AtkinsRéalis

Environmental Impact Assessment Report (EIAR) Volume 2 – Chapter 12 – Climate

Uisce Éireann

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0089328DG0044

BALLINA AND LOUGH TALT WATER SUPPLY UPGRADE

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Contents

Abbreviations **12-i**

Glossary **12-ii**

12. Climate **12-1**

12.1 Introduction 12-1

12.2 Expertise and Qualifications 12-1

12.3 Legislation and Policy Context 12-2
12.3.1 Legislation, Policy and Guidance 12-2
12.3.2 Consultations 12-7

12.4 Methodology 12-7
12.4.1 Greenhouse Gas Assessment Methodology 12-7
12.4.2 Climate Change Risk Assessment Methodology 12-12
12.4.3 Data Limitations 12-13

12.5 Receiving Environment 12-14
12.5.1 Climate Pollutants 12-14
12.5.2 Existing GHG Emissions Baseline 12-14
12.5.3 Future GHG emissions baseline 12-15
12.5.4 Current CCRA Baseline 12-16
12.5.5 Future CCRA Baseline 12-18

12.6 Potential Impact of the Proposed Development 12-20
12.6.1 Greenhouse Gas Assessment 12-20
12.6.2 Climate Change Risk Assessment 12-24

12.7 Mitigation Measures 12-29
12.7.1 Construction stage mitigation 12-29
12.7.2 Operational stage mitigation 12-31

12.8 Cumulative and Interactive Effects 12-31
12.8.1 Cumulative Impact Assessment 12-31
12.8.2 Interactions 12-31
12.8.3 Land, Soils, Geology and Hydrology 12-31
12.8.4 Air Quality 12-32
12.8.5 Waste 12-32
12.8.6 Populations and human health 12-32
12.8.7 Ecology 12-32

12.9 Residual Effects 12-32

12.10 Monitoring Requirements 12-33

12.11 Do Nothing Scenario 12-33

12.12 Section 15 Compliance 12-33

12.13 Conclusion 12-34

12.14 Difficulties encountered during preparation of this chapter 12-35

12.15 References 12-36

Tables

Table 12-1 — Carbon Budgets for the CAP25 5-Year Periods 12-3

Table 12-2 — CAP25 Sectoral Emission Ceilings for 2030 12-4

Table 12-3 — Purpose-built LCA Tool Methodology 12-8

Table 12-4 — TII Significance Criteria for Greenhouse Gas Assessment 12-11

Table 12-5 — Vulnerability Matrix 12-13

Table 12-6 – Trends in National GHG Emissions 2021 – 2025 12-15

Table 12-7 — Future Climate Change Summary of Projections under both RCP scenarios for 2050 period (2040-2070) taken from the EPA Climate Ireland Translate Projections 12-19

Table 12-8 — Purpose-built LCA Tool GHG Assessment by categories 12-20

Table 12-9 — Estimated GHG Emissions Relative to Sectoral Budgets and GHG Baseline 12-23

Table 12-10 — Climate Hazard Screening 12-25

Table 12-11 — Climate Change Vulnerability Assessment 12-26

Figures

Figure 12-1 — Lifecycle stages (reproduced from Figure 7.1: Building life cycle of BS EN 15978) 12-8

Figure 12-2 — Baseline Climatology for Mayo (1991-2020) 12-17

Figure 12-3 – Whole Life Carbon Assessment of the Proposed Development. Graph reproduced from Uisce Éireann's Whole Life Carbon Assessment Model V4.0. 12-21

Figure 12-4 — Operational GHG Emissions over 48-year lifespan (tCO_2e) 12-22

Figure 12-5 — Landslide Risk taken from GSI (2026) 12-29

Abbreviations

Abbreviation	Term
AEP	Annual Exceedance Probability
CAP	Climate Action Plan
CCRA	Climate Change Risk Assessment
CFRAM	Catchment-based Flood Risk Assessment and Management
ESR	Effort Sharing Regulation
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
FRA	Flood Risk Assessment
GHG	Greenhouse Gas
GHGA	Greenhouse Gas Emissions Assessment
GSI	Geological Survey Ireland
ISEP	Institute of Sustainability and Environmental Professionals
LULUCF	Land Use, Land-use Change and Forestry
NAF	National Adaptation Framework
NCCRA	National Climate Change Risk Assessment
NIFM	National Indicative Fluvial Mapping
OD	Ordnance Datum
RCP	Representative Concentration Pathways
RWSS	Regional Water Supply Scheme
TII	Transport Infrastructure Ireland
LCA	Whole Life Carbon Assessment
WSZ	Water Supply Zone
WTP	Water Treatment Plant

Glossary

Term	Definition
Annual Exceedance Probability (AEP)	Probability of a flood event occurring in any year.
Carbon Budget	Maximum allowable emissions over a defined period.
Carbon Dioxide Equivalent (CO2e)	Common unit used to compare greenhouse gases.
Carbon Sequestration	Removal and storage of carbon from the atmosphere.
Climate Adaptation	Adjustment to actual or expected climate conditions.
Climate Change	Long-term alteration of temperature and weather patterns.
Climate Change Risk Assessment (CCRA)	Assessment of climate-related risks and vulnerabilities.
Climate Hazard	Climate-related event or trend with potential to cause harm.
Climate Neutrality	Achieving net zero greenhouse gas emissions.
Climate Resilience	Ability to prepare for and recover from climate impacts.
Decarbonisation	Reduction of carbon emissions from activities and systems.
Embodied Carbon	Emissions associated with materials and construction.
Exposure	Presence of assets or receptors subject to hazards.
Flood Zone A	Area with high probability of flooding.
Flood Zone B	Area with moderate probability of flooding.
Flood Zone C	Area with low probability of flooding.
Global Warming Potential (GWP)	Measure of heat trapped by a greenhouse gas.
Greenhouse Gas (GHG)	Gas that contributes to the greenhouse effect.
Greenhouse Gas Assessment (GHGA)	Assessment of project greenhouse gas emissions.
Lifecycle Carbon Assessment	Evaluation of carbon emissions across an asset lifecycle.
National Climate Objective	Ireland’s objective to achieve a climate-neutral economy.
Operational Carbon	Emissions generated during operation of an asset.
Photovoltaic (PV) Panels	Solar panels that convert sunlight into electricity.
Representative Concentration Pathway (RCP)	Climate scenario used for future projections.

Term	Definition
Sectoral Emissions Ceiling	Legally defined emissions limit for a sector.
Sensitivity	Degree to which a receptor is affected by a hazard.
Sustainable Drainage Systems (SuDS)	Drainage systems that manage runoff sustainably.
Vulnerability	Susceptibility to adverse climate impacts.
Whole Life Carbon Assessment	Assessment of embodied and operational carbon emissions.

12. Climate

12.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the likely significant effects of the Ballina and Lough Talt Water Supply Upgrade (herein referred to as 'the Proposed Development') on climate during the construction and operational phases in accordance with the requirements of the EIA Directive. This Chapter also summarises the related regulatory and policy framework, describes the methods used to assess the identified impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant adverse effects and the anticipated likely residual effects after mitigation measures have been applied.

A full description of the development is available in Chapter 3 – 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.

Climate is defined as the average weather over a period of time, while climate change is a significant change to the average weather. Climate change is a natural phenomenon but in recent years human activities, through the release of greenhouse gasses (GHGs), have impacted on the climate (IPCC, 2015). The human release of GHGs is altering the Earth's atmosphere resulting in a 'greenhouse effect'. This effect is causing an increase in the atmosphere's heat-trapping abilities resulting in increased average global temperatures over the past number of decades. The release of carbon dioxide (CO_2) as a result of burning fossil fuels has been one of the leading factors in the creation of this greenhouse effect. The most significant GHGs are CO_2, methane (CH_4) and nitrous oxide (N_2O).

This assessment has been undertaken by a team of competent experts. Refer to Chapter 1 (Introduction and Methodology) for a description of the qualifications and expertise of the participating specialists.

This chapter should be read in conjunction with:

- Chapter 3 – Project Description
- Chapter 6 – Population and Human Health
- Chapter 7 – Biodiversity (incl. AA Screening and NIS; AtkinsRéalis 2026 Document Ref; 0089328DG0011, submitted with this application)
- Chapter 10 – Water (Hydrology and Hydrogeology) (incl. Flood Risk Assessment)
- Chapter 11 – Air Quality.

12.2 Expertise and Qualifications

This Chapter was written by Sarah Berry, Sarah is a Principal Climate Consultant in the Air Quality & Climate section of AWN Consulting, a Trinity Consultants Company. Sarah holds a BSc in Physical Geography from the University of Leeds. She has 9 years' experience in climate change and sustainability, with expertise in greenhouse gas permitting, accounting and verification. Her experience includes conducting strategic sector-specific GHG audits across a range

of industries (data centres, industrial facilities, hospitals, manufacturing, power stations and airports). She has prepared climate chapters for EIARs for Proposed Developments across Ireland including large residential developments, windfarms, industrial developments and wastewater treatment works.

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

12.3 Legislation and Policy Context

12.3.1 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 transposed 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.

12.3.1.1 Legislation

The **United Nations Paris Agreement** (United Nations, 2015) treaty binds signatory nations to a commitment to hold global average temperature increase well below 2°C above pre-industrial levels with efforts to limit the increase to 1.5°C below pre-industrial levels. Signatories commit to Nationally Determined Contributions 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 and a 90% reduction in GHG emissions by 2040. 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.

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".

12.3.1.2 Policy

The **European Green Deal** published by the European Commission in December 2019, provides an action plan which aims for the EU to achieve climate neutrality by 2050. The 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, 2024). 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 — Carbon Budgets for the CAP25 5-Year Periods

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO2e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO2e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO2e	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 12-2 — CAP25 Sectoral Emission Ceilings for 2030

Sector	Baseline (Mt CO_2e)	Carbon Budgets (Mt CO_2e)		2030 Emissions (Mt CO_2e)	Indicative Emissions % Reduction in Final Year of 2025-2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, CAP25 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	68				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	295	200	-	51

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

12.3.1.2.1 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 in 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.

12.3.1.2.2 Local Authority Policy

The Proposed Development intersects two local authority areas, both of which have individual climate change strategies.

Mayo County Council

Mayo County Council's Climate Action Plan (2024-2029) sets out a five-year roadmap to make the county climate-resilient, low-carbon, energy-efficient, and biodiversity-rich. It outlines how the council will reduce its own emissions while also guiding and influencing wider community and sectoral climate action. The key objectives of the plan include reducing greenhouse gas emissions, strengthen climate resilience, support community and sectoral action and protect and restore biodiversity.

The Mayo County Council's Climate Action Plan also addresses the risks that climate change possess to infrastructure, individuals, communities and businesses. It states Mayo is already experiencing rising temperatures,

changing rainfall patterns, sea level rise and more frequent extreme weather events. Mayo County Council commissioned a Climate Change Risk Assessment (2023) which highlighted flooding (river, and pluvial), heatwaves and drought are all likely to increase in future climate projections, severe windstorms will stay the same and some hazards such as cold spells and heavy snowfall are expected to decrease in frequency. The Assessment specifically mentions historical flooding along the River Deel in December 2018, caused by overflow, making the R132 between Castlebar and Bangor impassable. Adaptation measures are set out in the Council's Climate Action Plan including:

- Flooding: Flood relief schemes (Westport Cois Abhainn/ Ashwood Flood Relief Scheme, Ballina Flood Relief Scheme, Crossmolina Flood Relief Scheme and the Neal Flood Relief Scheme), risk mapping and emergency response planning;
- Coastal erosion: Coastal erosion management, dune restoration and restricting development in high-risk areas
- Wind and storms: Sustainable Urban Drainage Systems and upgrading stormwater networks, resilient design standards for infrastructure projects;
- Extreme heat: Shading and greening in urban areas and water resource management;
- Drought and water scarcity: Drought resilient land management and expanding green and blue infrastructure;
- Wildfires: Fire-risk monitoring and public awareness campaigns.

Sligo County Council

Sligo County Council's Climate Action Plan (2024-2029) sets out how the local authority will reduce greenhouse-gas emissions, strengthen climate resilience, deliver national climate obligations and support communities in adapting to climate impacts.

The Sligo County Council's Climate Action Plan sets a clear pathway for Sligo County Council to:

- Actively translate national climate policy to local circumstances with the prioritisation and acceleration of evidence-based measures;
- Assist in the delivery of the climate neutrality objective at local and community levels; and
- Identify and deliver a Decarbonising Zone (DZ) within the local authority area to act as a test bed for a range of climate mitigation, adaptation and biodiversity measures in a specifically defined area, through the identification of projects and outcomes that will assist in the delivery of the National Climate Objective.

Sligo County Council Commissioned a Climate Change Risk Assessment (2023) which highlighted some hazards (e.g., coastal, river and pluvial flooding, coastal erosion, heatwaves and drought) will increase while others will remain the same (e.g., severe windstorms). Projections indicate a decrease in the frequency of some hazards (such as cold spells and heavy snowfalls) with decreases in levels of associated risk. Adaptation measures are set out in the Council's Climate Action Plan including:

- Pluvial and fluvial flooding: flood-relief schemes, updated flood-risk mapping, Sustainable Urban Drainage Systems (SuDS);
- Coastal flooding: Nature-based coastal protection (dunes, wetlands) and restricting development in high-risk coastal zones;
- Extreme weather, wind and storms: Strengthening critical infrastructure, emergency-response planning, vegetation and tree-management programmes;
- Extreme heat: Urban greening and shading and water-resource management;
- Drought and water scarcity: Water-conservation programmes, leakage reduction and drought-resilience planning for land and water systems;
- Wildfires: Fire-risk monitoring, emergency-response readiness, public awareness campaigns and peatland restoration to reduce fuel load.

12.3.1.3 Guidance

The following guidance is considered relevant to this assessment:

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

12.3.2 Consultations

As part of the EIAR assessment process, consultation was undertaken with statutory organisations at various stages of the pre-planning process for the current application. There was no relevant feedback in relation to the Proposed Development and this Climate Chapter, Study Assessment and Methodology.

12.4 Methodology

12.4.1 Greenhouse Gas Assessment Methodology

12.4.1.1 Carbon Assessment Tool

The carbon assessment was conducted using Uisce Éireann's purpose-built whole lifecycle carbon assessment tool (herein referred to as the "purpose-built LCA tool") which was developed to calculate the anticipated GHG emissions from both the Construction (including embodied carbon) and Operational Phases of the Proposed Development using a series of calculations, industry standard emissions factors and assumptions to calculate a carbon footprint for the Proposed Development, details of which are provided in Appendix 12-1. The carbon footprint takes account of all anticipated GHG emissions including CO_2, CH_4, and N_2O, which are normalised and reported as t CO2e (see Section 12.5.1).

The purpose-built LCA tool was prepared in accordance with ISEP (2022) Guidance for Assessing GHG Emissions and Evaluating their Significance. Figure 12-1 indicates the infrastructural element, project lifecycle stage and primary emissions sources included in the purpose-built LCA tool (based on the lifecycle carbon assessment methodology in BS EN 15978 Sustainability of construction works (BSI 2011) and in PAS 2080:2023 Carbon Management in Buildings and Infrastructure (BSI 2023).

AtkinsRéalis provided information to the purpose-built LCA tool in association with Uisce Éireann. The purpose-built LCA tool uses the best available primary data wherever possible. Where primary data is not yet available due to the project's delivery stage, proportionate and evidence-based assumptions are applied in line with PAS 2080 (2023).

The lifecycle stages of relevance to the Proposed Development are the Product, Construction and Use stages as per BS EN 15978. The End-of-Life stage was excluded as the asset's service life will likely extend well beyond the assessment period, and no end-of-life activities are expected to occur within the timeframe of this carbon assessment.

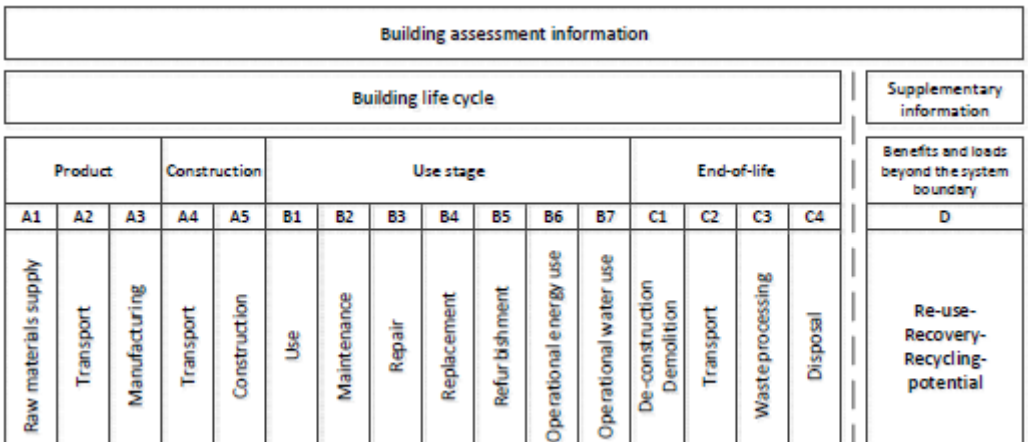


Figure 12-1 — Lifecycle stages (reproduced from Figure 7.1: Building life cycle of BS EN 15978)

The purpose-built LCA tool was developed by Uisce Éireann to assess GHG emissions associated with water infrastructure projects using Ireland-specific GHG emissions factors and data, where available (see Appendix 12-2). The primary purpose of the purpose-built LCA tool is to quantify the carbon impacts of the Proposed Development to support a clear understanding of its environmental footprint. It also acts to highlight opportunities for lower-carbon infrastructure solutions and integrating environmental considerations across planning, construction, and operational stages.

12.4.1.2 GHGA methodology

The purpose-built LCA Tool is underpinned by EN 15978 (see Figure 12-1 above) and applies a flexible whole-life carbon assessment methodology tailored (in the case of the Proposed Development) to the planning stage of the project. At this early point in development, the tool accommodates varying levels of data granularity by combining activity-based and material-based calculations with recognised emissions factors, supported by pre-defined carbon curves. This mixed-method approach ensures that carbon impacts are quantified as accurately as possible using the best available data, with proportionate, evidence-based assumptions applied only where primary data is not yet available. The tool's core purpose is to calculate the carbon impacts of the Proposed Development to support understanding of environmental effects.

The purpose-built LCA Tool splits down the Proposed Development into the following categories as shown in Table 12-3.

Table 12-3 — Purpose-built LCA Tool Methodology

LCA Category	Project Element	Methodology
Capital Emissions (A1-A3)	Assets (A1-A3)	Emissions for new and replaced or refurbished assets were based on the methodology set out in Section 12.4.1.2. Embodied carbon of major assets such as water mains and reservoirs were calculated separately as set out below.
	Water mains (A1-A3)	- Emissions for watermains were based on the methodology set out in Section 12.4.1.2 and considered embodied carbon within materials,

LCA Category	Project Element	Methodology	
			production process, region of origin, transport of material and associated excavation. A comparison of materials was carried out to determine the lowest carbon option for each length of pipework (see Section 12.6.1.1).
	Water reservoirs (A1-A3)	-	Emissions for the installation of four reservoirs as part of the Proposed Development followed the methodology set out in Section 12.4.1.2 including consideration of materials used and excavation and associated construction activities required at each site.
Transport Capital Emissions (A4)	Transport (A4)	-	GHG emissions from transporting of pipeline outside of Ireland have been calculated as part of the asset Capital Emissions set out above. See Traffic and Transport section below for more information.
Construction Capital Emissions (A5)	Construction works (A5)	For individual assets where no activity-based model is available (pipework and reservoirs) the construction emissions were estimated as 2% of the total emissions for each civil asset and 1% for M&E assets. Where temporary works and compound information is available it is captured in A1 - A3.	
Repair, maintenance and capital replacement (B2-B4)	Repair (B2), Maintain (B3) and Capital Replacement (B4)	The purpose-built LCA tool combines B2 (repair), and B3 (maintain) and uses a default value of 2% of total embodied carbon per civil or M&E asset to estimate GHG emissions from refurbishment. The repair and maintenance interval was specified in the LCA tool. The emissions for B4 (capital replacement) were calculated as 100% of capital emissions with different replacement intervals for M&E and civil assets.	
Chemicals and other emissions (B8)	Chemical emissions (B8)	-	There is no change to chemical products used at the water treatment plants associated with the Proposed Development. However, due to the increase in capacity of the site, an increased volume of chemicals will be required to treat water. GHG emissions were calculated based on the volume of chemicals multiplied by a relevant emissions factor. Transport of chemicals has been omitted from the calculation however it is estimated to be significantly less than the uncertainty factor associated with the project totals (see Section 12.4.3).
	Water Sludge (B8)	-	Due to the increase in the capacity of the site, as discussed above, volume of sludge treated and transported off site will also increase. GHG emissions created from the sludge treatment process are from dewatering of the sludge (energy consumption by a Plate Press) and transport of the sludge offsite.

LCA Category	Project Element	Methodology	
Energy usage (B8)	Renewable Solar (B6)	-	Solar panels are due to be installed at the Proposed Development. The panels are expected to contribute to the Proposed Development's annual energy demand.
	Energy usage (B8)	-	It is assumed that assets will not reach peak capacity on day one but increase until the design horizon is reached. The resulting energy usage in a specific year is then multiplied by the SEAI grid electricity emission factor for each year (profile provided by the SEAI).
End- of- Life (C1-C4)	End-of-Life (C1-C4)	-	As set out in Section 12.6.1 end-of-life is not included as most assets will be refurbished rather than replaced.

Land use change

The purpose-built LCA Tool does not consider GHG emissions arising from land use change. Land use change impacts the climate through the removal of carbon sinks such as trees. Trees sequester carbon dioxide from the atmosphere over time, having a positive impact on the climate. The existing landscape was assessed at each key area of infrastructure for the Proposed Development to determine the impact of land use change on climate.

Traffic and transport

GHG emissions associated specifically with the transport of pipeline outside of Ireland has been calculated within the LCA model. Other traffic and transport during both construction and operational stages such as HGV movements and movements of workers has been scoped out of this assessment based on the TII guidance Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2025a), which 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. The same criteria are applied for climate assessments in lieu of alternative guidance.

- 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; and
- A change in road alignment by 5m or greater.

AtkinsRéalis have prepared a Traffic and Transport Impact Assessment for the Proposed Development enclosed separately and have prepared Chapter 15: Roads, Traffic & Transportation of this EIAR. As per Chapter 15, it has been determined by AtkinsRéalis that neither the construction stage traffic nor operational stage traffic will increase by 1,000 AADT, or 200 HDV AADT, or that the development will result in speed changes or changes in road alignment. Therefore, the construction and operational phase traffic associated with the Proposed Development does not meet the TII screening criteria for inclusion in a detailed air quality assessment and therefore climate assessment. On this basis, a detailed quantitative assessment of construction and operational stage traffic emissions has been scoped out, as there is no potential for likely significant effects on climate.

12.4.1.3 Significance Criteria for GHGA

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

In accordance with ISEP guidance, the significance of effect of GHG emission resulting from a given project is based on its contribution to sectoral and national carbon budgets and whether it supports Ireland's CAP25 objective of achieving carbon neutrality by 2050, by reducing GHG emissions. This process requires an assessment of the quantified GHG emissions against the sensitivity of receptors (Ireland's national GHG targets or National Climate Objective), qualification of the potential measures that might mitigate against GHG emissions, and a degree of professional judgement that takes account of the balance of all of these factors. Both the ISEP and TII guidance documents are explicit in this concept, however the TII document also highlights the issue of significance in the context of how a project mitigates its GHG emissions.

In order to streamline the process and provide accountability, the criteria outlined in PE-ENV-01104 (see Table 12-4) (Transport Infrastructure Ireland, 2022) and reproduced in ISEP 2022 are used together with the following two factors:

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

Table 12-4 — TII Significance Criteria for Greenhouse Gas Assessment

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

12.4.2 Climate Change Risk Assessment Methodology

As per the TII PE-ENV-01104 guidance (2022), an initial 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 proposed site location. This is a qualitative screening which intends to only proceed with relevant hazards (e.g., sea level rise is not an applicable hazard to inland areas or wildfire is not considered a hazard in an urban location). Following this, all-relevant hazards are assessed on their exposure under future climate change.
- The sensitivity is based on a High, Medium or Low rating with a score of 1 to 3 assigned as per the criteria below.
- **High Sensitivity** - The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3.
- **Medium Sensitivity** - It is possible or likely the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2.
- **Low Sensitivity** - It is possible the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1.

Once the sensitivities have been identified the exposure analysis is undertaken. The exposure analysis involves determining the level of exposure of each climate hazard at the project location irrespective of the project type. For example, flooding could be a risk if the project location is next to a river in a floodplain. Exposure is assigned a level of High, Medium or Low as per the below criteria.

- **High Exposure:** It is almost certain or likely this climate hazard will occur at the project location, i.e. might arise once to several times per year. This is an exposure score of 3.
- **Medium Exposure:** It is possible this climate hazard will occur at the project location, i.e. might arise a number of times in a decade. This is an exposure score of 2.
- **Low Exposure:** It is unlikely or rare this climate hazard will occur at the project location, i.e. might arise a number of times in a generation or in a lifetime. This is an exposure score of 1.
- Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability.

12.4.2.1 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 12-5 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 to be not significant.

However, where residual medium or high vulnerabilities exist the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks. An assessment of construction phase CCRA impacts is only required according to the TII guidance (TII, 2022) if a detailed CCRA is required.

Table 12-5 — 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 CCRA, detailed in Section 12.6.2.2.1, 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.

While a CCRA for the construction phase was not required, best practice mitigation against climate hazards is still recommended in Section 12.7.

12.4.3 Data Limitations

GHG Assessment

As the EIAR is a pre-planning assessment, reasonable assumptions, advised by an experienced and competent project design team, are required to estimate the impact that the Proposed Development will have on climate. The assessment of the likely significant effects must consider uncertainty in design and assumptions made in assessments. Therefore, to address this, a reasonable conservative estimate has been adopted for the assessment where the detailed design of an element of the Proposed Development has not yet been finalised.

The purpose-built LCA Tool uses a number of default values to estimate GHG emissions from life cycle stages where primary data is not available, such as, A5 Construction emissions and B4 Capital replacement emissions. A full list of purpose-built LCA Tool assumptions are available within Appendix 12-1.

Emissions factors used within the purpose-built LCA Tool are from a wider variety of sources and have been included in Appendix 12-2 for completeness.

The purpose-built LCA Tool recommends an uncertainty factor of 15% which is aligned with Royal Institute of Chartered Surveyors (RICS) v.2. standard.

Climate Change Risk Assessment

Representative Concentration Pathways (RCPs) provide a broad range of possible futures with respect to climate change based on assumptions of human activity. With respect to climate vulnerability, RCP4.5 and RCP8.5 have been assessed, as they considered a moderate-risk future climate scenario and a high-risk future climate scenario where very high levels of greenhouse gas emissions continue to occur resulting in a worst-case future scenario with respect to climate hazards, such as flood risk and extreme temperature events.

The information that has informed the assessment is sufficient to identify the likely significant effects. The limitations described in this chapter are not considered to have a material impact on the assessment conclusions.

12.5 Receiving Environment

12.5.1 Climate Pollutants

GHG emissions have different efficiencies in retaining solar energy in the atmosphere and different lifetimes in the atmosphere. In order to compare different GHGs, emissions are calculated on the basis of their Global Warming Potential (GWP) over a 100-year period, giving a measure of their relative heating effect in the atmosphere, this is presented through the use of carbon dioxide equivalent (CO_2e). The IPCC AR6 Synthesis Report: Climate Change 2023 (IPCC 2023) sets out the global warming potential for a 100-year time period (GWP100) for CO_2 as the basic unit (GWP = 1) whereas CH_4 has a GWP100 equivalent to 29.8 units of CO_2 (for fossil sources) and N_2O has a GWP100 equivalent of 273.

12.5.2 Existing GHG Emissions Baseline

Data published in July 2026 (Environmental Protection Agency, 2026a), indicates that Ireland exceeded, without the use of flexibilities, its 2025 annual limit set under EU's Effort Sharing Regulation (ESR) (EU 2018/842) by 5.01 $MtCO_2e$. However, the reported emissions for 2025 represent the third consecutive year in which Ireland's emission were below 1990 levels by 5.5%. Emissions Trading Scheme emissions have decreased by 52.4% or 11.8 $MtCO_2e$ compared to 2005 and Effort Sharing Regulation emissions decreased by 11.8% or 5.6 $MtCO_2e$. Ireland is now a net 3,198 $ktCO_2e$ distant from its target under the Effort Sharing Regulation.

The EPA estimate that 2025 total national GHG emissions, excluding LULUCF, have decreased by 2.3% on 2024 levels to 52.65 $MtCO_2e$. The sector with the highest emissions in 2025 was agriculture at 38.7% of the total, followed by transport at 22.0%. For 2025, total national emissions (including LULUCF) were 55.16 $MtCO_2e$ (Table 12-6). Agriculture emissions decreased by 0.2% in 2025, primarily due to a 3.3% reduction in cattle herd numbers. However, a 12.7% increase in fertilizer nitrogen lessened the impact of the herd reduction on emissions. Greenhouse gas emissions from the transport sector decreased by 1.5% in 2025, the increase in the use of biofuels contributed to the majority of this emission reduction in addition to the increasing number of electric vehicles on Irish roads. Emissions from the energy industries sector decreased for the fourth consecutive year by 7.1% in 2025. This reduction can be attributed to an increase in imported electricity as well as increased renewable generation. Renewables accounted for 40.6% of electricity generation in 2025.

The current estimates of National greenhouse gas emissions (including LULUCF) in 2025 are 14.5% below 2018 levels, at considerable variance from the National Climate ambition of a 51% reduction by 2030. The data indicate that from 2021 to 2025 Ireland has used 99.6% or 293.9 $MtCO_2e$ of the 295 $MtCO_2e$ Carbon Budget for the five-year period 2021-2025. This leaves 1.1 Mt CO_2e of the budget available to be carried over into budget 2 for 2026-2030. In order to achieve Ireland's climate ambition of a 51% reduction by 2030, annual emission reductions of over 10% are required for the next 5 years.

In relation to compliance with the sectoral emissions ceilings (SECs), the provisional GHG emissions estimates (see Table 12-6) indicate that four sectors, Buildings (Residential), Buildings (Commercial and Public), Agriculture and Other, have stayed within their sectoral emissions ceilings. The other three sectors, Electricity, Transport and Industry have exceeded their sectoral emissions ceilings. The EPA state that the National Climate objective of a 51% reduction by 2030 will be unattainable unless every sector meets its indicative percentage reduction target.

Table 12-6 — Trends in National GHG Emissions 2021 – 2025

Sector Note 1	2021	2022	2023	2024	2025	Total	Sectoral Emissions Ceiling 2021-2025	% SEC 2021-2025 Used
	MtCO2e							
Electricity	9.82	9.62	7.50	6.89	6.30	40.12	40	100.3%
Transport	11.19	11.88	11.93	11.78	11.61	58.40	54	108.1%
Buildings (Residential)	6.71	5.62	5.23	5.49	5.21	28.26	29	97.4%
Buildings (Commercial and Public)	1.42	1.38	1.34	1.44	1.39	6.97	7	99.6%
Industry	7.25	6.82	6.47	6.20	6.00	32.74	30	109.1%
Agriculture	21.97	21.78	20.72	20.44	20.40	105.30	106	99.3%
Other Note 2	1.82	1.85	1.73	1.64	1.75	8.79	9	97.6%
LULUCF	2.87	2.47	2.97	2.51	2.51	13.33	-	N/A
National Total (incl. LULUCF)	63.05	61.42	57.89	56.38	55.16	293.90	295	99.6%

Note 1 Reproduced from latest emissions data from the EPA (EPA, 2026).

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).

12.5.3 Future GHG emissions 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 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 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 by Regulation (EU) 2023/857, and Ireland must now limit its ETS and non-ETS greenhouse gas emissions by at least 42% by 2030. The EU Regulation 2026/667 adds an additional interim target of achieving 90% reduction by 2040. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS

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

In May 2026, the EPA released the report Ireland's Greenhouse Gas Emissions Projections 2025-2030 (EPA, 2026b), which includes total projected emissions and a breakdown of projected emissions per sector under the 'With Existing Measures' and 'With Additional Measures' scenarios. The EPA projections indicate that currently implemented measures (With Existing Measures) will achieve a reduction of 12.7% on 2005 levels by 2030, significantly short of the 42% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, EPA projections show that Ireland can achieve a reduction of 23.4% by 2030, still short of the 42% reduction target.

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

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

12.5.4 Current CCRA Baseline

The region of the Proposed Development has a temperate, oceanic climate, resulting in mild winters and cool summers. This baseline data is derived from the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA5 data reanalysis and includes observed data from meteorological weather stations in Ireland and recorded data from 1950-2020. This method has been chosen to ensure data can be analysed at the daily level and harmoniously compared with future scenarios. The baseline time-period referred to in this assessment was from 1991-2020 and is specific to County Mayo. It is acknowledged that the Proposed Development crosses the border between County Mayo and County Sligo however the difference in climate data across a geographically small area does not have an impact on results.

Figure 12-2 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 (130 mm) with average monthly precipitation 122 mm across the winter period. The driest month on average was April (89 mm), with February through to July also experiencing lower than average rainfall (<108 mm). Ireland and Mayo'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 Mayo's climatology, where substantial rainfall occurring across the winter, often accompanied by single-day precipitation maximums exceeding 32mm.

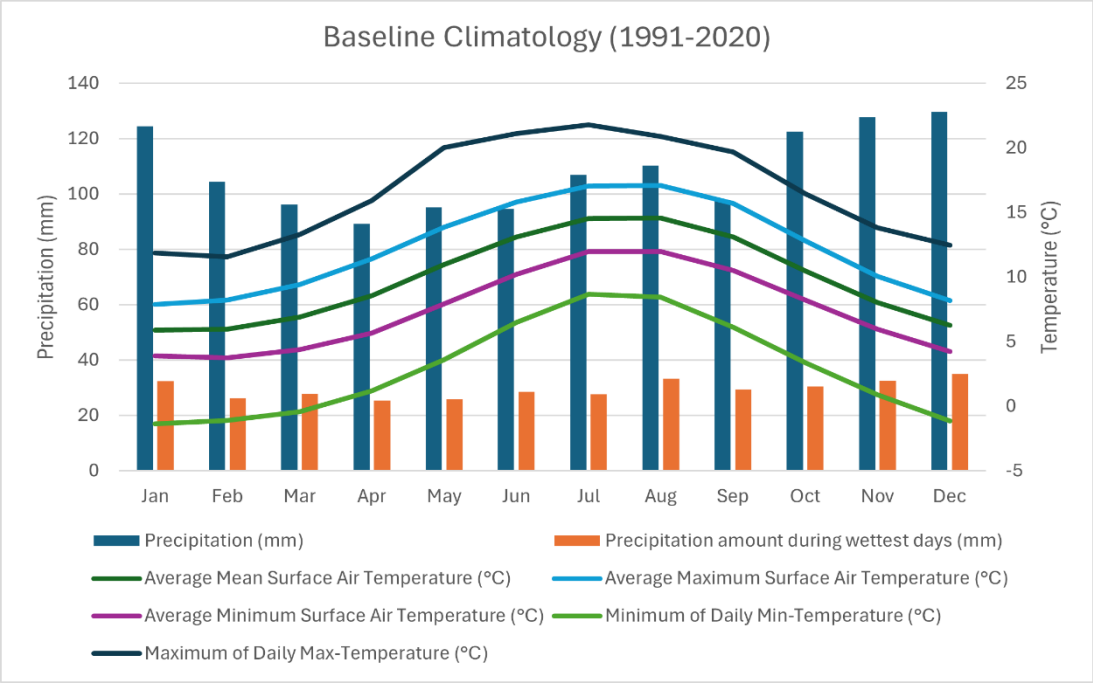


Figure 12-2 — Baseline Climatology for Mayo (1991-2020)

July and August are the warmest months with marginal differences in mean temperature (14.5°C), with average mean surface temperatures across the summer months (June – August) >14°C. Average maximum temperatures across May-September range from 13°C – 17°C. July is the warmest month for maximum daily temperatures (21.8°C).

January and February are the coldest months with average mean surface air temperatures of 5.9°C and average minimum temperature of 3.8°C. For daily minimum temperatures which reference the lowest range values (10th percentile range) of the data, January (-1.4°C) is the coldest with February and December each experiencing daily lows of (≤ -1°C). March also experiences daily minimums of ≤0°C.

Historical records show Mayo has experienced several severe storms, with wind gusts 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 Knock Airport Weather Station from 1996-2020 (data collection at this weather station began in 1996) approximately 20 km from the Proposed Development site and indicates a mean monthly 10 m wind speed of 10 knots (19 km/hr) and mean maximum gusts ≥46 knots (85 km/h) (Met Éireann, 2025).

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 16°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 for example 74 gorse fires in 2021 (Mayo County Council Climate Action Plan, 2024). Other notable historic climatic events in Mayo include (Mayo County Council Climate Action Plan, 2024):

- Recent experiences of river and pluvial flooding events in 2020, 2021, 2022;
- Severe windstorms are currently experienced on a frequent basis in Mayo and result in wide-ranging impacts, including damage to buildings and infrastructure (e.g. Dooagh National School), and disruptions to energy supply and transport networks across the county;

- Mayo experienced both a heatwave and drought in 2018 and 2021, with heatwaves recorded in 2022. These events included, amongst others, increased demand on water resources and recreational areas, detrimental impact on freshwater quality, and contributed to the development of uncontrolled fires (e.g. high temperatures in 2021 lead to 74 gorse fires).

12.5.5 Future CCRA Baseline

12.5.5.1 Climate Change Impacts and Projections for Ireland

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

- Increased likelihood of more frequent and intense North Atlantic low-pressure systems bringing high rainfall and storms;
- Greater risk of river and coastal flooding;
- Summer water shortages in the east;
- Impact to water quality.

12.5.5.2 Climate Modelling and Planning

International best practice and national policy such as the NCCRA (2024) and PE-ENV-01104 (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 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 (Met Éireann, 2023b). Three locations along the pipeline were selected (start, middle, end) and data was averaged to establish the values in Table 12-7.

12.5.5.3 Key Findings from Future Climate Change Projections

Projected changes include:

- Summer temperatures rising by over 1°C and overall mean temperatures increasing >1°C;
- Fewer cold winter nights and more frequent short heatwaves (≥5 days >25°C);
- Significantly fewer frost days annually; and
- Increased annual rainfall across fewer days, potential for heavy rains and deluge.

Table 12-7 — 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	RCP4.5	RCP8.5
		(1976-2005)	(2040-2070)	(2040-2070)
Temperature	Mean temp (°C)	9.4	10.4	10.8
	Mean Max temp (°C)	12.8	13.7	14.1
	Mean Min temp (°C)	6.0	7.1	7.6
	Average of Daily Max temp (°C)	24.8	26.8	27.4
Frost, Snowfall and Ice	Frost Days Annually (no. days)	32	18	14
Precipitation and Flooding	Annual precipitation (mm)	1,288	1,337	1,355
	Max 1-day (mm)	37	45	46
	No. Wet Days annually (>1mm)	208	203	202
Storms and high winds	Number of Storms Qualitative (Description)	On Average 8 named storms annually with speeds exceeding 100 km/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 Gust Speed (90th percentile) (knots)	59 (N.2)		
Drought	Absolute Drought (≥15 days with less than 1mm)	Rare	Marginal increase	Increased Likelihood
Wildfire	Qualitative (Descriptive)	Several wildfires have occurred across Ireland	Rising temperatures and prolonged dry spells are increasing key wildfire risk factors, elevating overall vulnerability.	
Lightning	Qualitative (Descriptive)	Occurring during summer periods	This hazard may modestly increase in the future due to more favourable conditions, such as rising temperatures and extended warm periods beyond the traditional summer season	
Note-1: Data from combined Met Éireann, UK Met Office and Dutch Meteorological services.				

Note-2: Data Knock Airport approximately 20 km from the site. Met Éireann 30-year averages (1996-2020) (Met Éireann, 2023)

Recent weather patterns and records of extreme weather events recorded by Met Éireann have been reviewed. Considering the 2025 data, Met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters and reduction in cold spells and subzero temperatures. This will result in longer dry periods and heavy rainfall events. Met Éireann has high confidence in maximum rainfall rates increasing but not in how the frequency or intensity of storms will change with climate change.

Impacts 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 site in Mayo/ Sligo will evolve over time and consideration is needed with respect to this within the design of the Proposed Development.

12.6 Potential Impact of the Proposed Development

12.6.1 Greenhouse Gas Assessment

The results of the purpose-built LCA Tool are shown in Table 12-8 below and shown graphically in Figure 12-3.

As discussed in Section 12.6.1, the Proposed Development will not be decommissioned and therefore a project lifespan has only been included within this section to enable annualisation of GHG emissions to compare against national and sectoral budgets. The target year design of new or upgraded elements is up to 50 years. The construction period is estimated to last 2 years, with 48 years operational life. Over the 50-year lifespan of the Proposed Development, the GHG emissions are estimated to be 24,212 tCO_2e. It should be emphasised that these are incremental GHG emissions, baseline emissions from the existing infrastructure are not accounted for within this assessment, only those relevant to this specific planning application.

Table 12-8 — Purpose-built LCA Tool GHG Assessment by categories

LCA Tool Category	tCO2e	% of Total	Sector
Capital Emissions (A1-A3)	12,007	50%	Industry
Transport Capital Emissions (A4)	673	3%	Transport
Construction Capital Emissions (A5)	1,002	4%	Industry
Total Construction Phase	13,682	57%	
Repair, maintenance (B2-B3)	590	2%	Industry
Capital replacement (B4)	1,627	7%	Industry
Energy usage (B6)	6,854	28%	Energy industries (including electricity generation)
Chemicals and other emissions (B8)	1,459	6%	Other (including waste and waste water)
Total Operational Phase	10,530	43%	
Total	24,212		

LCA Tool Category	tCO2e	% of Total	Sector
Total avoided emissions from use of solar panels	1,911		

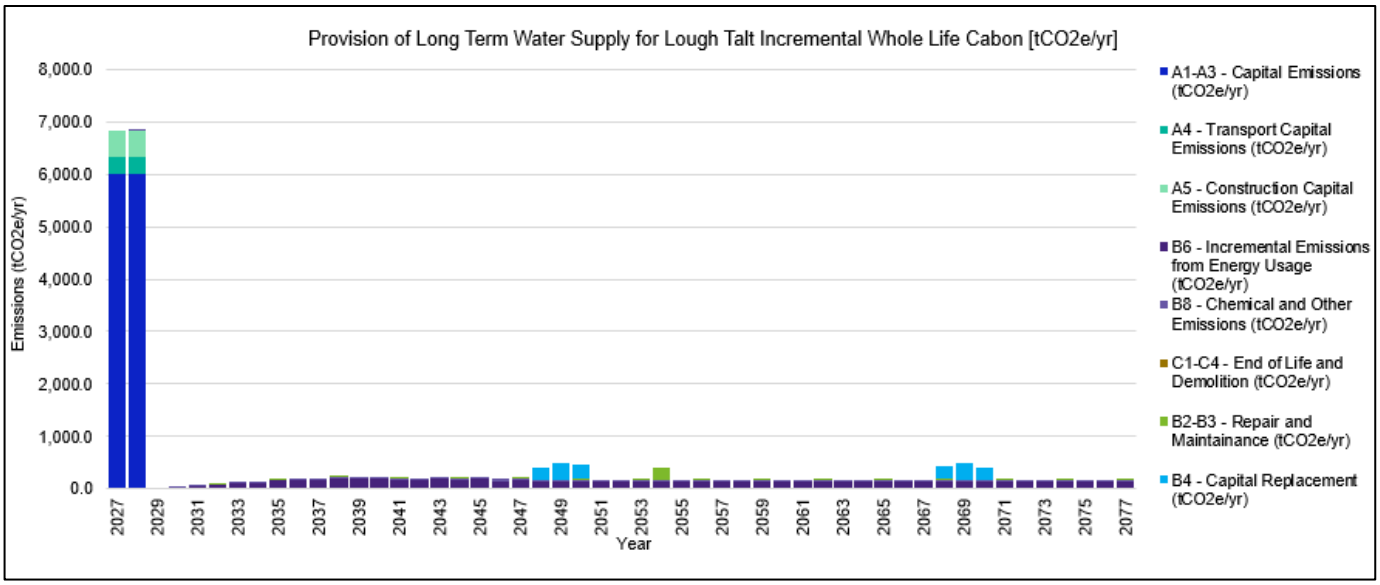


Figure 12-3 — Whole Life Carbon Assessment of the Proposed Development. Graph reproduced from Uisce Éireann's Whole Life Carbon Assessment Model V4.0.

12.6.1.1 Construction Phase

The greatest risk with respect to construction phase activities on climate will be due to embodied energy in the construction materials required for the Proposed Development. Construction works are currently planned to commence in 2027, subject to planning approval from An Coimisiún Pleanála. The construction works are expected to be substantially complete by 2029. Figure 12-3 shows the proportion of GHG emissions occurring during the two-year construction phase totalling 13,682 tCO_2e, (57% of total emissions), of which, 88% come from lifecycle stages A1-A3 embodied carbon within materials. The purpose-built LCA Tool sets out the assets with the highest embodied carbon as the watermains and the reservoirs at 7,625 tCO_2e and 2,027 tCO_2e respectively. In the case of the reservoirs, the emissions are largely attributed to the volumes of concrete required for the construction. The purpose-built LCA Tool has assumed an appropriate precautionary approach and has not accounted for potential industry-related improvements in the production process of cement or steel in the future which could improve the carbon intensity of these materials.

Transport of materials and construction activities make up a further 3% and 4% of construction GHG emissions respectively.

12.6.1.1.1 Land use change

For the Proposed Development, the land take will predominantly be from roads and agricultural land to facilitate the installation of the watermains or previously developed land which already contains infrastructure associated with the Proposed Development. 2010/335/: Commission Decision of 10 June 2010 on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC state that the carbon sequestration value for agriculture land (or crop land) is zero tonnes of carbon per hectare, for land principally occupied by agriculture. Similarly, the TII Tool (2026) provides an emissions factor of zero for urban fabric such as roads. As the carbon sequestration value for agricultural land and urban fabric is zero, the land take required is not considered to impact

carbon sequestration. Overall, there will be a negligible impact on carbon sequestration as a result of the construction phase of the Proposed Development.

The exception to this is at Windy Gap Break Pressure Tank where bog will be disturbed for the installation of 185 m^2 tank. Strict mitigation measures are in place to protect the bog and reinstate it after construction (see Section 12.7.1).

12.6.1.2 Operational Phase

Once operational, most of the sources of emissions that arise during construction will cease. However, operational power requirements will increase up to the design year (2044) in line with water demand. The purpose-built LCA Tool accounts for start-up times and design year targets within the calculations, therefore GHG emissions associated with the operation of the Proposed Development cover a 48-year lifespan from completion of construction. 10,530 tCO_2e are anticipated to be produced from the operation of the Proposed Development over its 48-year lifespan (see Figure 12-4). 21% of this can be considered embodied carbon as it is associated with repair, maintenance and capital replacement of assets. The further 79% is from incremental chemical use and incremental energy consumption.

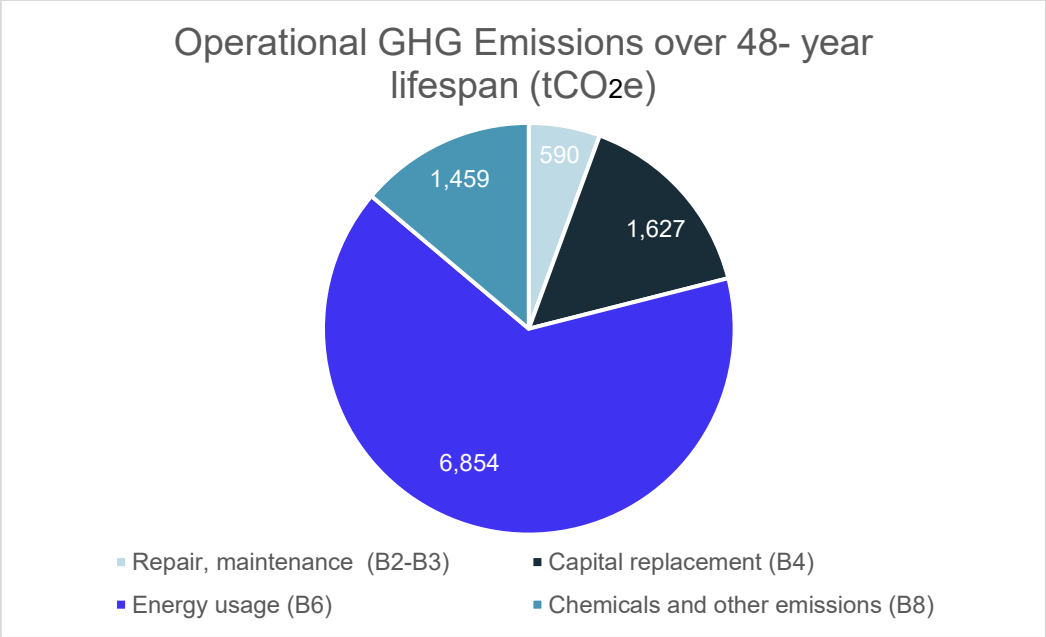


Figure 12-4 — Operational GHG Emissions over 48-year lifespan (tCO_2e)

12.6.1.3 Chemical demand

1,459 tCO_2e will be emitted from incremental chemical use associated with the treatment of water and residual waterworks sludge which is generated and processed for removal off site. However, due to the increase in capacity of the site, an increased volume of chemicals will be required to treat water. Chemical emissions are assessed cradle to gate for this assessment and therefore the transport of chemicals to the localities has not been included. However, the delivery emissions are likely to account for a very low percentage of total chemical emissions and therefore will be covered by the uncertainty factor which is discussed in Section 12.4.3.

12.6.1.3.1 Energy demand

65% of operational GHG emissions are from energy consumption of the Proposed Development (6,854 tCO_2e). Energy demand at the Proposed Development is expected to increase from 159,200 kWh/yr to 3,009,147 kWh/yr.

The increase in energy use is primarily due to the following

- The increase in pumping duration of the Wherrew Pumping Station from approximately 8 hours a day to 22 hours a day;
- The increase in pumping capacity at Lisglennon RWPS, which will operate 22 hours a day;
- The increase in treatment capacity and equipment required to achieve larger treated water volume and

The addition of a booster pumping station at Bonniconlon. The existing system is split between the Ballina and Lough Talt WSZs, the proposed system will combine these two WSZs into one, which requires additional flows, pumping, and treatment, as well as conveyance to the Lough Talt WSZ from the Lisglennon WTP through a pipeline, 5 km of which requires high lift (160 m) pumping to the Windy gap high point break-pressure tank.

This increase in energy demand will be partially offset by the installation of 1,419m^2 of solar panels which are expected to generate 207,911 kWh/yr avoiding 46.5 tCO_2e annually, which would otherwise have been emitted from the use of grid electricity.

12.6.1.3.2 Summary

The GHG emissions from the Proposed 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. In Table 12-9, GHG emissions have been compared against the carbon budget for the industry, energy, transport, and waste sectors in 2030 (DECC, 2024), against Ireland's total GHG emissions in 2025, and 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).

Table 12-9 demonstrates the estimated total GHG emissions, which have been annualised over the 50-year Proposed Development lifespan, are a small fraction of the sectoral budgets.

Table 12-9 — 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 2025 Total GHG Emissions (existing baseline)	55,163,780	Total GHG Emissions	484.24	0.001%
Non-ETS 2030 Target	27,721,670			0.002%
2030 Sectoral Budget (Industry Sector)	4,000,000	Total Industry Emissions	305	0.008%
2030 Sectoral Budget (Transport Sector)	6,000,000	Total Transport Emissions	13	0.0002%
2030 Sectoral Budget Energy industries (including electricity generation)	3,000,000	Total Electricity Emissions	137	0.005%
2030 Sectoral Budget Waste (including waste and waste water)	1,000,000	Total Waste Emissions	29.2	0.003%

12.6.1.4 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.

The level of mitigation described in Section 12.7 has been taken into account when determining the significance of the Proposed Development of GHG emissions. According to the TII significance criteria described in Section 12.4.1.3, 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) states as follows:

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

The Proposed Development aligns with the following GHG significance criteria as per Table 12-4:

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

In accordance with the EPA Guidelines (EPA, 2022), the above criteria equates to an impact of GHG emissions during the construction and operational phase of a ***direct*** effect 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 does not impede the trajectory to carbon neutrality, the effect on the climate is considered to be ***not significant***.

12.6.2 Climate Change Risk Assessment

12.6.2.1 Construction Stage

A detailed CCRA of the construction phase has been scoped out, as discussed in Section 12.4.2. Therefore, a detailed CCRA is not required (TII, 2022a). However, consideration has been given to the Proposed Development's vulnerability to the climate change hazards with best practice mitigation measures proposed in Section 12.7. High precipitation and pluvial flood risk due to increased precipitation, and intense periods of rainfall:

- Fluvial and coastal flooding at relevant sections of the Proposed Development;
- Increased temperatures, potentially causing drought and wildfires;
- Major storm damage, including wind damage, fallen objects landslides.

12.6.2.2 Operational Phase

12.6.2.2.1 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 12-10 presents the initial qualitative climate hazards screening relevant to the Proposed Development. A number of climate hazards have been screened out of the assessment due to the Proposed Development location.

Table 12-10 — Climate Hazard Screening

Climate-related Hazard	Hazard Screening Rationale	Screening
Extreme hot 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 equipment, materials, and infrastructure, and affect the lifecycle of assets.	Screen in
Extreme cold temperature	As the majority of the infrastructure is buried and the pipework is wide in diameter it is not sensitive to frost and cold temperatures. The future climate scenarios demonstrate reduced frost days which further lowers the risk to the Proposed Development.	Screen out
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 AtkinsRéalis Stage 1 Flood Risk Assessment comprehensively screened all key infrastructure sites. Overall, the Proposed Development is classified as 'water compatible' subject to incorporation of standard flood-resilient design and ongoing drainage management however as one site is at risk of flooding, as detailed in Section 12.6.2.3, fluvial flooding is scoped in.	Screen in
Drought	It is unlikely that droughts will impact the Proposed Development due to the size of the abstraction points and minimal abstraction rates however as drought is one of the driving factors for the upgrades to the water supply in this region and droughts have occurred across Ireland, previously impacting water supply, it should therefore be screened in.	Screen in
Wildfire	County Mayo Climate Action Plan (2024) notes 74 gorse fires in 2021 and should therefore be considered a risk to the Proposed Development.	Screen in
High winds and storms	The majority of sites are made up of existing infrastructure and are relatively non-exposed. Infrastructure at Windy Gap has been minimised and buried as much as possible. However some infrastructure may still be exposed to high winds. Historically, Ireland has experienced several notable storm events including Storm Éowyn (2025) and Storm Darragh (2024), which caused widespread damage across Ireland. These storms often bring heavy rainfall and flood warnings, increasing overall risk.	Screen in

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 mostly underground or made up of existing infrastructure and is therefore not prone to lightning and is unlikely to impact the operations of the Proposed Development.	Screen out
Landslides and Subsidence	The Geological Survey Ireland (GSI) landslide susceptibility mapping database (GSI, 2025) indicates that the Proposed Development site is classified as having moderate landslide susceptibility (see Figure 12-5) and has a history of landslides around Lough Talt.	Screen in
Sea level rise and coastal flooding	The Stage 1 Flood Risk Assessment comprehensively screened all key infrastructure sites. Overall the Proposed Development is classified as 'water compatible' subject to incorporation of standard flood-resilient design and ongoing drainage management however as one site and one section of pipeline are at risk of flooding as detailed in Section 12.6.2.3, flooding of all types is scoped in.	Screen in

12.6.2.3 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. The screened in hazards 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. Table 12-11 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.

Table 12-11 — Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Extreme Heat	1 (Low)	2 (Medium)	2 (Low Risk)
High precipitation and flooding (pluvial, fluvial, coastal)	1 (Low)	2 (Medium)	2 (Low Risk)
Drought	1 (Low)	1 (Low)	1 (Low Risk)
Wildfire	1 (Low)	1 (Low)	1 (Low Risk)
High winds and storms	1 (Low)	2 (Medium)	2 (Low Risk)
Landslides and subsidence	1 (Low)	2 (Medium)	2 (Low Risk)

The sensitivity and exposure of the area was determined with reference to data provided from 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.

Extreme Heat

Extreme hot temperatures have the potential to impact materials and some related infrastructure. However, high quality, durable building materials will be selected for the Proposed Development. The infrastructure has been designed to accommodate elevated temperature conditions in accordance with current best practice and applicable standards. Structural design considers thermal actions in line with I.S. EN 1991-1-5 (Eurocode 1: Thermal Actions), together with the relevant material Eurocodes and Irish National Annexes. For underground infrastructure, pipeline material standards (EN805 and ISO4427) will apply. Any sensitive equipment will be appropriately housed in accordance with manufacturer's recommendations.

Potential heat-related impacts such as surface softening are possible during heatwaves however projected extremes are not expected to reach critical thresholds for infrastructure failures seen in other European countries. Overall, extreme temperatures are not considered a significant risk.

Flooding

A Flood Risk Assessment (FRA) was undertaken by AtkinsRéalis for the Proposed Development (Appendix 10-2, Volume 3 of the EIAR). It provides an integrated assessment of flood risk for all principal sites and pipeline sections within the scheme, ensuring compliance with national and county planning policy and the delivery of robust, climate-resilient water infrastructure for the region. The FRA assesses coastal, pluvial, fluvial, artificial (from drainage systems), groundwater, estuarial flooding and flooding caused by a failure of infrastructure.

Of the seven principal sites (Lisglennon RWS&PS, Bonniconlon Reservoir, Bonniconlon BPS, Wherrew Raw Water Intake and Pumping Station, Windy Gap Break Pressure Tank (BPT), Lough Talt WTP, New Lisglennon to Lough Talt Treated Water Pipeline), the shore area of the intake sites is at risk of flooding, as detailed below. All other locations were screened out during Stage 1 of the FRA due to low risk of flooding.

- Wherrew Raw Water Intake and Pumping Station (RWI&PS);

Fluvial flood risk: CFRAM and NFIM mapping confirm that the intake works and the lowest, lakeshore portion of the site are located within Flood Zone A (high probability of flooding), with a further portion extending into Flood Zone B (moderate probability). However, the main RWPS building, compound, and all principal upgraded infrastructure are set back and elevated on higher ground, within Flood Zone C (low probability). The 1% AEP flood level of 11.58 mOD (including 500 mm freeboard) has been taken as the design flood level for the assessment. While the proposed intake platform level (10.65 mOD) may be submerged during an extreme flood event, the intake structure is designed to be water compatible, as a submersible asset and is capable of operating safely under flooded conditions. Consequently, the residual flood risk to the proposed intake works is considered acceptable

No Further FRA Required for Planning Purposes since the Wherrew RWI&PS is classified as water-compatible and its location is functionally dependent on proximity to the waterbody. Key mitigations are recommended below.

Key mitigation measures include:

- Intake structure designed to be fully submersible during flood events.
- Structural elements designed to withstand potential flood loading.
- Sensitive electrical and control equipment located either above design flood levels or outside the floodplain where practicable.
- Access, maintenance and operational procedures to be developed with consideration of flood conditions and residual risk.

Pipeline Corridors:

Pipeline Corridors A-E were also assessed for flooding through a Stage 1 assessment. Coastal flooding along a section of Pipeline C (Creggs Road) was found to be at risk under 1:200 and 1:1000 year tidal/ estuarial flood extents. A section of Pipeline C, (Creggs Road) may be affected by combined tidal/fluvial surges at the upper estuary of the River Moy. The same section is considered at risk from fluvial flooding as it sits within Flood Zone A. All other pipelines are at low or no risk of flooding. The proposed works within the Creggs Road section of the Pipeline Corridor comprises of buried pipelines and sealed underground chambers and the proposed development is “water compatible”. The proposed design and mitigation measures address all identified flood risks and stakeholder expectations.

Drought

As explained in Section 12.1, the purpose of the Proposed Development is to upgrade water supply for Mayo and Sligo in line with the NWRP. This includes increasing the capacity for Ballina and surrounds, and replace Lough Talt, to improve water security. Temperatures are due to increase in RCP4.5 and RCP8.5 scenarios, increasing evaporation rates. However, precipitation is also due to increase by 4% and 5% respectively making drought unlikely. Chapter 10 assessed that changes in level due to the proposed abstraction increase will be very small relative to the existing level regime. Drought sufficient enough to impact the Proposed Development is therefore considered low risk.

Wildfire

County Mayo Climate Action Plan (2024) notes 74 gorse fires in 2021. As heatwaves and drought conditions increase in future climate scenarios, wildfires are also likely to increase in frequency. County Sligo Climate Action Plan (2024) does not mention wildfire risk.

Given the underground nature of the pipeline the sensitivity of the pipeline is low with respect to wildfire as it is naturally protected.

High wind and storms

Whilst winds in general are predicted to reduce in intensity with future climate change, storms are likely to become more extreme. Storms in RCP8.5 are likely to be more extreme than in RCP4.5.

Generally, infrastructure is impacted by flying debris rather than direct impacts of extreme weather. As much of the infrastructure associated with the Proposed Development is below ground, the exposure of the Proposed Development is low risk. For remaining infrastructure, the Proposed Development will be designed in accordance with I.S. EN 1991-1-4 (Eurocode 1: Actions on Structures – Wind Actions) and the relevant Irish National Annex. Wind loads appropriate to the site location, terrain category, altitude, and building geometry will be applied in the structural design to ensure stability and robustness under extreme wind events. Wind and storms are therefore considered low risk to the Proposed Development.

Landslides and subsidence

According to GSI (2026) areas around the Proposed Development, towards Lough Talt, are at risk from landslides. There are several historic landslides aligned with the proposed route however there is no data available such as the date, intensity, cause or impact of the landslides. As most of the infrastructure is buried, a landslide is unlikely to cause significant damage to the Proposed Development. Further, most of the sites are on flat ground or established sites and therefore landslide risk can be considered as low.

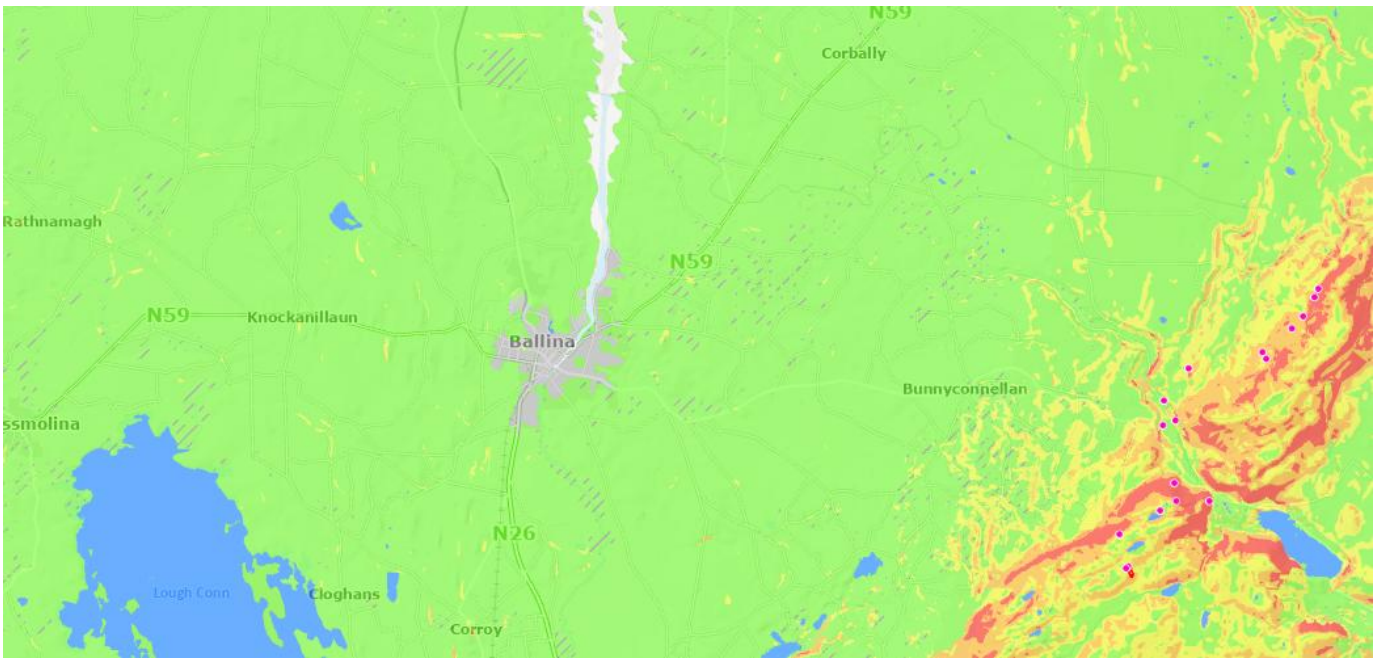


Figure 12-5 — Landslide Risk taken from GSI (2026)

Summary

Overall, the climate change hazard vulnerabilities identified for the Proposed Development are not considered significant. Therefore, no detailed risk assessment is required.

12.6.2.4 CCRA Significance of Effects

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

12.7 Mitigation Measures

12.7.1 Construction stage mitigation

The most significant GHG emissions from the construction stage were from materials used in the watermains and reservoirs. 12.6.1.1 To reduce GHG emissions from the construction of the reservoirs, the final design will follow the public body requirements under the Green Public Procurement Strategy, including recommendations in reducing embodied carbon in cement and concrete through public procurement in Ireland (Department of Enterprise, Trade and Employment 2024), and Action Plan 2024-2027 (DECC 2024). Adherence to the DOE 2025, Draft Whole of Government Circular Economy Strategy 2026 -2028 Acceleration document. Carbon reduction is an iterative process that will continue throughout the detailed design and construction stages. Uisce Éireann aims to further reduce embodied carbon during these future stages, achieving alignment with PAS 2080 (BSI 2023), which is a global standard for managing infrastructure carbon, through lean design and modern construction methods.

During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- Backloading of HGVs where possible to reduce transport emissions
- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods;
- Ensuring that fossil fuel powered plant and equipment meet the Euro Stage V emission standard;
- Ensuring, where practicable, that site vehicles and delivery vehicles meet the Euro VI/Euro 6 standards for emissions;
- Ensure all plant, machinery and vehicles 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;

The Design Team also intend to align with UE standards and sustainability ambitions which are set out in its Sustainability Framework, surpassing standard regulation through;

- Procurement of low carbon materials where possible, such as:
  - Concrete: GGBS, 30% lower clinker content cement
  - Steel: recycled steel, cross laminated timber
  - Bricks and aggregates: reclaimed or recycled
- Use of alternative methods of concrete reinforcement where possible, such as fibre reinforcement, polymer reinforced concrete or glass reinforce plastic rebar
- 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;
- Re-use of materials on site e.g. excavated material;
- Specifying electrically powered plant and equipment where practicable and using grid connections for electric power when practicable instead of fossil fuel powered generators;
- Use of sustainably sourced HVO during construction where available.

Land Use Change

Most of the ground being disturbed during construction is agricultural grassland which has zero GHG emissions associated with it. However, in some of the key infrastructure areas, the land has been marked up as a potential location of biodiversity interventions in line with UÉ's policy of biodiversity net gain. Proposed mitigation strategies at Wherrew RWPS include soft landscaping measures such as amenity grassland, wildflower and woodland mix planting as well as salvage and reinstatement of disturbed areas. At Lisglennon WTP native hedgerows trees, scrub and wildflowers will be planted across a 18,068 m^2 area. In addition, at Bonniconlon BPS Evergreen trees and shrubs native to the area will be instated as a hedgerow between the road and site boundary fence to screen off the site infrastructure. The hedgerow will be allowed to rewild and grow unrestricted to provide biodiversity enhancement to the agricultural grassland site in line with UÉ policy of biodiversity net gain. Increased planting of trees and grasses on suitable lands will, over time, help to increase the carbon sequestration potential of the land and benefit the climate.

Windy Gap BPT is located on blanket bog, the removal of which has the potential to release GHG emissions. However, as set out in Chapter 3 (Project Description) mitigation is in place to minimise disruption to the bog as follows:

- The peat layer will be carefully stripped, stored separately, and kept moist to preserve its structure and biological value.
- During the construction phase use of bog mats and low-pressure plant will be deployed to prevent rutting and compaction.

- After construction of structural elements, the original peat will be re-laid to its full depth and lightly compacted to match surrounding levels. Stored vegetation turves, if any, will be replaced on the surface, ensuring rapid habitat recovery. Any temporary drains or channels created during construction will be fully backfilled with peat to restore natural water flow.

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, method statements and good site management practise. The Contractor will also be required to mitigate against the effects of extreme wind/storms, temperature extremes through site risk assessments, method statements and good site management practise. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction.

12.7.2 Operational stage mitigation

The operational phase emissions are primarily caused by increased energy demand described in section 12.6.1.3.1. To mitigate this, solar panels are being installed at Bonniconlon and Lough Talt WTP and Lisglennon WTP.A combined total of 1,419 m^2 are due to be installed across the Proposed Development. The panels are expected to generate 207,911 kWh/yr based on the annual effective solar hours for county Mayo, which is 965 hours. The total operational carbon savings per year because of this is estimated to be approximately 46.5 tCO2e/yr. Further, GHG emissions associated with energy consumption will decrease through time in line with the government's decarbonisation agenda.

12.8 Cumulative and Interactive Effects

12.8.1 Cumulative Impact Assessment

In accordance with guidance from the ISEP (ISEP, 2022) the climate is not constrained by project, regional or national boundaries and therefore the GHG assessment has been presented in the context of the national and sectoral carbon budgets for the whole of Ireland and the ability of the Proposed Development to assist or impede the national relevant targets. Given the contribution of such targets to the global efforts to reduce the impact of society upon the climate the assessment is considered to be inherently cumulative.

In light of these statements, the residual cumulative effect of the Proposed Development in relation to GHG emissions is considered ***direct***, ***long-term***, ***negative*** and ***slight***, which is overall ***not significant*** in EIA terms.

12.8.2 Interactions

Climate has the potential to interact with a number of other environmental attributes.

12.8.3 Land, Soils, Geology and Hydrology

The impact of flood risk has been assessed and the Proposed Development will be designed to cater for increased rainfall in future years as a result of climate change. The effect of the interactions between climate and land, soils, geology and hydrology are therefore ***direct, short-term, negative*** and ***imperceptible*** during the construction phase and ***direct, long-term, negative*** and ***not significant*** during the operational phase, which is overall ***not significant*** in EIA terms.

12.8.4 Air Quality

Air quality and climate have interactions due to the emissions from the burning of fossil fuels during the construction and operational phases generating both air quality and climate impacts. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

12.8.5 Waste

Waste management measures will be put in place to minimise the amount of waste entering landfill, which has higher associated embodied carbon emissions than other waste management such as recycling. The effect of the interactions between waste and climate are considered to be ***direct, short-term, negative*** and ***not significant*** during the construction phase and ***direct, long-term, negative*** and ***not significant*** during the operational phase, which is overall ***not significant*** in EIA terms.

12.8.6 Population and human health

Climate change has the potential to influence environmental conditions that affect human health and wellbeing, including exposure to extreme weather events, heat stress, flooding, and disruption to critical infrastructure and services. Appropriate mitigation measures have been incorporated into the design to minimise GHG emissions, enhance climate resilience and reduce the potential for climate-related risks to affect local populations. As such, no significant adverse interactive effects are anticipated between climate and population and human health and therefore the interaction should be considered as ***direct, short- term, negative*** and ***imperceptible*** during the construction and operational phases, which is ***not significant*** in EIA terms.

12.8.7 Ecology

Climate change has the potential to alter habitat conditions, species distributions, phenology, and ecosystem functioning through changes in temperature, precipitation patterns, extreme weather events, and other climate-related pressures. However appropriate mitigation measures have been incorporated into the design to minimise GHG emissions, enhance climate resilience and reduce the potential for climate-related risks to ecology and biodiversity and therefore the interaction should be considered as ***direct, short- term, negative*** and ***imperceptible*** during the construction and operational phases, which is ***not significant*** in EIA terms.

12.9 Residual Effects

The impact to climate due to a Proposed Development must be assessed as a whole for all phases. The Proposed Development will result in some impacts to climate through the release of GHG emissions, an amount of which will occur regardless of mitigation due to the nature of the Proposed Development. The measure of impact is how the Proposed Development contributes to or impedes the ability of Ireland to reach carbon neutrality by 2050 as described in Section 12.4.1.3. 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*".

Best practise mitigation measures are put forward for the Proposed Development along with a commitment by the applicant, in common with other companies in Ireland, to reduce climate impacts where possible and practicable. As such, the Proposed Development is considered to have a ***direct*** effect 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 does not impede the trajectory to carbon neutrality, the effect on the climate is considered to be ***not significant*** in EIA terms.

In relation to climate change vulnerability, it has been assessed that there are no significant risks to the location and structure of the Proposed Development as a result of climate change. The residual effect of climate change on the Proposed Development is considered ***direct*** due to receptors presence, ***long-term*** due to the Proposed Development's lifespan, ***negative*** as the effects of climate change are exasperated by further GHG emissions, and ***imperceptible*** due to the low vulnerability of the location of the Proposed Development to the effects of climate change. Overall this is considered to be ***not significant*** in EIA terms.

12.10 Monitoring Requirements

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). Where monitoring shows that the Proposed Development is not meeting its targets, further mitigation will be put in place.

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.

12.11 Do Nothing Scenario

In the Do-Nothing scenario, the Proposed Development would not proceed and the GHG emissions described in Section 12.6 would not occur and there would be no change to the future climate scenarios. However, the Proposed Development will benefit approximately 36,400 people (Uisce Éireann, 2026) and aims to provide a safe and reliable water supply to Ballina, Lough Talt and surrounding areas, supporting the planned growth and development in the area.

Large sections of Ballina town are served by a critical aging trunk main, in the do-nothing scenario this leaves the town with an unreliable water supply. In the do-nothing scenario, the already unreliable water supply will be further vulnerable to the effects of climate change, putting future growth and development at risk. Without the implementation of the Proposed Development, the risks to a reliable and sustainable water supply are highlighted in the EPA's Critical Infrastructure Vulnerability to Climate Change report (EPA 2021a), with climate change threatening water availability.

12.12 Section 15 Compliance

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.".

This chapter demonstrates how the Proposed Scheme is consistent with the objectives of Section 15 of the 2015 Act (as amended). The EIAR has carried out a greenhouse gas emissions assessment and assessed the Proposed Scheme's resilience/adaptation to climate change.

- Greenhouse Gas Emissions Assessment – This assessment considers the Proposed Scheme's GHG emissions over its lifetime. The assessment analyses these emissions in the context of the relevant carbon budgets, targets and policies to ensure consistency with the most recent approved climate action plan and the most recent approved national long term climate action strategy, and with measures in furtherance of the national climate objective. This complies with subsections 15 (1) (a), (b), and (d) of the Act.
- Climate Change Vulnerability Assessment – This assessment identifies the impact of a changing climate on the Proposed Scheme and receiving environment in the context of the most recent approved national adaptation framework and approved sectoral adaptation plans. The assessment considers the Proposed Scheme's vulnerability and adaption to climate change and identifies adaptation measures to increase resilience. This covers sections 15(1)(c) and (e) of the Act.
- The above measures pursue the furtherance of the national climate objective and the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State as far as practicable as required by section 15(1)(d) and(e) of the Acts.

12.13 Conclusion

Detailed climate assessments have been undertaken to determine the effect that the Proposed Development will have on climate and how the Proposed Development could be impacted by future climate hazards.

During construction the Proposed Development will emit and estimated 13,682 tCO_2e, mostly associated with materials used within the reservoirs and watermains. Climate change vulnerability is not assessed during the construction phase however mitigation measures are set out in Section 12.7.

The operational phase emissions are primarily caused by increased energy demand due to a change in system from a gravity fed system to a pumped system. In addition, due to the volume of water increasing, the volume of chemicals used to treat water will also increase in volume. Solar panels are being installed which will offset some of the electricity demand. Further, GHG emissions associated with energy consumption will decrease through time in line with the governments decarbonisation agenda.

The results of the assessments were compared to national and sectoral budgets and were found to have an insignificant effect; therefore the project can be considered to be aligned with Ireland's GHG trajectory to net zero by 2050. In addition, due to the level of mitigation taking place, the significance of effect was found to be minor adverse according to ISEP guidelines (2022). In accordance with the EPA Guidelines (EPA, 2022), the above criteria equates to an impact of GHG emissions during the construction and operational phase of a ***direct*** effect 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 does not impede the trajectory to carbon neutrality, the effect on the climate is considered to be ***not significant***.

In relation to climate change vulnerability, baseline climatology and future climate scenarios (RCP4.5 and RCP 8.5) were assessed. Following an initial Climate Hazard Screening, a Climate Change Risk Assessment found that there are no significant risks to the location and structure of the Proposed Development as a result of climate change. The residual effect of climate change on the Proposed Development is considered ***direct*** due to receptors presence, ***long-term*** due to the Proposed Development's lifespan, ***negative*** as the effects of climate change are exasperated by further GHG emissions, and ***imperceptible*** due to the low vulnerability of the location of the Proposed Development to the effects of climate change. Overall this is considered to be ***not significant*** in EIA terms.

12.14 Difficulties encountered during preparation of this chapter

There were no difficulties encountered during the preparation of this chapter.

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