon in construction materials and emissions from construction activities. Therefore, the assessment has been included in the construction phase assessment for the purposes of the EIAR. The assessment is broken down into the following stages as per Section 10.3.1.1:

- Product stage (A1 – A3);
- Transportation to site (A4);

- Site operations (construction activities) (A5);
- Material replacement & refurbishment (B4 – B5).

The construction phase embodied carbon emissions comprise stages A1 – A5 include the construction materials, the transport of the materials to site and the construction activities or site operations. Ongoing material refurbishment and replacement throughout the lifetime of the development is included within category B4 – B5, these are default values based on the typical maintenance requirements for the chosen material types over the assumed 60-year lifetime which is the default time-period in the OneClick LCA software. Default values, and values factored from the previous Phase 1E development, are used as there are no site-specific values available for the project. This is considered a conservative approach. Figure 10.4 shows the embodied carbon for the proposed development per lifecycle stage with both the output from the OneClick tool and TII Carbon Tool assessments included.

Construction materials make up most carbon emissions for the proposed development making up approximately 77% of the total construction phase embodied carbon emissions across the different buildings and the relevant infrastructure. The external walls as well as the beams, floors and roofs are the areas with the highest carbon impact, based on the general default values and assumptions made for the carbon calculations. Transportation to site, site operations and material replacement make up the remainder of the construction embodied carbon emissions.

The carbon assessment has highlighted the areas where the highest embodied carbon emissions occur, specifically because of building materials. The carbon emissions have been calculated based on standard default materials for the various building types within the OneClick tool as detailed material information was not available at this stage in the project. Additionally, the average material types within the TII Carbon Tool were used for the purposes of this assessment in the absence of more detailed information.

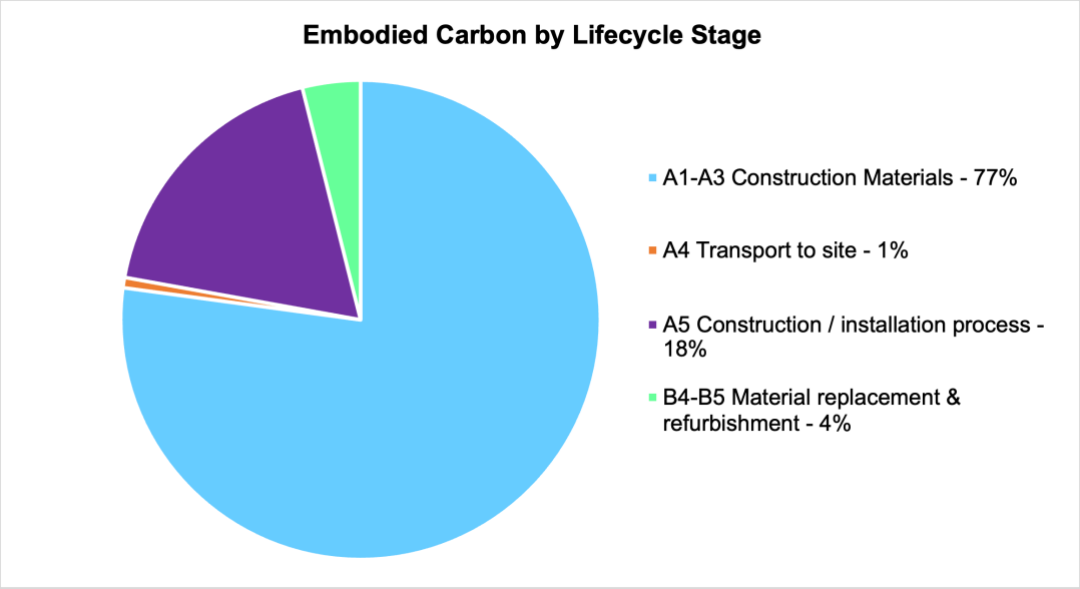



**Figure 10.4:** Embodied Carbon by Lifecycle Stage

It has been calculated that the total construction phase embodied carbon (including maintenance and replacement of materials over the development lifetime) will be 58,228 tonnes $CO_2e$ (Table 10.6). The GHG emissions from the development as a total cannot be compared against one specific sector 2030 carbon budget, the emissions are broken down into different assessment categories and these must be compared separately to the relevant sectoral emissions budget which are detailed in Table 10.2. The relevant sectoral emissions for the proposed development comparison include the industry sector, transport sector, electricity sector and waste sector. The predicted emissions for the proposed development are annualised over the assumed 60-year lifespan and then compared to the relevant

sector 2030 carbon budgets. Annualising the full carbon emissions over the lifetime of the development allows for appropriate comparison with annual GHG targets.



| Stage | GHG Assessment Category | Predicted GHG Emissions ($tCO_2e$) | Relevant Sector for Carbon Budget Comparison | Annualised GHG Emissions as % of Relevant Carbon Budget |
|---|---|---|---|---|
| A1-A3 | Materials | 44,919 | Industry | 0.02% |
| A4 | Material Transport | 404 | Transport | 0.0001% |
| A5 | Clearance and demolition | 3.6 | Industry | 0.0000015% |
| A5 | Excavation | 620 | Industry | 0.0003% |
| A5 | Construction Water Use | 221 | Industry | 0.0001% |
| A5 | Plant Use | 764 | Electricity | 0.0004% |
| A5 | Construction Worker Travel to Site | 7,446 | Transport | 0.002% |
| A5 | Construction Waste Disposal | 1,255 | Waste | 0.002% |
| A5 | Construction Waste Transport | 314 | Transport | 0.00009% |
| B4-B5 | Maintenance Material | 2,281 | Industry | 0.001% |
| **Total** | | **58,228** | | |

**Table 10.6:** GHG Assessment Results

The predicted GHG emissions (Table 10.6) can be averaged over the full lifespan of the proposed development to give the predicted annual emissions to allow for direct comparison with national annual emissions and targets.

In Table 10.7, GHG emissions have been compared against the carbon budget for the electricity, transport, industry and waste sectors in 2030 (DECC, 2023a), against Ireland's total GHG emissions in 2022 and against Ireland's EU 2030 target of a 30% reduction in non-ETS sector emissions based on 2005 levels (33 Mt $CO_2e$) (set out in Regulation EU 2018/842 of the European Parliament and of the Council).

The estimated total GHG emissions, when annualised over the 60-year proposed development lifespan, are equivalent to 0.002% of Ireland's total GHG emissions and 0.004% of Ireland's non-ETS 2030 emissions target. The estimated GHG emissions associated with energy use during the construction phase are equivalent to 0.0004% of the 2030 Electricity budget, while the total GHG emissions associated with transport-related activities are 0.002% of the 2030 Transport budget, construction waste GHG emissions are 0.0025% of the Waste budget and industry-related activities are 0.02% of the 2030 Industry budget (DECC, 2023a). Thus, the impact of the construction phase on climate will be a ***direct, short-term, negative*** and ***not significant***.

| Target/Sectoral Budget ($tCO_2e$) | | Sector Annualised Proposed Development GHG Emissions are Compared | Annualised Proposed Development GHG Emissions as % of Relevant Target/Budget |
|---|---|---|---|
| Ireland's 2024 Total GHG Emissions (Existing Baseline) | 57,640,000 | Total GHG Emissions | 0.002% |
| Non-ETS 2030 Target | 27,721,670 | Total GHG Emissions | 0.004% |
| 2030 Sectoral Budget (Industry Sector) | 4,000,000 | Total Industry Emissions | 0.02% |
| 2030 Sectoral Budget (Transport Sector) | 6,000,000 | Total Transport Emissions | 0.002% |
| 2030 Sectoral Budget (Electricity Sector) | 3,000,000 | Total Electricity Emissions | 0.0004% |
| 2030 Sectoral Budget (Waste Sector) | 1,000,000 | Total Waste Emissions | 0.002% |



**Table 10.7:** Estimated GHG Emissions Relative to Sectoral Budgets and GHG Baseline

10.6.1.2 Operational Phase

#### 10.6.1.2.1 Traffic Emissions

There is the potential for increased traffic volumes to impact climate. The change in traffic was reviewed against the PE-ENV-01104 screening criteria outlined in Section 10.3.1 (TII, 2022a) and a detailed climate assessment of traffic emissions was screened out due to the low-level changes in traffic associated with the proposed development. There are no significant impacts to climate predicted due to traffic emissions. The impact of the operational phase traffic emissions on climate will be a ***direct, long-term, negative*** and ***not significant***.

#### 10.6.1.2.2 Operational Energy Use

The proposed development has been designed to reduce the impact to climate where possible. Several measures have been incorporated into the design to ensure the operational phase emissions are minimised. The primary elements with respect to reducing climate impacts and optimising energy usage are summarised in Section 8.8.1 and are based on information provided by the project building engineers. In addition, the proposed development has been designed to reduce the impact on climate where possible (Building Life Cycle Report and Sustainability & Energy Report by Fallon Design Consulting Engineers). Thus, the impact of the operational phase energy emissions on climate will be a ***direct, long-term, negative*** and ***not significant***.

### 10.6.2 Climate Change Risk Assessment

10.6.2.1 Construction Phase

A detailed CCRA of the construction phase has been scoped out, as discussed in Section 10.3.2.1. However, consideration has been given to the proposed development's vulnerability to the following climate change hazards with best practice mitigation measures proposed in Section 11.7:

- 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.



10.6.2.2 Operational Phase

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

The sensitivity of the proposed development to the climate hazards is assessed irrespective of the project location. Table 10.8 details the sensitivity of the proposed development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been established the exposure of the proposed development to each of the climate hazards is determined, this is the likelihood of the climate hazard occurring at the project location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the vulnerability of the proposed development to each of the climate hazards as per Table 10.4. The results of the vulnerability assessment are detailed in Table 10.8.

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

**Table 10.8:** Climate Change Vulnerability Assessment

The sensitivity and exposure of the area was determined with reference to several online tools and with input from the various discipline specialists on the project team. It was concluded that the proposed development does not have any significant vulnerabilities to the identified climate hazards as described in the below sections. All vulnerabilities are classified as low.

#### 10.6.2.2.1 Flooding

A Site-Specific Flood Risk Assessment (SSFRA) was undertaken by EGIS Engineering Ireland and submitted with this planning application. This document was reviewed to inform the climate change vulnerability assessment and assess the potential for flooding at the proposed development site.

The proposed development is in Flood Zone C, where the probability of fluvial or coastal flooding is low (less than 0.1% Annual Exceedance Probability). The site is situated outside of the 0.1% AEP flood extents for both coastal and fluvial sources, as confirmed by the ICPSS, CFRAMS, NCFHM, and Strategic Flood Risk Assessment (SFRA) mapping.

There is no historical evidence of flooding at the site, and no significant flood risks from groundwater, pluvial sources, or artificial drainage systems were identified. Although some flooding events have occurred nearby, these do not extend to the proposed site. The only portion of the project intersecting with a 0.1% fluvial event zone is the rising main, which will be a sealed pipe and therefore is not at risk of floodwater ingress.

Sustainable Urban Drainage Systems (SuDS) have been incorporated into the development in line with the Greater Dublin Strategic Drainage Study requirements. The surface water drainage system has been modelled for 1-in-1, 1-in-30, and 1-in-100-year storm events, with additional 30% climate change allowance applied. The simulations confirm the network will function without flooding, even under high tide scenarios (+3.63mOD).

Finished Floor Levels (FFL) for the proposed dwellings range from +4.85mOD to +9.60mOD, exceeding the required minimum FFL of +4.53mOD, which includes allowances for High-End Future Scenario (HEFS) sea level rise (+1.0m).

In conclusion, the development is not vulnerable to flooding and will not increase flood risk elsewhere due to effective drainage and mitigation strategies.



#### 10.6.2.2.2 Extreme Wind, Fog, Lightning & Hail

In relation to extreme winds, the building shall be designed to the appropriate standards to account for the relevant wind loadings events for RCP4.5 and RCP8.5. If required as part of the building design, lightning protection shall be provided for. Hail and fog are not predicted to significantly affect the building due to its design.

The landscaping proposals for the proposed development have carefully considered the increased intensity of storms and wind speeds due to climate change. Tree species have been selected for their resilience to strong winds and their suitability to the local environment. The planting strategy prioritizes native species that are well-adapted to local weather patterns, soil conditions, and wind exposure. Large and/or evergreen trees have been avoided near structures to reduce the risk of damage. Instead, rows of shrubs and smaller trees will be used as windbreaks to mitigate wind speeds before they reach larger trees or built elements.

It can be concluded that overall, the proposed development has low vulnerability to extreme wind, fog, lightning and hail.

#### 10.6.2.2.3 Wildfires

In relation to wildfires, the *Think Hazard!* tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR, 2025), indicates that the wildfire hazard is classified as low for the Dublin area. This means that there is between a 4% to 10% chance of experiencing weather that could support a hazardous wildfire that may poses some risk to life and property loss in any given year. Future climate modelling indicates that there could be an increase in the weather conditions which are favourable to fire conditions. These include increases in temperature and prolonged dry periods. However, due to the project location in a built-up, urban area the risk of wildfire is significantly lessened, and it can be concluded that the proposed development is of low vulnerability to wildfires.

#### 10.6.2.2.4 Landslides

The Geological Society of Ireland (GSI) landslide susceptibility mapping database (GSI, 2025) was reviewed to inform the risk from landslides at the proposed development. There have not been any historical landslide events in the vicinity of the proposed development and the area is of low susceptibility to future landslides. Therefore, the vulnerability of the proposed development to landslides is classed as low.

#### 10.6.2.2.5 Extreme Temperatures (Heat & Cold) & Drought

Extreme temperatures, both extreme heat and extreme cold, have the potential to impact the building materials and some related infrastructure. However, high quality, durable building materials will be selected for the proposed development at the detailed design stage.

The landscape scheme has been designed to be drought-resistant, where traditionally wet conditions are increasingly punctuated by dry spells due to climate change. This includes native and locally adapted species that are naturally suited to Irish weather patterns, soil conditions, and increasingly variable climate extremes.

Throughout detailed design phase, the architects will be using guidance documents to inform with design detail decisions including the EU Commission *Technical Guidance on Adapting Buildings to Climate Change* (European Commission, 2021), LETI emergency design guide (LETI, 2020), and the latest available IPCC report. In addition, should updated EuroCodes be published prior to completion of detailed design, which will include consideration for climate impacts, these design standards will be considered.



#### 10.6.2.2.6 Summary

Therefore, the proposed development has a low vulnerability to the identified climate hazards, provided detailed design includes for the impact of climate change under both RCP4.5 and RCP8.5 up to 2100, as has been assessed for within this CCRA. Therefore, no detailed risk assessment is required.

### 10.6.2.3 CCRA Significance of Effects

With design mitigation in place, there are no significant risks to the proposed development because of climate change. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect of the impacts to the proposed development because of climate change are ***direct, long-term, negative*** and ***not significant***.

## 10.6.3 Cumulative Developments

The cumulative impact of all sites within the proposed development has been considered in the previous sections. With respect to the requirement for a cumulative assessment with additional developments the IEMA (IEMA, 2022) and TII (TII, 2022a) guidance on which the assessment is based states that "*the identified receptor for the GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable. By presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland's ability to meet its national carbon reduction target. This assessment approach is considered to be inherently cumulative*".

The traffic data used for the operational phase assessment included cumulative traffic from existing and permitted developments in the surrounding area, specifically additional residential developments in Portmarnock area, a school and sportsgrounds (Traffic and Transport Assessment). Therefore, this impact assessment is cumulative. The cumulative impact of the proposed development in relation to GHG emissions is considered ***direct, long-term, negative*** and ***not significant.***

## 10.6.4 Do-Nothing Impact

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

As the site is zoned for development, it is likely that in the absence of the proposed development a development of a similar nature would occur. Therefore, the predicted climate impacts within this report are likely to occur even in the absence of the proposed development.

# 10.7 MITIGATION MEASURES (AMELIORATIVE, REMEDIAL OR REDUCTIVE MEASURES)

Several measures have been incorporated into the design of the development to mitigate against the impacts of future climate change These measures have been considered when assessing the vulnerability of the proposed development to climate change (Section 10.6.2.2).

### 10.7.1 Construction Phase

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

- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled.
- 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 embodied carbon footprint of the site. A construction waste management plan will be implemented to minimise construction waste sent to landfills. Recycling of materials will be promoted to and reduce the environmental footprint of the site.
- Sourcing materials locally will be prioritised. This will help to reduce transport related $CO_2$ emissions and helps support local suppliers, further promoting economic sustainability.
- Material choices and quantities will be reviewed during detailed design, to identify and implement any lower embodied carbon options, where feasible. For example, a 30% minimum clinker replacement in cement may be utilised in line with the requirements for public bodies.

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

Throughout detailed design and construction phase, guidance documents to inform with design detail decisions shall be reviewed e.g. the EU Commission Technical Guidance on Adapting Buildings to Climate Change (European Commission (2021a), LETI emergency design guide (LETI, 2020), and the latest IPCC report.

### 10.7.2 Operational Phase

Several measures have been incorporated into the design of the development to mitigate against the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated into the design of the development to avoid potential flooding impacts due to increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the proposed development to climate change (Section 10.6.2.2).

The proposed development has been designed to reduce the impact on climate because of energy usage during operation. The Building Life Cycle Report and Sustainability & Energy Report prepared by Fallon Design Consulting Engineers and submitted under separate cover with this planning application details several incorporated design mitigation measures that have been incorporated into the design of the development to reduce the impact on climate wherever possible. Such measures included in the proposed development to reduce the impact to climate from energy usage are:

- A2/A3 BER rating;
- Compliance for the Apartments to Part L 2021/ NZEB;
- Energy Performance Coefficient (EPC) 0.30 for dwellings;
- Carbon Performance Coefficient (CPC) 0.35 for dwellings;

- Achieve air tightness standards of 3 $m^3/m^2/hr$;
- Ensure thermal bridging details are designed to achieve thermal bridging factors of 0.08$W/m^2K$ or less;
- Building fabric u-value and g-value calculations will be completed to at least meet the requirements of NZEB in relation to thermal performance;
- Lighting will be designed to limit the energy required and effect on surrounding environment including existing flora and fauna. External lighting will comply with the latest standards and achieve:
    - Low-level lighting
    - Utilise low voltage LED lamps
    - Minimum upward light spill
- Use of low carbon technology includes High Efficiency Split System Air Source Heat Pumps. This unit and key sustainable measures will satisfy the Renewable Energy Ratio;
- Exceed the minimum U-Value standards identified in Part L 2022 Dwellings;
- Provide an appropriate combination of technologies to ensure energy consumption is in line with Part L 2022 Dwellings requirements (Renewable Energy Ratio (RER) > 0.20);
- Access to public transport and reduced reliance on private transport has been considered as the application site is near established rail and bus transport services as well as established social and community services of Portmarnock;

The identified measures will aid in reducing the impact to climate during the operational phase of the proposed development in line with the goals, relevant policies and objectives of the Fingal County Development Plan 2024-2029, including climate mitigation measures.

## 10.8 RESIDUAL IMPACT OF THE PROPOSED DEVELOPMENT

### 10.8.1 Proposed Development

The proposed development will result in some impacts to climate through the release of GHGs. TII state that the crux of assessing significance is *"not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050".* The proposed development has proposed some best practice mitigation measures and is committing to reducing climate impacts where feasible. As per the assessment criteria in Table 10.3 the impact of the proposed development in relation to GHG emissions is considered ***direct, long-term, negative*** and ***not significant*** provided the final design and construction phase take account of GHG mitigation measures set out in Section 10.7 and local and national Climate Action Plans.

In relation to climate change vulnerability, it has been assessed that there is a low risk due to future climate change hazards. This risk will be mitigated where possible to reduce the vulnerability of the site. The residual effect of climate change on the proposed development is considered ***direct, long-term, negative*** and ***not significant***.

### 10.8.2 Cumulative

With respect to the requirement for a cumulative assessment PE-ENV-01104 (TII, 2022a) states that *"for 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".*

However, 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. Therefore, the assessment approach is inherently cumulative. In addition, the IEMA guidance has addressed the issue of cumulative assessment and has stated that *"all global cumulative GHG sources are relevant to the effect on climate change, and this should be taken into account in defining the receptor (the atmospheric concentration of GHGs) as being of 'high' sensitivity to further emissions. Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other." (IEMA, 2022).*



## 10.9 MONITORING

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

Monitoring will also be conducted by the contractor to include the ongoing management of adaptation and mitigation to measure their effectiveness. If monitoring of adaptation measures and mitigation measures indicates that the measures are not effectively minimising embodied carbon, then they should be reviewed and updated.

## 10.10 REINSTATEMENT

Reinstatement is not required as part of this project

## 10.11 DIFFICULTIES ENCOUNTERED

At this stage in the project's development, detailed information on all building materials was not yet available. As such, the assessment was based on a combination of default values from the One Click LCA tool and values factored from the previously consented Phase 1E of the development. The Phase 1E data served as a reference baseline, with adjustments applied in line with the updated schedule of areas for Phase 1F. Where specific information was available these were used directly in the calculation.

Nevertheless, the absence of this information did not prevent a robust assessment being carried out and thus there were no significant difficulties encountered when compiling this assessment.