Chapter 12
Climate

Table of Contents

12. CLIMATE 1

12.1 INTRODUCTION 1
12.2 LEGISLATION, POLICY AND GUIDANCE 2
12.3 METHODOLOGY 7
12.4 RECEIVING ENVIRONMENT 11
12.5 DESCRIPTION OF POTENTIAL IMPACTS 16
12.6 MITIGATION MEASURES 23
12.7 RESIDUAL EFFECTS 25
12.8 REFERENCES 26

Table of Tables

TABLE 12-1 - 5-YEAR CARBON BUDGETS 2021-2035 4
TABLE 12-2 - SECTORAL EMISSIONS CEILINGS 2030 4
TABLE 12-3 - SIGNIFICANCE CRITERIA FOR GHGA 9
TABLE 12-4 - VULNERABILITY MATRIX 11
TABLE 12-5 - TRENDS IN TOTAL NATIONAL GHG EMISSIONS 2022 – 2024 11
TABLE 12-6 - SITE SPECIFIC - FUTURE CLIMATE CHANGE SUMMARY OF PROJECTIONS UNDER BOTH RCP SCENARIOS FOR 2050 PERIOD (2040-2070) TAKEN FROM THE EPA CLIMATE IRELAND TRANSLATE PROJECTIONS 15
TABLE 12-7 - GHC ASSESSMENT RESULTS 17
TABLE 12-8 - ESTIMATED GHG EMISSIONS RELATIVE TO SECTORAL BUDGETS AND GHG BASELINE 18
TABLE 12-9 - CLIMATE HAZARD SCREENING 20
TABLE 12-10 - CLIMATE CHANGE VULNERABILITY ASSESSMENT 21

Table of Figures

FIGURE 12-1 - BASELINE CLIMATOLOGY (DONEGAL COUNTY) 1991-2020 13
FIGURE 12-2 - GHG EMISSIONS BY LIFE-CYCLE PHASE 16
FIGURE 12.3 - CONSTRUCTION GHG EMISSIONS 16

12. Climate

12.1 Introduction

This chapter assesses the likely climate impacts and the impact of climate change risks on the proposed development located in, Co. Donegal. This chapter should be read in conjunction with the following Chapters, and their appendices, which present related impacts arising from the proposed development.

- Chapter 4: Description of the Proposed Development
- Chapter 5: Traffic and transportation
- Chapter 8: Land and Soils
- Chapter 11: Air Quality
- Chapter 19 Major Accidents and Disasters
- Chapter 20: Interactions and Cumulative Effects
- Chapter 21: Summary of Mitigation and Monitoring Measures.

The aim of the proposed development is to provide an attractive trail between the towns of Donegal Town and Ballybofey/Stranorlar in County Donegal, mainly to be used for recreational purposes by pedestrians, cyclists and people with impaired mobility. It is anticipated that the provision of a greenway in this location will provide enhanced access to the wider region, enticing users to explore its surrounding towns and villages and further develop the untapped tourism potential within the region. A full description of the development is available in Chapter 2 (Project Description).

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

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

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12.2 Legislation, Policy and Guidance

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

12.2.1 Guidance

The principal guidance and best practice documents used to inform the assessment of potential impacts on climate are summarised below. In addition to specific climate guidance documents, the following EIA 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 of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017).

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

- Environmental Protection Agency (2024) National Climate Change Risk Assessment. Technical Guidance for Sectoral Assessment;
- Environmental Impact Assessment of Rural Cycleways (Offline & Greenway) – A Practical Guide (PE-ENV-01109)
- 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);
- Intergovernmental Panel on Climate Change (IPCC) (2023) 6th Synthesis report;
- International Organization for Standardization (ISO) (2021) ISO 14091:2021. Adaptation to climate change - Guidelines on vulnerability, impacts and risk assessment;
- 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);
- ISEP Principles Series: Climate Change Mitigation & EIA (ISEP, 2010);
- Publicly Available Specification (PAS) 2080:2016 on Carbon Management in Infrastructure (BSI, 2016); and
- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a).

12.2.2 Legislation

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

Regulation (EU) 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 Parliament and Council, 2021) follows from the Paris Agreement and writes into EU law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas (GHG) emissions by at least 55% by 2030, compared to 1990 levels. These targets are also applied to member states.

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (European Parliament and Council, 2014) acknowledges that climate change will play a crucial role in the sustainable development of society. Directive 2014/52/EU requires assessment of the impact of specific types of new development on the climate. There is a requirement for the quantification of greenhouse gases from a development, and an assessment of the risk posed to specific types of new development by the adverse effects of climate change.

The **Climate Action and Low Carbon Development Act 2015** (Government of Ireland, 2015) enables Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*'. This is referred to in the 2015 Act (as amended) as the '*national transition objective*'. The 2015 Act (as amended) made provision for a national mitigation plan, and a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

Section 15 of the 2015 Act, sets out the duties imposed by certain bodies, including local authorities and An Coimisiún Pleanála. This section was amended by the 2021 Act and states:

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

a) the most recent approved climate action plan,

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

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

d) the furtherance of the national climate objective, and

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

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

12.2.2.1 Policy

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

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

The latest iteration of the Government of Ireland's Climate Action Plan (CAP25) (Government of Ireland, 2025a) was published in 2025 updating many of the suggested measures and actions required to achieve carbon budgets and sectoral emissions ceilings from CAP24 (Government of Ireland, 2024a). Both CAP24 and CAP25 should be read together. The plans taken together provide the roadmap for halving Ireland's emissions by 2030 and achieving carbon neutrality by 2050. CAP25 details the 5-year carbon budget periods, shown in Table 12-1, and the Sectoral Emissions Ceilings, shown in Table 12-2, as required by the Climate Act.

Table 12-1 - 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 12-2 - Sectoral Emissions Ceilings 2030

Sector	Baseline ($MtCO_2e$)	Carbon Budgets ($MtCO_2e$)		2030 Emissions ($MtCO_2e$)	Indicative Emissions % Reduction in Final Year of 2025 – 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment – Residential	7	29	23	4	40
Built Environment – Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, CAP25 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	68				
Unallocated Savings	-	-	-	-	-

Sector	Baseline ($MtCO_2e$)	Carbon Budgets ($MtCO_2e$)		2030 Emissions ($MtCO_2e$)	Indicative Emissions % Reduction in Final Year of 2025 – 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	295	-	295	-

The **Long-Term Strategy on Greenhouse Gas Emissions Reductions** (Government of Ireland, 2023) provides the indicative pathways beyond 2030 on how Ireland will transition towards carbon neutrality by 2050. The strategy is intended to bridge the gap between the short-term objectives of the Climate Action Plans and the longer-term objectives of EU Climate Law and Ireland's National Climate Objective.

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

- National Policy Objective 1: Ensure that all plans, projects and activities requiring consent arising from the National Planning Framework are subject to the relevant environmental assessment requirements including SEA, EIA, SFRA and AA as appropriate.
- National Policy Objective 37: Ensure the integration of safe and convenient alternatives to the car into the design of our communities, by prioritising walking and cycling accessibility to both existing and proposed developments and integrating physical activity facilities for all ages.
- 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.

Climate change vulnerability policy

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

In relation to the built environment, the NAF states in Chapter 3, "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).

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

- **Hazard** - the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.

- **Exposure** - the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.
- **Sensitivity** - refers to the degree to which a system or asset is affected by climate hazards. It reflects how vulnerable something is to changes such as temperature extremes, flooding, or drought, based on its physical, functional, or ecological characteristics.
- **Vulnerability** - the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity.
- **Risk** - the potential for adverse consequences for human or ecological systems.

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

The **Transport Sectoral Adaptation Plan (T-SAP II)** provides the national policy basis for assessing climate resilience within Ireland's transport system. It identifies priority climate risks such as flooding, coastal erosion, heat stress and extreme weather across all transport modes and evaluates their likelihood and impact under RCP 4.5 and RCP 8.5 scenarios for 2030, 2050 and 2100. 40 sector-specific adaptation actions aimed at strengthening infrastructure resilience, improving data and monitoring, and integrating nature-based solutions are listed. The plan establishes a framework to track implementation, ensuring that future transport projects consider climate vulnerability and embed appropriate adaptation responses.

The **Tourism Sectoral Adaptation Plan** details how the tourism sector is highly sensitive to climate. As a result, adaptation and resilience planning are critical to safeguard economy generated from tourism as well as communities which rely on it. Key risks to the sector include damage to infrastructure, reduced accessibility, impacts on natural landscapes and increased operational costs. This is in addition to uncertainty around demand patterns and seasonality. The Plan lists climate hazards which could impact tourism as: flooding, extreme precipitation, heatwaves and changing weather patterns. Opportunities such as warmer conditions improving Ireland's appeal as a holiday destination and the potential to extend the holiday season are identified.

Local Authority policy

The Donegal County Council (DCC) *Local Authority Climate Action Plan (LACAP) 2024 to 2029* (DCC, 2024) sets out how DCC will be responsible for enhancing climate resilience, increasing energy efficiency, and reducing greenhouse gas emissions, across its own assets, services, and infrastructure, for which it is fully accountable, whilst also demonstrating a broader role of influencing, advocating, and facilitating other sectors, to meet their own climate targets and ambitions. This is necessary to ensure that the environmental, social, and economic benefits that come with climate action can be fully realised.

Strategic goals and objectives have been set based around six key themes:

- Sustainability and resource management
- Governance and leadership
- Transport
- Built environment
- Natural environment & green infrastructure
- Community resilience

In 2023, Donegal County Council submitted a Climate Change Risk Assessment (DCC, 2023) as part of its 2024 Climate Action Plan. The assessment identified several key climate hazards

and associated impacts for Donegal, highlighting windstorms, fluvial flooding, and snowfall as high-risk hazards with potentially major consequences for transport.

12.3 Methodology

12.3.1 Greenhouse Gas Assessment Methodology

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 12.4.1).

12.3.1.1 Construction Phase

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, greenway or rail projects using Ireland-specific emission factors and data. The tool 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. The tool aligns with PAS 2080.

The purpose of the embodied carbon assessment is to engage the design team in the consideration of embodied carbon at an early stage in the development and mitigate embodied carbon. This engagement aims to ensure carbon savings are made and to assist in aligning the project to Ireland's CAP goal of Net Carbon Zero by 2050.

The TII Carbon Tool has been used to assess the GHG emissions associated with site clearance works, land use change, excavation works, construction materials, material transport, energy usage during construction, construction worker travel, water use and construction waste. Reasonable conservative estimates have been used in this assessment where necessary to provide an estimate of the GHG emissions associated with the proposed development.

12.3.1.2 Operational Phase

Operational phase emissions are associated with the ongoing energy and maintenance requirements of the site, including power for lighting and EV charging points, estimated waste volumes, maintenance of the greenway including energy used to carry out routine maintenance and water use.

Lighting and EV operational emissions were calculated using the TII Carbon Tool. The following assumptions were made:

- All energy was assumed to come from grid electricity. As per Carbon Tool Emission Factors this is taken from SEAI Database (2023). This has been assumed to be stable over the lifespan with respect to emissions which is considered to be a worst-case scenario.
- Lighting - Annual kWh calculated by multiplying no. of lights, power output (taken from typical supplier specification) and annual operational hours
- EV - Annual kWh calculated by multiplying EV spaces by average power output of a DC Fast charger by assumed operational hours.

The replanting of mixed forest, natural grasslands and transitional woodland scrub will positively impact climate and has been accounted for within the assessment.

In addition, the modal shift from GHG-emitting vehicles to pedestrian or bicycle users has also been quantified by the proposed development's design team using the Tool for Economic Appraisal of Active Modes (TEAM) (TII 2024). The main function of the tool is to conduct a Cost- Benefit Analysis (CBA) by monetising the benefits of active travel schemes, such as the proposed development. The tool quantifies savings such as reduced vehicle operation costs, improved health, accident reductions and increased tourism revenue from visitors. For this assessment, the TEAM tool used demand forecasting to estimate the number of vehicles kilometres that could be removed from the road network in favour of walking or cycling using the proposed greenway. The model assumes consistent emissions from vehicle use across the 30-year appraisal period. It has not taken into consideration the uptake of electric vehicles or the decarbonisation of the electricity grid during this period due to the uncertainty surrounding this.

12.3.1.3 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, 2022) outlines a recommended approach for determining the significance of the construction, operational and decommissioning phases of a development.

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022) is based on ISEP GHG Guidance (ISEP, 2022) which is consistent with the terminology contained within Figure 3-4 of the EPA's (2022) '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'*.

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

TII (TII, 2022) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. In line with ISEP GHG Guidance (ISEP, 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 12-3 (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.

Table 12-3 - Significance criteria for GHGA

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

Ireland's carbon budgets can also be used to contextualise the magnitude of GHG emissions from the proposed development (TII, 2022). The approach is based on comparing the net proposed development GHG emissions to the relevant carbon budgets (Government of Ireland, 2025a). With the publication of the Climate Action Act in 2021 and CAP25, sectoral carbon budgets have been published for comparison with the net GHG emissions from the proposed development over its lifespan.

The proposed development has a defined lifespan in accordance with RICS 'Whole Life Carbon Assessment for the built Environment' (RICS 2022) which recommends infrastructure assets/ civil engineering works have a 120-year lifespan based on guidance EN 17472:2022. For the purpose of this assessment, a 120-year lifespan will be utilised.

12.3.2 Climate Change Risk Assessment Methodology

As per the TII PE-ENV-01104 guidance (2022), a screening of risk during the operational phase is conducted. 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, 2022) provides the list of asset categories and climate hazards to be considered. The asset categories will vary for development type and need to be determined on a development-by-development basis.

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

First an initial screening of physical hazards is carried out based on the site and nature of the proposed development (sensitivity and exposure). This is a qualitative screening which intends to only proceed if relevant. Climate hazards are screened in or out as appropriate.

A Climate Vulnerability Assessment is then carried out based on a semi-quantitative analysis of sensitivity and exposure.

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.

The exposure analysis involves determining the level of exposure of each climate hazard at the project location irrespective of the project type. For example, sea level rise is not an applicable hazard to inland areas or wildfire is not considered a hazard in an urban location. 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.

12.3.2.1 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 12-4 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 development can be considered as 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 and decommission phase CCRA impacts is only required according to the TII guidance (TII, 2022) if a detailed CCRA is required.

Table 12-4 - Vulnerability Matrix

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

The screening and Climate Change Vulnerability Assessment detailed in Section 12.5.2 did not identify any residual medium or high risks to the proposed development as a result of climate change. Therefore, a detailed CCRA for the construction and operational phase were scoped out.

Although the development is likely to be exposed to potential weather extremes due to climate change during the construction phase, the potential length of the construction phase and its transient nature means that a CCRA for the construction phase can be scoped out. However, best practice mitigation against climate hazards during construction is still recommended in as outlined in Section 12.6.1.

12.3.3 Difficulties Encountered

There were no difficulties encountered when completing the climate assessment.

12.4 Receiving Environment

12.4.1 Current GHG 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 12-5).

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 12-5 - 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%

Sector [Note 1]	2022	2023	2024	Total Budget (Mt CO_2e) (2021-2025)	% Budget 2021-2025 Used	Annual Change 2023 to 2024
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).

12.4.2 Future GHG Baseline

The future baseline with respect to the GHGA can be considered in relation to the future climate targets which the assessment results will be compared against. In line with TII (TII, 2022) and ISEP 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 9.5% 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 21.7% by 2030, still short of the 42% reduction target.

12.4.3 Current Climate Change Baseline

The region of the proposed development has a temperate, oceanic climate, resulting in mild winters and relatively cooler summers when compared with continental Europe. This baseline data is derived from the European Centre for Medium-Range Weather Forecasts (ECMWF)

ERA5 data reanalysis (ECMWF, 2023) which includes observed data from individual meteorological weather stations across Ireland from 1950-2023. This data is reanalysed to model a complete picture of Ireland's historical climate. This method has been chosen to ensure data can be analysed at the daily level and harmoniously compared with future scenarios as historical data from weather stations around Ireland and Donegal have gaps in records and variables. The baseline time-period referred to in this assessment was from 1991-2020 and is specific to county Donegal and the location of the development in question.

Figure 12-1 below shows the climatology for the 30-year baseline period from 1991 to 2020 indicating the wettest months are from October through to January, with December being the wettest month (139mm) with average monthly precipitation 125mm across the winter period. The driest month on average was April (89mm), with February through to May also experiencing lower than average rainfall (~90mm). Ireland and Donegal's precipitation patterns are strongly influenced by its oceanic climate, with the wettest months typically coinciding with periods of frequent low-pressure Atlantic storm systems. This is evident in Donegal's climatology, where substantial rainfall occurring across the winter, often accompanied by single-day precipitation maximums exceeding 30 mm.

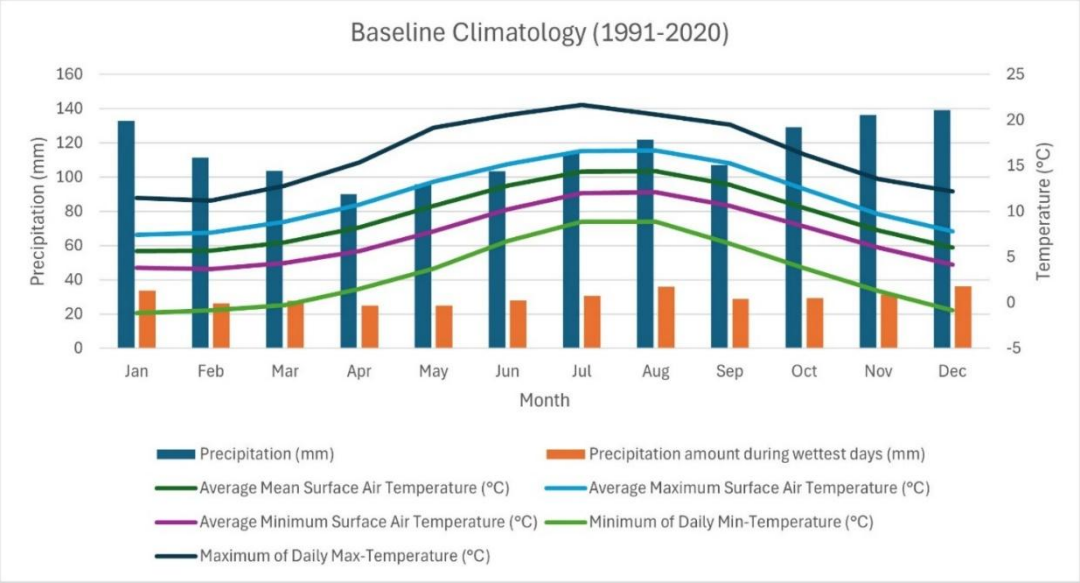

Figure 12-1 - Baseline Climatology (Donegal County) 1991-2020

July and August are the warmest months with marginal differences in mean temperature (14.3°C), with average mean surface temperatures across the summer months (June – August) >12.8°C. Average maximum temperatures across May-September range from 13°C – 16°C. July and August are also the warmest months for maximum daily temperatures (21°C - 20°C respectively) which showcases the higher value ranges recorded during a particular month.

January and February are the coldest months with average mean surface air temperatures of 5.6°C and average minimum temperatures of 3.7-3.6°C. For daily minimum temperatures which reference the lowest range values (10th percentile range) of the data, January (-1.1°C) is the coldest with February and December each experiencing daily lows of (-0.8°C). March also experiences daily minimums of ≤0°C.

Historical records show Donegal has experienced several severe storms, with wind speeds exceeding 100 km/h, and records in Ireland were set in the last decade, including a national record for wind speed during Storm Éowyn in January 2025. Storm activity is concentrated in winter (December–February), with an average of eight named storms annually (Met Éireann, 2025).

Historical data was taken from Malin Head Weather Station from 1991-2020 approximately 80km from the proposed development site and indicates a mean monthly 10m wind speed of 7.8 knots (14 km/hr) and mean maximum gusts ≥80 knots (148 km/h) (Met Éireann, 2023).

Overall, the baseline climatology for the proposed development site and region shows evidence of high rainfall across the year. Winters are mild with average minimums >4°C and

summers are relatively mild, with average maximums of 15°C and daily maximums >20°. However, while this maximum is not significant for extreme heat or prolonged drought impacts, wildfires have been noted across the county and particular in proximity of the proposed development's location. In April 2025 large wildfires burned areas along the Barnesmore Gap and also in the last decade several wildfires have burned across Donegal (RTE, 2025).

12.4.4 Future Climate Change Risk

Climate Change Impacts and Projections for Ireland

Ireland is already experiencing increased annual rainfall in the north and west, with more variable patterns in the south and east including the area of the proposed development (EPA, 2021). Key risks identified by the EPA relevant to the proposed project include:

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

Climate Modelling and Planning

International best practice and national policy such as the IPCC (2023), NCCRA (2024), and Transport Infrastructure Ireland (TII, 2022) recommends using two emission scenarios to project future climate change. This includes a moderate and high emission scenarios (RCP4.5 and RCP8.5) for future planning. These Representative Concentration Pathways (RCPs) reflect varying levels of global climate mitigation and are explained below.

- RCP 4.5 (a 'moderate' scenario) represents an approximate 2.4°C increase in global average temperatures (1.7-3.2°C). It assumes moderate mitigation efforts leading to stabilisation of emissions by mid-century and is generally aligned with current policies for emission reduction.
- RCP 8.5 (a 'worst case' / high emissions scenario) represents an approximate 4.3°C increase in global average temperatures (3.2-5.4°C) and assumes continued high emissions with minimal mitigation. This high-end scenario is useful for understanding potential impacts of current emission trends continue. Consequently, this scenario will result in the highest level of physical risk for Ireland, and therefore the greatest requirement for adaptation.

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

12.4.4.1 Key Findings from Future Climate Change Projections

Table 12-6 presents the key findings from the analysis of future climate projections under two scenarios: a medium-emissions pathway (RCP4.5) and a high-emissions 'worst-case' pathway (RCP8.5). Both scenarios are compared against the site-specific baseline (1976–2005) derived from the Ireland TRANSLATE projections (EPA, 2025b) dataset and historical data taken from Malin Head (Met Eireann, 2023 & 2025). The table details the principal climate hazards and their projected changes under each scenario.

Projected changes include:

- Summer temperatures rising by over 2°C and overall mean temperatures increasing 1.1°C and 1.5°C by mid-century under RCP4.5 and RCP8.5 respectively.
- Summer rainfall decreases while winter rainfall increases sharply, contributing to an overall increase in rainfall annually for the proposed development location.
- Fewer frost days and cold winter nights and more frequent short heatwaves (≥5 days >25°C).

- Increased likelihood of extended dry spells and possible drought which may elevate the risk of wildfire.
- Increased likelihood of more storms which may increase the risk of flooding due to deluge of rainfall, which may be a factor in increased Max 1-day precipitation projections (+2mm and +3mm).

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

Table 12-6 - Site Specific - Future Climate Change Summary of Projections under both RCP scenarios for 2050 period (2040-2070) taken from the EPA Climate Ireland Translate Projections

Climate Hazard	Indicator	Baseline (1976-2005)	RCP4.5 (2040-2070)	RCP8.5 (2040-2070)
Temperature	*Mean temp (°C)*	8.7	9.8	10.2
	Mean Max temp (°C)	12.3	13.3	13.7
	Mean Min temp (°C)	5.1	6.3	6.7
	Average of Daily Max temp (°C)	24	26.7	27.2
Frost, Snowfall and Ice	*Frost Days Annually (no. days)*	48	26.7	20
Precipitation and Flooding	*Annual precipitation (mm)*	1798	1875 (+77)	1895 (+97)
	Max 1-day (mm)	43	51 (+8)	53 (+10)
	No. Wet Days annually (>1mm)	226	222	221
Storms and high winds	*Number of Storms Qualitative (Description)*	On Average 8 named storms annually with speeds exceeding 100km/hr (N.1)	Winter storm frequency is projected to increase, with a possible extension of the storm season. While the intensity of individual storms cannot be accurately projected, wind speeds are likely to remain above 100 km/hr.	
	Max mean 10m wind Speed (Knots)	68 (N.2)		
Drought	*Absolute Drought (≥15 days with less than 1mm)*	Rare	Marginal increase	Increased Likelihood
Lightning	*Qualitative (Descriptive)*	Occurring during summer periods	This hazard may modestly increase in the future due to more favourable conditions, such as rising temperatures and extended warm periods beyond the traditional summer season	

Note-1: Data from Met Éireann

Note-2: Data Malin Head approximately 80km from the site. Met Éireann 30-year averages (1991-2020) (Met Éireann, 2023)

12.5 Description of Potential Impacts

12.5.1 Greenhouse Gas Assessment

Over the 120-year lifespan of the proposed development, the GHG emissions are estimated to be 39,060 tCO_2e. The most significant proportion of GHG emissions occur during the operational phase as a result of electricity used for EV charging and lighting (see Figure 12-2). Emissions associated with each lifecycle stage are set out in Table 12-7 and Figure 12-2 below.

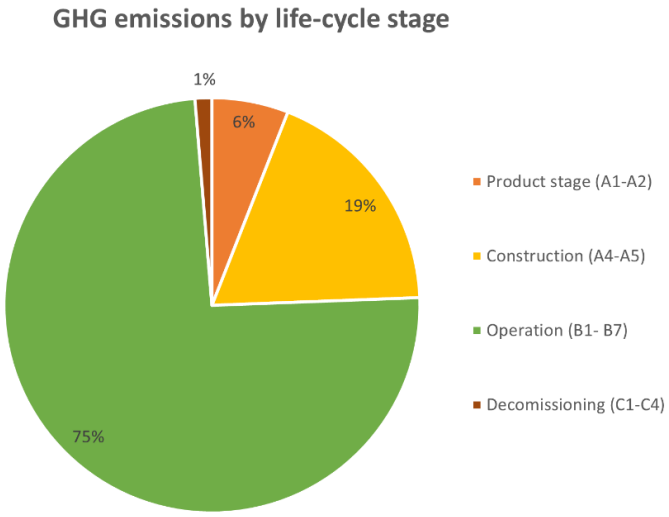

Figure 12-2 - GHG Emissions by Life-Cycle Phase

12.5.1.1 Construction Phase

The construction phase (A1-A5) of the proposed development is predicted to result in 9,534 tCO_2e. Of this, construction materials (Product Stage A1-A3) make up 76% and fuel usage by construction plant and generators contributes 21%. Total construction phase emissions include the positive impact of carbon sequestration from replanting woodland scrub, natural grasslands and mixed forest at the site of the proposed development (-1,164.5 tCO_2e) as can be seen in Figure 12-3.

Excavated material will be re-used on the site avoiding an estimated 487 tCO_2e associated with the transportation of excavated material to landfill.

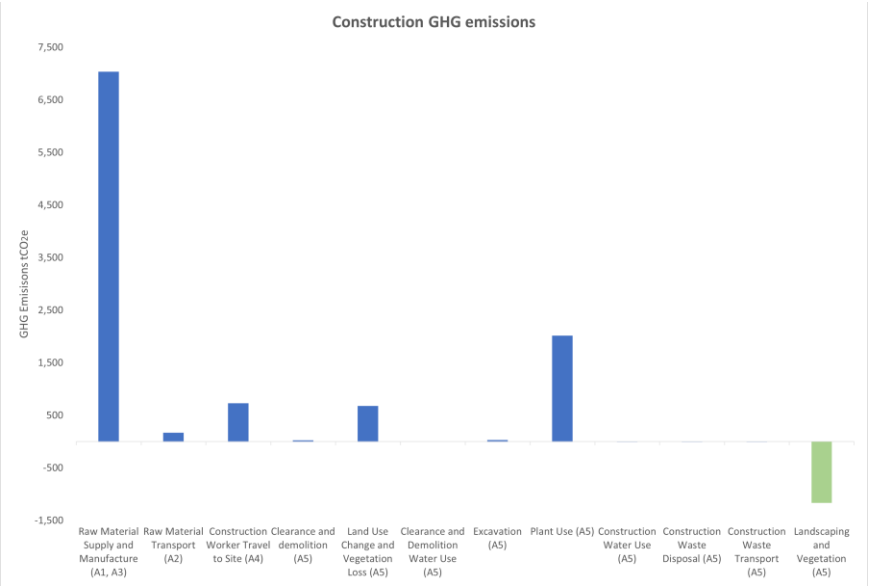

Figure 12-3 - Construction GHG Emissions

12.5.1.2 Operational Phase

Table 12-7 shows operational phase emissions (B1-B7) total 29,014 tCO_2e over the development's lifespan (241.79 tCO_2e annualised) over the 120 year lifespan (based on RIC's guidance as set out in Section 12.3.1.3, resulting from electricity demand for EV charging and lighting (78%), routine maintenance (15%) and energy used for maintenance (6%). As the proposed development is a greenway, GHG emissions associated with the operational phase are limited to those mentioned above.

User Utilisation of Infrastructure (B8) emissions have been calculated using the TII TEAM model (TII, 2024) (see Section 12.3.1.2 for details). The modal shift is estimated to avoid -499 tCO_2e which would otherwise result from vehicle usage.

12.5.1.3 Decommissioning Phase

Estimates of waste to landfill and energy required to carry out decommissioning works have been used to quantify predicted GHG emissions from the decommissioning phase.

Table 12-7 - GHC Assessment Results

	Activity	Elements considered	Emissions (tCO_2e)	Sector
A1-A3	Materials	Aggregates, plastics, cabling, concrete, road pavement materials, aluminium signs, geotextiles, timber etc.	7,038	Industry
A2	Material transport	HGV	171	Transport
A5	Clearance and demolition	Site preparation and clearance	26	Industry
A5	Land use change and vegetation loss	LUC from woodland scrub, mixed forest, agriculture, peat bog	681	LULUCF
A5	Excavation	Excavation of peat, topsoil and other materials	33	Industry
A5	Construction energy	Fuel usage by plant operation, generator use and depot office	2,018	Industry
A4	Worker travel to site	Small van trips	730	Transport
A5	Construction water	Water used during demolition, clearance and construction	0.3	Industry
A5	Construction waste disposal	Various waste types and streams	0.6	Waste
A5	Construction waste transport	Transport of waste offsite. Waste will be taken from the site by HGV.	0.7	Waste
A5	Landscaping and vegetation	Planting of mixed forest, grassland and woodland scrub	-1165	LULUCF
A1-A5	**Total Construction GHG Emissions**		**9,534 tCO_2e**	
B6	Operational energy	Lighting and EV chargers	22,747	Electricity
B1	Operational waste disposal	Disposal of waste	346	Waste
B1	Operational waste transport	Vehicle movements (other than waste disposal HGV)	-	Transport
B2-B5	Maintenance energy use	Fuel usage by plant operation	1,684	Industry
B2-B5	Maintenance	Asset repair and replacement of parts	4,234	Industry
B7	Operational water	Operational water use	2	Industry
B1-B7	**Total Operational GHG emissions**		**29,014 tCO_2e**	

	Activity	Elements considered	Emissions (tCO_2e)	Sector
C1	Decommissioning emissions	Materials and plant use	48	Industry
C2	Decommissioning waste disposal	Waste	0.03	Waste
C3-C4	Decommissioning waste transport	Waste transport	464	Transport
C1-C4	**Total Decommissioning GHG emissions**		**512 tCO_2e**	
A1-C4	**Total life cycle GHG emissions (120 years)**		**39,060 tCO_2e**	
B8	*User utilisation of infrastructure*	*TEAM tool TII*	*-499 tCO_2e*	*Transport*

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. The predicted GHG emissions (as shown in Table 12-7) have been 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 12-8, GHG emissions have been categorised by sector and 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, against Ireland's EU 2030 target of a 42% reduction in non-ETS sector emissions based on 2005 levels (27.7 Mt CO_2e) (set out in Regulation EU 2018/842 of the European Parliament and of the Council).

The estimated total GHG emissions, when annualised over the 120-year proposed development lifespan, are equivalent to 0.0006% of Ireland's total GHG emissions in 2024. The total annualised energy use emissions are 0.006% of the Electricity sector budget. Total annualised industry-related emissions are 0.0012% of Ireland's non-ETS 2030 emissions target and 0.003% of the 2030 Industry budget. The estimated annualised GHG emissions associated with transport-related activities are 0.0001% of the 2030 Transport budget, while annualised waste GHG emissions are 0.001% of the Waste budget.

Table 12-8 - Estimated 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	325	0.0006%
Non ETS 2030 Target (42% of 2005 ETS Level)	27,722,000			0.0012%
2030 Sectoral Budget (Industry Sector)	4,000,000	Total Industry Emissions	126	0.003%
2030 Sectoral Budget (Transport Sector)	6,000,000	Total Transport Emissions	8	0.0001%
2030 Sectoral Budget (Waste Sector)	1,000,000	Total Waste Emissions	7	0.001%
2030 Sectoral Budget (Electricity Sector)	3,000,000	Total Electricity Emissions	190	0.006%

12.5.1.4 GHGA Significance of Effects

The TII guidance states that the following two factors should be considered when determining significance:

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

Estimated GHG emissions from EV chargers during the operational phase are the most significant contributor for the proposed development. It should be recognised that this is due to the extended lifespan of the project and should be considered in the context that EV chargers facilitate the transition away from fossil fuel powered vehicles which emit significantly more GHG emissions when in use. In addition, Ireland's target to decarbonise 80% of the electricity grid by 2030 and achieve net zero by 2050 (Government of Ireland, 2024) should reduce the emissions associated with the EV chargers as emissions should follow a decreasing trajectory until the point the electricity grid achieves net zero. Due to the uncertainty around current projections this assessment has used a conservative approach and accounted for emissions at present day carbon intensity.

Moreover, User Utilisation of Infrastructure emissions (life-cycle category B8) have also been accounted for which recognises avoided emissions attributed to the modal shift from GHG emitting vehicles to active transport. Although positive, the avoided emissions associated with the modal shift, calculated by the design team, are not significant enough to create a net positive impact to GHG emissions from the proposed development.

The level of mitigation described in Section 12.6 has been taken into account when determining the significance of the proposed development's GHG emissions.

According to the TII significance criteria described in Section 12.3.1.3 and Table 12-3 the significance of the GHG emissions during the construction and operational phase is minor adverse.

The ISEP GHG guidance (ISEP, 2022) (which has been embraced by the updated TII Guidance (TII, 2022) in Section 6.7.2) defines minor adverse as follows:

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

The proposed development aligns with the following GHG significance criteria as per Table 12-3:

- The project's GHG impacts are mitigated through 'good practice' measures.
- The project has complied with existing and emerging policy requirements; and
- Fully in line to achieve Ireland's trajectory towards net zero.

In accordance with the EPA guidelines (EPA, 2022), the above significance equates to a significance of effect of GHG emissions during the construction, operational and decommissioning phase which is **direct, long-term, negative** and **not significant**.

12.5.2 Climate Change Risk Assessment

12.5.2.1 Construction and Decommission Phase

A detailed CCRA of the construction and Decommissioning phases has been scoped out. 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 12.6.1.

- Flood risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding.
- Increased temperatures potentially causing water scarcity and prolonged periods of hot weather.
- Reduced temperatures resulting in ice or snow and [possible hazard to working conditions].
- Major storm damage, including wind damage and coastal flooding from storm surge.
- Wildfire and fire risk elevated resulting from dry spells and elevated temperatures.
- The Construction Environmental Management Plan (CEMP) will include comprehensive method statements for assessing slope stability risks within or adjacent to the work areas. These inspections will be supervised by a qualified geotechnical engineer and/or engineering geologist, who will recommend and oversee appropriate protective measures as required.

12.5.2.2 Operational Phase

Climate Hazard Screening

To determine the vulnerability of the proposed development to climate change the sensitivity and exposure of the development to various climate hazards must first be determined. Table 12-9 presents the initial qualitative screening of climate hazards relevant to the proposed development. A number of climate hazards have been screened out of the assessment due to the proposed development's location.

Table 12-9 - 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 development. Historical data combined with future projections shows rising temperatures in Ireland. Heat and thermal expansion can damage bridges, assets, materials, and road surfaces, and 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 development during both construction, and operational phases due to the sensitivity of construction materials, site access, and site assets to water exposure.	Screen in
Fluvial flooding	The proposed development is located in close proximity to a fluvial watercourse, and this is considered a hazard for the development.	Screen in
Drought	Droughts have occurred across Ireland, previously impacting water supply. Future reductions in water availability would not directly impact operation.	Screen out
Wildfire	The area surrounding the site has experienced wildfires historically and wildfire has been noted in the Donegal Climate Change Risk Assessment (2023).	Screen in
High winds and storms	While the site itself isn't significantly elevated, nor are the proposed design changes, existing and proposed assets and design components 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

Climate-related Hazard	Hazard Screening Rationale	Screening
Fog	Fog is not considered a significant hazard for this development, as it does not involve transport, aviation, or activities requiring high visibility.	Screen out
Lightning	The proposed design is not elevated, and no extra risk is considered above what already exists under the existing design codes of the site and buildings	Screen out
Landslides and Subsidence	The Geological Society of Ireland (GSI) landslide susceptibility mapping database (GSI, 2025) was reviewed. The proposed development is largely within an area of Low to Moderate landslide susceptibility however in close proximity and bounded by areas of elevated landslide risk. Consideration has been given to subsidence and adequate engineering measures are in place to ensure stability.	Screen in
Sea level rise and coastal flooding	The location of the development is a considerable distance from the coast and not exposed.	Screen out

Climate Change Vulnerability Assessment

The sensitivity and exposure of the development to the screened in climate hazards must first be determined to then determine the vulnerability of the proposed development to climate change. Flooding (pluvial and fluvial), extreme heat, extreme cold, extreme wind, wildfire, and landslide have been considered as relevant 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.

The proposed development spans several kilometres and is divided into multiple stages. Our approach has been to assess each stage against the most vulnerable hazards—specifically pluvial and fluvial flooding—since the degree of exposure to these hazards varies across the different stages.

Table 12-10 details the sensitivity of the proposed development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been determined, the exposure of the proposed development to each of the climate hazards is determined, this reflects on the possible likelihood of the climate hazard occurring at the project location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the overall vulnerability of the proposed development to each of the climate hazards. The results of the vulnerability assessment are detailed in Table 12-10 and is based on the current climate.

Table 12-10 - Climate Change Vulnerability Assessment

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

The sensitivity and exposure of the area was determined 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.

Flooding

Future increases in rainfall due to climate change may elevate the risk of surface water (pluvial) flooding. Roughan & O'Donovan Consulting Engineers completed a Site-Specific Flood Risk Assessment (SSFRA) (2025) which reviewed all of the proposed development components. Under this assessment it is concluded that the majority of the proposed development is not at risk of flooding, however some areas such as trailheads are within Flood Zone A. These areas underwent a Stage 2 FRA. The SSFRA under stage 2 concluded that the current design is justified and the flood risk adequately mitigated through elevation of the EV chargers above the 0.1% AEP level (1 in 1000 year flooding), constructing the greenway at grade of flood resilient construction, installation of interceptor ditch and ensuring the greenway will not impact surface drainage pathways (Roughan & O'Donovan Consulting Engineers, 2025).

The existing design incorporates an extensive stormwater drainage network and a range of Sustainable Urban Drainage Systems (SuDS) to effectively manage surface water and strengthen climate resilience. Key features include grey infrastructure such as culverts storm drain and green infrastructure providing a comprehensive drainage network across the site. These systems are designed to slow runoff rates and route flows through controlled monitoring points.

Vulnerable assets such as EV power stations and parking locations are not within flood risk zones and have included design measures to ensure flood risk is mitigated. EV Charging Stations will be raised and cabling underground in waterproof enclosed design following best practice.

Combined, these measures provide adaptation of design to account for climate change and robust mitigation against pluvial flooding while protecting the surrounding environment, enhancing biodiversity and supporting sustainable water management throughout the site.

Extreme Temperatures (Heat & Cold)

In relation to extreme temperatures, both extreme heat and extreme cold, these have the potential to impact the building materials and some related infrastructure. However, building materials will be selected which meet the relevant design standards and accommodate high and low extreme temperatures. The design complies with EN 1991-1-5 for thermal actions and relevant material Eurocodes (EN 1992, EN 1993, etc.) to ensure performance under elevated and low temperature conditions. All materials are specified in accordance with the appropriate Eurocodes and CE-marked product standards to ensure long-term performance under Ireland's temperature extremes, including freeze–thaw resistance, thermal expansion properties, and durability requirements.

The likelihood of extreme cold events in the future is projected to decrease reducing their overall exposure and risk. Dangerous heat levels (+30°C) are equally unlikely and design has incorporated these considerations with thresholds for materials accommodating these extremes. Therefore, both extreme temperatures (cold and heat) are not considered a significant risk given the mitigation integrated across the design.

High Winds and Storms

Given the nature of the proposed development, it is less likely to be "in-use" during storms and many of the main elements i.e. pavements are not likely to be significantly affected by wind. Native plants and vegetation have been selected with consideration for wind loads and damage.

The design does not introduce any significant changes in elevation compared to the existing layout; therefore, overall exposure and vulnerability remain unchanged. Future wind-related risks have been considered as part of the design process to ensure resilience.

Wildfire

Historically this area has been prone to wildfire. Future projections do show an increased levels of rainfall which may reduce the overall likelihood of wildfire. Mitigation measures integrated into the design have considered this risk and include spacing landscaping, vegetation, and infrastructure to allow for fire barriers. (See Appendix 4.2 Management and Maintenance Plan).

Landslide and Subsidence

As set out in Chapter 8, Land and Soils, the proposed development passes through areas that may be susceptible to ground instability, including landslides, rockfalls, and bog slides. The GSI Landslides Database recorded three landslide events along the proposed development, with the most recent occurrence in November 2020 and evidence of large boulders that have rolled downhill, indicating potential for rockfall events. As identified in the GSI Landslides Database, the landslide susceptibility along the Barnesmore Gap ranges from Moderately Low to High. The chapter concludes that the potential consequences of rockfall events can be severe, but the probability of such an event impacting the greenway is unlikely.

During the construction phase, a detailed geological inspection will be carried out on the mountainside above the former railway route through Barnesmore Gap to identify any potentially unstable boulders that could pose a risk of falling toward the greenway. Where necessary, stabilisation measures will be implemented to reduce this risk to an acceptably low level. During the operational phase, repeat geological inspections of the mountainside above the old railway through Barnesmore Gap will be carried out every 5 years to monitor the stability and safety of the mountain slope, and any necessary further stabilisation measures will be carried out implemented to ensure the ongoing safety of the greenway.

Summary

Overall, the proposed development has accommodated all vulnerabilities through integrated mitigation across the design to the identified climate hazards. Therefore, a detailed risk assessment is not required if mitigation is carried out a specified.

12.5.2.3 CCRA Significance of Effects

With design mitigation in place, there are no significant risks to the proposed development due to climate change. However, this should be re-evaluated in future, as understanding of potential hazards caused by a changing climate increases. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect of the impacts to the proposed development due to climate change during the operational phase are **direct, long-term**, **negative** and **not significant**.

12.5.3 Do Nothing Scenario

In the Do-Nothing scenario, the site will remain as per the baseline and will change in accordance with trends within the wider area. The Do-Nothing scenario is considered neutral in terms of the climate assessment. Due to the nature of the proposed development, the benefits of active travel, such as the modal shift from GHG emitting vehicle use, health related benefits and tourism potential will not be applicable in the Do-Nothing scenario.

12.6 Mitigation Measures

12.6.1 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:

- Where possible, buildings will be retained and demolition avoided to negate additional GHG emissions being released.
- During the design stage, alignment of the Greenway was carefully considered to avoid dense vegetation where possible
- Minimising waste of materials through reusing surplus cut material for earthworks as fill for verges and slopes and reusing concrete/masonry from demolition as aggregate. The design maximises pre-cast construction off site to reduce wastage.

- Re-use and recycle of materials - in line with TII's Sustainability Implementation Plan and Circular Economy Guidance, the re-use and recycle of materials on site as opposed to disposal and landfill will be prioritised. Measures for managing construction waste are set out in Chapter 4.
- Carbon Tool assumes 50% Cement Replacement for all in-situ structural concrete.
- Cut/fill balance – the alignment design endeavours to follow the natural topography where possible, to minimise the waste produced from the intervention and reduce the transportation of materials.
- Site clearance - The alignment also endeavours to minimise vegetation clearance and sequestration loss where possible by using the existing railway line and running adjacent to field boundaries. An exercise was undertaken to determine the amount of site clearance required and categorise the type of land on which the clearance is occurring. Site clearance and vegetation loss values were then inputted into the carbon tool as calculated.
- In areas of peat, floating construction is proposed ('No-dig' solutions).
- Reduction in 6F2 capping stone and subbase (crushed stone) required along existing railway line. This is a reduction in the standard pavement construction (300mm 6F2 stone and 150-200mm sub-base) by utilising the existing railway line. Geotechnical Investigation has been undertaken and shown that the stiffness and density of the existing sub-ballast is sufficient and therefore the pavement layers can be reduced.
- Fencing design – existing boundaries retained where possible, new fencing to be sheep wire with hedge rather than post and rail where possible.
- Use of existing railway line allows re-use of numerous structures in whole or in part.
- Lighting minimised and only where necessary, see chapter 4. Lighting designed to balance ecological sensitivity and safety/attractiveness for greenway users. Lighting is provided in proximity to the urban areas, and therefore it will enable the majority of trips to continue to be undertaken in the hours of darkness.
- Materials to be sourced locally, where possible.
- Ordering specific quantities to reduce waste
- The 3 main compounds will be powered by grid electricity, which has been accounted for in the carbon tool.
- Solar PV will be used for temporary lighting
- Water will be re-used for wheel washers

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 and fluvial and pluvial 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, any concerns will be raised to the Site Manager. 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 other hazards through site risk assessments and method statements.

12.6.2 Operational Phase

The proposed development has been designed to reduce the impact on climate change through the promotion and opportunity for active travel over GHG emitting travel methods (see Section 12.3.1.2). In addition, operational phase mitigation includes the widespread planting of native Irish species of trees and shrubs, natural wildflower regeneration and woodland flora planting which will sequester carbon dioxide, positively contributing to reducing the impact of climate change as set out in Chapter 14 of this EIAR. In addition, to reduce operational water use, waterless toilets will be installed at the proposed development.

The proposed development will incorporate a combination of Sustainable Drainage Systems (SuDS) and grey stormwater infrastructure, including culverts, storm drains, permeable surfaces, and swales. These measures will help slow runoff rates while expanding the drainage network through green infrastructure.

For fluvial and pluvial flood risk, the greenway will be constructed using flood-resilient design standards. EV charging stations have been identified as highly vulnerable to flooding and have been elevated (7.31mAOD) and positioned in areas with minimal flood exposure, underground cabling will significantly reduce flooding vulnerability and exposure to extreme temperatures. EV chargers will be specified to an IP rating of IP68 to protect against effects of submersion of water. With regards to overheating, modern EV chargers manage heat via derating and modern thermal management; overheating that poses a safety hazard is uncommon when standards and maintenance are followed. Weather protection is part of the ZEVI Universal Design Guidelines for EV chargers.

The design and landscaping also account for extreme wind events. Bridge structures will be engineered to meet standards for high wind speeds, and landscaping will feature deep-rooted native plants to enhance stability and resilience. The bridges and greenway will undergo regular routine inspection and maintenance will be carried out where required.

12.6.3 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 Construction Environmental Management Plan (CEMP). Monitoring will include embodied carbon of construction materials, water usage, power and fuel usage, and waste generation (including reuse and recycling rates).

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

12.7 Residual Effects

The impact to climate as a result of a proposed development must be assessed as a whole for all phases. The measure of impact is how the proposed development contributes to or impedes the ability of Ireland to reach carbon neutrality by 2050. This is supported by the ISEP guidance which states the significance should be assessed on "*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*".

Although the nature of the proposed development will lead to avoided GHG emissions through the modal shift to active travel and the installation of EV chargers will facilitate less fossil fuel vehicles, the proposed development will result in a net negative impact on climate through the release of GHG emissions. As a conservative approach has been followed, this assessment does not account for decarbonisation of the electricity grid, which may reduce GHG emissions associated with the EV chargers (see Section 12.5.1.4).

Best practice mitigation measures are put forward for the proposed development along with a commitment by the Applicant, to reduce climate impacts where possible and practicable. As such, the proposed development is considered to have a ***direct*** impact due to its presence, that is long***-term*** as a result of the estimated lifetime of the infrastructure and ***negative*** due to the emission of GHGs. Due to the mitigation measures in place and the fact that the proposed development promotes active travel and use of EVs and therefore does not impede the trajectory to carbon neutrality, the impact on the climate is considered to be ***not significant*** in EIA terms.

In relation to climate change vulnerability, no significant residual risks to the proposed development due to climate change were identified if all mitigatory measures are conducted. The hazard with the most potential impact is flooding, both fluvial and pluvial. The mitigation measures presented in Section 12.6 have reduced the residual risk to Low. The residual effect of climate change on the proposed development is therefore considered ***direct, long-term, negative*** and ***not significant,*** which is overall not significant in EIA terms.

12.8 References

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