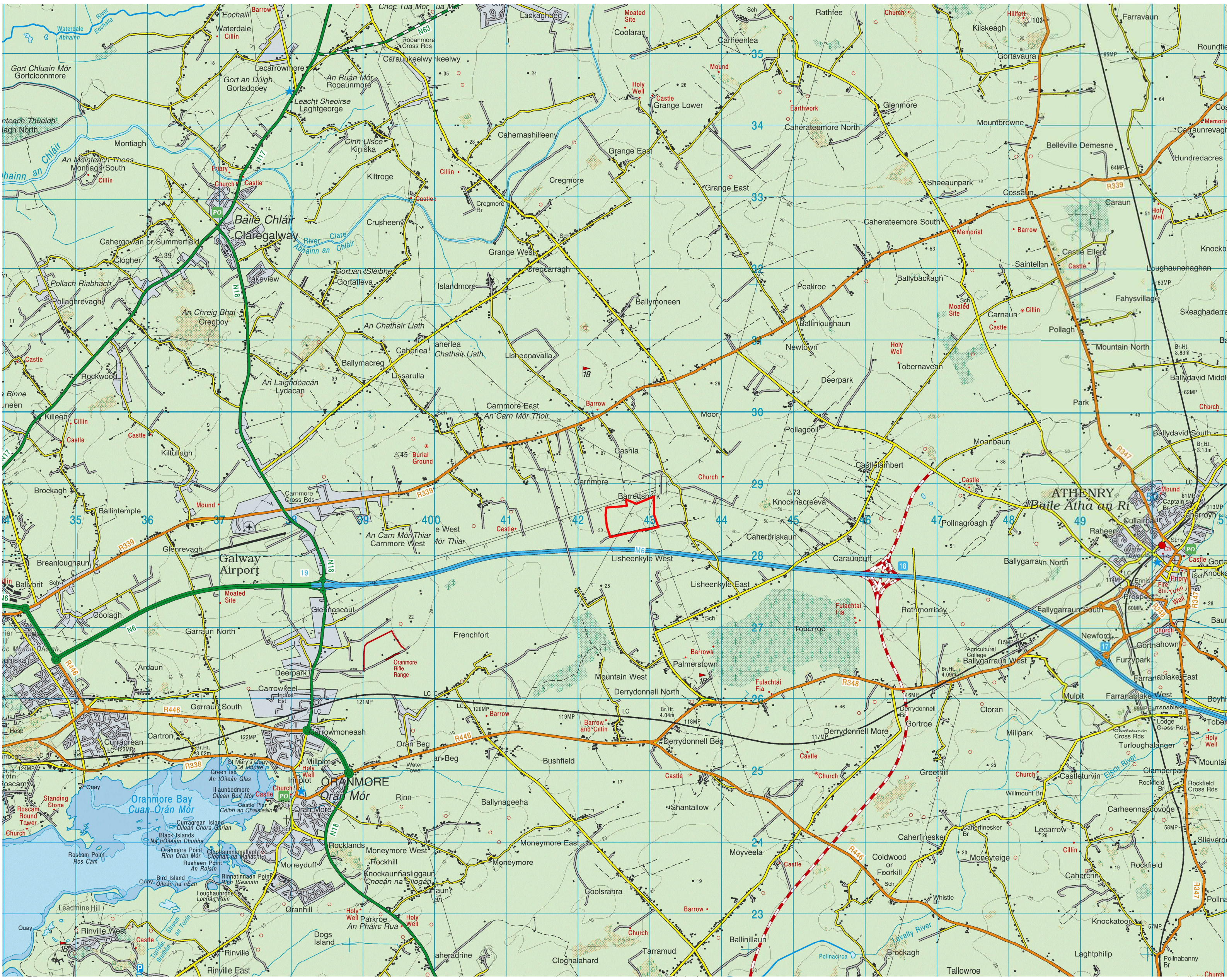
CHAPTER 9

CLIMATE



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QUARRY CONSULTING

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CHAPTER 9: CLIMATE

Introduction

9.1 This chapter provides an assessment of local climate and an assessment of potential changes in greenhouse gas emissions resulting from the proposed extension and continued use of an existing limestone quarry and associated concrete manufacturing facilities at Barrettspark, Athenry, Co. Galway

9.2 The proposed development site is described in chapter 3 – Project Description.

Scope of Work

9.3 The following sections of this Chapter describe the potential climate change impacts associated with the proposed development. The following issues are addressed separately

- climate change legislative framework/policy context;
- analysis of evolving local environmental baseline trends;
- identifying climate change concerns in relation to proposed development;
- assessing effects (cumulative effects and uncertainty);
- identifying alternatives and mitigation measures;
- identifying monitoring and adaptive management.

Contributors

9.4 Quarry Consulting undertook the impact assessment presented in this chapter on behalf of Coshla Quarries. This chapter was prepared by Rory Brickenden (B.A. MEngSc). The lead consultant for the study was Peter Kinghan (Chartered Mineral Surveyor), Post Graduate Diploma in Environmental Engineering.

Peter Kinghan

9.5 The Climate chapter of the Environmental Impact Assessment Report (EIAR) for the proposed quarry development has been authored by Peter Kinghan, a Chartered Mineral Surveyor and Chartered Geomatics Surveyor with over 20 years of professional experience in environmental impact assessments across diverse sectors, including extractive industries, waste management, and energy. He holds a Diploma in Geo Surveying, a Degree in Mineral Surveying and Resource Management, and a Diploma in Environmental Engineering from Trinity College Dublin (2006), complemented by a Master's degree in Business Management. Additionally, Peter is certified in Geographic Information Systems (DIT 2008) and a certificate in Environmental Sustainability from University College Dublin (2024).

Rory Brickenden BA, MEngSc.

9.6 The Climate chapter of the Environmental Impact Assessment Report (EIAR) for the proposed quarry development has been completed by Rory, a geoscientist with Quarry Consulting. Rory holds a BA in Geoscience from Trinity College Dublin (2023) and a Master's degree in Water, Waste, and Environmental Engineering from University College Dublin (2024). His professional experience encompasses a variety of environmental assessments, particularly in the quarry and energy sectors. Rory's experience in environmental surveying air quality monitoring tasks such as noise, dust, and water monitoring.

Climate Change and Greenhouse Gases

9.7 Although variation in climate is thought to be a natural process, the rate at which the climate is changing has been accelerated rapidly by human activities. Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are thought to increase the frequency of extreme weather conditions such as storms, floods and droughts.

Ireland's Greenhouse Gas Emissions

Ireland Climate Change Performance - Climate Change Performance Index (CCPI) 2024

9.8 Established in 2005, the Climate Change Performance Index (CCPI) is an independent monitoring tool which tracks countries climate protection performance. It assesses individual countries based on: climate policies, energy usage per capita, renewable energy implementation and Greenhouse Gas Emissions (GHG) and ranks their performance in each category and overall.

9.9 Ireland, ranked 47th in 2022, climbed 10 places to 37th in 2023, and is currently ranked 43rd for 2024. Ireland remains as a "low" performer in international performance.

Ireland's Greenhouse Gas Emissions Projections 2023 - EPA

9.10 The EPA published a document called Ireland Greenhouse Gas Emissions Projections in June 2023.

9.11 The EPA has produced two scenarios in preparing these greenhouse gas emissions projections: a "With Existing Measures" (WEM) scenario and a "With Additional Measures" (WAM) scenario. These scenarios forecast Irelands greenhouse gas emissions in different ways. The WEM scenario assumes that no additional policies and measures, beyond those already in place by the end of 2021 (latest national greenhouse gas emission inventory), are implemented. The WAM scenario assumes that in addition to the existing measures, there is also full implementation of planned government policies and measures to reduce emissions such as those in the 2023 Climate Action Plan.

9.12 Greenhouse gas emissions projections show total emissions decreasing from the latest Inventory (2021) levels by 15% by 2030 under the With Existing Measures (WEM) scenario and by 32% under the more ambitious With Additional Measures (WAM) scenario.

Irelands Climate Change Assessment 2023 - EPA

9.13 Greenhouse Ireland's carbon budgets are set to guide the country toward achieving a 51% reduction in greenhouse gas emissions by 2030, with a goal of reaching net-zero emissions by 2050. These budgets are broken down into three five-year periods:

- 2021-2025: 295 Mt CO2 equivalent (average annual reduction of 4.8%)
- 2026-2030: 200 Mt CO2 equivalent (average annual reduction of 8.3%)
- 2031-2035: 151 Mt CO2 equivalent (provisional, with an average reduction of 3.5%)

9.14 Sectoral emission ceilings have been established to distribute the carbon budget across different sectors of the economy. For the industry sector, which includes the quarrying sector, a reduction target of 35% by 2030 has been set. This translates to reducing emissions from 7 Mt CO2eq in 2018 to 4 Mt CO2eq by 2030.

9.15 The quarrying sector, as part of the wider industry sector, must adhere to these reduction targets to help Ireland meet its overall climate goals. This will require significant changes in

operations, including adopting more energy-efficient technologies, reducing reliance on fossil fuels, and potentially incorporating renewable energy sources into quarrying processes.

National Legislation and Policy

Climate Action and Low Carbon Development (Amendment) Act 2021

9.16 The Climate Action and Low Carbon Development (Amendment) Act 2021 establishes legally binding targets for greenhouse gas emission reductions in an effort to address climate change. This legislation mandates a 51% reduction in greenhouse gas emissions by 2030 compared to 2018 levels, and achieving net-zero emissions by 2050. These ambitious targets are designed to align with international climate agreements, such as the Paris Agreement, and demonstrate a strong commitment to transitioning to a sustainable, low-carbon economy. The Act also emphasizes the importance of developing sector-specific carbon budgets, ensuring that every sector contributes to the overall reduction targets.

9.17 To support these goals, the Act mandates the creation of detailed Climate Action Plans, which outline the policies and measures necessary to achieve the emissions targets. These plans are updated every five years, incorporating the latest scientific evidence and technological advancements. The legislation also establishes an independent Climate Change Advisory Council to provide expert advice and monitor progress, ensuring accountability and transparency. This comprehensive framework aims to foster a holistic approach to climate action, integrating environmental, social, and economic considerations to drive sustainable development and mitigate the impacts of climate change.

Climate Action Plan 2024

9.18 The Climate Action Plan 2024 (CAP 2024), published in December 2023 by the Department of the Environment, Climate and Communications, sets out Ireland's strategy to achieve a 51% reduction in greenhouse gas (GHG) emissions by 2030 and net zero emissions by 2050. CAP 2024 is underpinned by legally binding carbon budgets and sectoral emissions ceilings, as outlined in the Climate Action and Low Carbon Development (Amendment) Act 2021. The plan focuses on accelerating emissions reductions across all sectors of the economy while integrating measures to build climate resilience.

9.19 The plan includes measures targeting key sectors such as energy, transport, agriculture, and industry, which encompass activities related to quarrying and construction. CAP 2024 highlights the need for sustainable practices, the use of renewable energy, and reductions in emissions from operations. These objectives provide a framework to support essential development while ensuring quarry operations align with Ireland's national and EU climate goals.

Programme for Government: Our Shared Future

9.20 The Department of the Taoiseach published the Programme for Government on the 29th of October 2021. The programme states the importance addressing the changing climates:

'The next ten years are critical if we are to address the climate and biodiversity crisis which threatens our safe future on this planet.

9.21 The programme states in relation to natural resources:

'We will harness the natural resources to meet our needs in this country, without compromising the ability of future generations to meet theirs'.

And

'We will work in partnership with industry, retailers, and consumers to promote a more sustainable and responsible system and culture for consumption, use and re-use of materials and end of use recycling and disposals. We will also work with the EU implementing the agreed Circular Economy approach'.

National Adaptation Framework - 'Planning for a Climate Resilient Ireland 2024'

9.22 The Ireland's National Adaptation Framework (NAF) serves as a comprehensive strategy to enhance the country's resilience to climate change impacts. Developed under the Climate Action and Low Carbon Development Act of 2021, the NAF outlines a structured approach for various sectors and local authorities to integrate adaptation measures into their planning and operations. The framework emphasizes a coordinated and inclusive process, involving public consultation, government approval, and continuous oversight and evaluation by relevant stakeholders, including the Climate Change Advisory Council (CCAC) and the National Adaptation Steering Committee (NASC).

9.23 Key actions under the NAF include the development and implementation of sectoral adaptation plans (SAPs) and Local Authority Climate Action Plans (LACAPs). These plans are required to align with the latest climate and adaptation science, ensuring that measures are specific, measurable, achievable, relevant, and time-bound. The NAF also mandates regular reviews and updates every five years to reflect new scientific knowledge and evolving policy landscapes. This iterative process ensures that Ireland's adaptation strategies remain effective and responsive to the growing challenges posed by climate change, thus safeguarding communities, ecosystems, and critical infrastructure.

Sectoral Adaptation Planning

9.24 Under the National Adaptation Framework (NAF) of 2018, seven government departments prepared Sectoral Adaptation Plans (SAPs) covering 12 priority sectors. These plans, approved in 2019, outline key risks and strategies to build climate resilience across sectors such as agriculture, forestry, seafood, biodiversity, transport, and health. The SAPs were developed using a six-step adaptation planning process detailed in the Sectoral Planning Guidelines for Climate Change Adaptation. Currently, revised and new SAPs are being developed under Ireland's second statutory NAF, approved on 5 June 2024, with a deadline for completion by Q3 2025. Each plan aims to mainstream adaptation into sectoral policies, address vulnerabilities, ensure climate-proofing of emergency planning, and improve coordination with local government.

Quarrying Sector

9.25 In the context of Ireland's climate adaptation strategies, the quarrying sector falls under the critical infrastructure theme. This theme includes sectors such as transport infrastructure, electricity and gas networks, and communication networks, which are crucial for the functioning of the economy and society. The quarrying industry must align with the broader goals of the Sectoral Adaptation Plans by integrating climate resilience measures into their operations. This involves assessing climate risks, adopting sustainable practices, and contributing to national emission reduction targets.

Existing Environment

Regional Context

Current Climate and Weather

9.26 Ireland has a temperate maritime climate characterized by mild temperatures, high levels of precipitation, and relatively consistent weather patterns influenced by the North Atlantic Drift, an extension of the Gulf Stream. The climate is typified by its variability, with frequent changes in weather due to the influence of various atmospheric systems and the surrounding oceanic conditions. Winters are generally mild, and summers are cool, with average temperatures ranging from around 4°C in winter to 15°C in summer.

Climate Change and Future Weather Changes

9.27 Ireland's temperate maritime climate is expected to undergo significant changes in the coming decades due to climate change and increased greenhouse gas concentrations. Rising temperatures, altered precipitation patterns, sea level rise, and increased storm intensity are some of the key challenges that Ireland will likely face. As a result, it is crucial for the country to continue its efforts to both mitigate and adapt to these changes in order to minimise the negative impacts on its environment, economy, and society.

9.28 Table 9.1 summarises climate impact projections for Ireland, estimates of projections confidence are derived from published projection data from the National Adaptation Framework 2018.

Table 9.1: Summary of observed and projected climate changes and impacts for Ireland

Parameter	Observed	Projected	Example of Biophysical Impacts
Temperature	Average temperatures have increased by 0.8°C since 1900, an average of 0.07°C per decade. The number of warm days (over 20°C) has increased while the number of cold days (below 0°C) has decreased.	Projections indicate an increase in average temperatures across all seasons (0.9-1.7°C). The number of warm days is expected to increase and heat waves are expected to occur more frequent.	Incidences of cold stress are likely to decrease while incidences of heat stress will increase. The duration of the growing season will increase, occurring earlier and extending further.
Precipitation	Increase in average annual national rainfall of approximately 60mm or 5% in the period 1981-2010, compared to the 30-year period 1961-1990.	Significant reductions are expected in average levels of annual, spring and summer rainfall. Projections indicate a substantial increase in the frequency of heavy precipitation	The increased occurrence of dry spells will result in increased pressure on water supply. An increase in the frequency of extreme precipitation events will result in increased

	The largest increases are observed over the west of the country.	events in Winter and Autumn (approx. 20%)	fluvial and pluvial flood risk.
Wind Speeds and Storms	No long-term change in average wind speed or direction can be determined with confidence. The number and intensity of storms in the North Atlantic has increased by approx. three storms per decade since 1950.	Projections indicate an overall decrease in wind speed and an increase in extreme wind speeds, particularly during winter. The number of very intense storms is projected to increase over the North Atlantic region. Projections suggest that the winter track of these storms may extend further south and over Ireland more often.	Increases in extreme wind speeds may impact on wind turbines and the continuity of power supply. Infrastructure will be at risk due to the increased occurrence of intense storms (e.g. winter 2013/2014.
Sea Level and Sea Surface Temperature	Historically, sea level has not been measured with the necessary accuracy to determine sea level changes around Ireland. However, measurements from Newlyn, in southwest England, show a sea level rise of 1.7cm per decade since 1916. These measurements are considered to be representative of the situation to the South of Ireland. Sea surface temperatures have increased by 0.85°C since 1950, with 2007 the warmest year in Irish coastal records.	Sea levels will continue to rise for all coastal areas, by up to 0.8 m by 2100. The south of Ireland will likely feel the impacts of these rises first. Sea surface temperatures are projected to continue warming for the coming decade. For the Irish Sea, projections indicate a warming of 1.9°C by the end of the century.	Significant increase in areas at risk of coastal inundation and erosion. Increased risk to coastal aquifers and water supply. Change in distribution fish species. Implications for fisheries and aquaculture industries.

Local Context

9.29 The Athenry weather station is located approx. 7 km east of the proposed development and is considered representative of conditions experienced at the application site.

9.30 The moderating influence of the Atlantic Ocean is felt throughout Ireland. The annual mean temperature for different areas in Ireland varies between mountainous regions, lowlands and the coast. Mean daily maximum temperatures are typically between 13.14 to 14.34° C and mean daily minimum temperatures are typically between 5.25 to 6.79° C for the area surrounding Athenry weather station, refer to table 9.2. There has been a steady increase in mean daily minimum temperature from 2010 to 2023 and the mean daily maximum temperature and mean daily rainfall.

9.31 During the period 2010-2023, the mean daily rainfall maximum and minimum were 2.66mm and 4.36mm at the Athenry weather station (refer to table 9.2)

Table 9.2: Athenry weather station temperature and precipitation averages from 2010 to 2023

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Temperature														
Mean Daily Maximum Temperature	13.62	13.48	13.14	13.41	13.92	13.29	13.48	13.58	13.67	13.63	13.69	13.98	14.34	14.55
Mean Daily Minimum Temperature	5.25	6.10	5.93	5.94	6.22	5.48	6.05	6.29	5.91	6.06	6.13	6.51	6.79	7.12
Rainfall														
Mean Daily Rainfall (mm)	2.66	3.75	3.45	3.12	3.47	4.32	2.94	3.29	2.96	3.91	4.05	3.08	3.46	4.36

Impact Assessment

Methodology

9.32 There are no industry-specific tools developed to assess the impacts of climate change within the extractive sector in Ireland.

9.33 However, the Institute of Environmental Management and Assessment (IEMA: UK) published a document in 2020 called Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation. The climate change risk assessment outlined by IEMA in Appendix 1 of their report will be used to assess the how the proposed development is vulnerable to climate change.

9.34 A detailed methodology of the climate change risk assessment is provided in Appendix 9.A of this report.

9.35 Additionally, Transport Infrastructure Ireland developed a carbon assessment tool in December 2022, which has been used to calculate the carbon emissions associated with the proposed development.

Climate Change Risk Assessment

9.36 The aim of the climate change risk assessment is to determine the relevant weather events that have the potential to impact the proposed development. The results of the climate change risk assessment will be used to implement measures to improve the resilience of the proposed development to climate change. If necessary, climate change will be integrated into the design process of the project.

9.37 Table 9.3 shows the results of the climate change risk assessment.

Table 9.3: Climate change risk assessment summary

Weather Event	Risk Category (IEMA 2020)	Determination of Significance of Effect (EPA 2022)
Temperature Extremes	Low risk	Not Significant
Flooding	Low risk	Not Significant
High Wind Speeds	Low risk	Not Significant
Fire	Low risk	Not Significant
Landslide	Low risk	Not Significant
Lightning	Low risk	Not Significant

9.38 The climate risk categories outlined by the IEMA (2020) guide are used to identify and categorise the level of risk posed by various weather events, such as temperature extremes, flooding, and high winds. These identified risks are then cross-referenced with the EPA (2022) criteria for determining the significance of their effects on the development. This dual approach ensures

that both the likelihood of a climate-related event occurring and the potential impact on the development are fully considered. As shown in the table, all weather events are assessed as low risk under the IEMA criteria, and their effects are determined to be not significant by the EPA. This analysis confirms that no substantial modifications to the project design are necessary to mitigate climate-related risks.

Carbon Footprint Assessment

Direct Effects

9.39 The proposed continued operation and extension of an existing limestone quarry and concrete manufacturing facility at Barrettspark, Athenry, Co. Galway presents varied carbon emission values across different developmental phases, as evaluated using the Transport Infrastructure Ireland Carbon Tool. A detailed carbon footprint assessment report can be found in appendix 9.B.

9.40 Table 9.4 shows a summary of the carbon emissions generated by the proposed development.

Table 9.4: Carbon footprint assessment summary table

Project Phase	Activity/Description	tCO_2e Emissions (Annual)
Operational	Annual energy use for plant machinery (520l /day consumed for 275 working days / annum)	477.8
	Carbon emissions from excavating aggregate (approx. 400,000 tonnes p.a.)	3307.6
	Carbon emissions from processing aggregate (approx. 400,000 tonnes p.a.)	393.9
	Transport emissions from moving aggregate off-site (HGVs travel 670,000 km p.a.)	726.6
	Carbon emissions from concrete production (includes emissions from the concrete plant and truck movements from exporting concrete)	235.8
	Total Annual Emissions for Operational Phase	5141.7
	Existing Vegetated Screening Berms	-208.7
Decommissioning	**No emissions**	0
Total	**Projected Emissions for Entire Project (operational 20 years)**	102625

9.41 The total annual carbon emissions generated from the proposed development is 5141.7 tCO2e. The EPA 'Irelands Climate Change Assessment' shows total carbon emissions generated for the country to be 55.01 MtCO2eq (55,010,000 tCO2e) in 2023. The proposed development will generate 0.0093% of Irelands annual greenhouse gas.

9.42 Industry accounted for 6.29 MtCO2eq (6,290,000tCO_2e) of annual carbon emissions in 2023. The proposed development will generate 0.08% of emissions of the industry sector's carbon emissions.

9.43 The EPA has produced provisional estimates of greenhouse gas emissions for the time period 1990-2023 outlined in Ireland's Provisional Greenhouse Gas Emissions 1990-2023. From 2022 to 2023, total process emissions from the mineral products subsector (including cement) decreased by 6.5% in line with a reduction in production.

Indirect Effects[1]

9.44 Potential indirect effects of the proposed development in relation to climate are outlined below:

- **Downstream emissions from the use of concrete and aggregates:** The concrete, aggregates, and concrete blocks produced at the site will contribute to indirect carbon emissions when used in construction projects. These emissions occur throughout the lifecycle of these materials, including their production, transportation to project sites, use, and eventual disposal or recycling.
- **Secondary economic activities:** The expanded quarry and manufacturing operations will continue to support local economic growth, which may indirectly increase emissions. This includes emissions from the extraction, production, and transportation of raw materials, such as cement for concrete. Additionally, increased transport activity and energy use by supporting industries and services in the region could further contribute to emissions.

9.45 Based on the scale and extent of the proposed activities, greenhouse gas (GHG) emissions are assessed as not making a significant contribution to Ireland's overall carbon emissions. While the project does not significantly contribute to global GHG emissions, it is important that all developments implement measures to reduce their emissions where possible.

Significance of Effects

9.46 Based on the assessment above there will be no significant effects.

Table 9.5: Determine of Significance of Effect (EPA guidance, 2022)

Activity	Receptor	Description of Effect (Character / Magnitude / Duration / Probability / Consequences) (Negligible - High)	Existing Environment (significance / Sensitivity) (Negligible - High)	Significance of Effect (Imperceptible - Profound)

Conclusion on Indirect Effects

While downstream emissions from the use of concrete and aggregates could be theoretically quantified, it would be very difficult to do so accurately due to the complexities of tracking where and how these materials are used once they leave the site. Additionally, such emissions are considered too remote and varied to be reliably attributed to the specific activities of the project. As a result, they are not considered significant enough to be included in the detailed assessment of this project's EIA.

Plant and vehicle emissions during construction and operational phases	Climate	Negligible to low / Short-term / Likely / Minor	(Climate is globally sensitive, but the local impact is small)	Not significant
Removal of vegetation	Climate	Negligible to low / Short-term / Certain / Minor	Medium (Vegetation plays a role in carbon sequestration, but the effect is small)	Not significant

Mitigation

Climate Change/Weather Events

9.47 The mitigation measures proposed are designed to increase the resilience of the proposed development to climate change and increased extreme weather events. The mitigation measures increase the projects capacity to absorb climate change related weather events.

9.48 Based on the climate change risk assessment mitigation measures to improve the resilience of the proposed development are provided in table 9.6.

Table 9.6: Mitigation Measures related to weather events

Weather Event	Risks and Likely Effects	Mitigation Measures	Residual Effect
Flooding	Flooding events could result in asset damage, with the potential for subsequent loss of containment of substances stored and handled on Site. The frequency of these natural events could increase as a result of climate change.	The only mitigation measure proposed in relation to flooding is to stop pumping from the quarry void to the licensed groundwater infiltration area during flood events, allowing the lower floor area to flood.	Not significant
High Wind Speeds	Potential accidents caused by severe winds could include impact damage from windblown debris.	The Proposed Development will be designed in accordance with the appropriate engineering codes and standards to withstand the forces generated by wind on the systems and structures.	Not significant
Temperature Extremes	Increasing atmospheric temperatures could result	No additional mitigation proposed other than the engineering design to	Not significant

	in the operational instability. This has the potential to impact the operation of the quarry and associated manufacturing activities.	established engineering codes and standards.	
Lightning	Direct or indirect lightning strikes have the potential to cause a major accident due to electrical energy which can result in fires and equipment damage. This can cause harm to people working at the Proposed Development, damage to the Site infrastructure and harm to the environment in the event of a major fire. Lightning could also present a source of ignition to flammable materials resulting in a major fire. which could harm people both onsite and offsite.	Safety in design is the key mitigation and the proposed development will be constructed in accordance with all relevant safety codes, standards and Directives.	Not significant

Carbon Emissions

9.49 Table 9.7 below are some potential mitigation measures to be implemented to reduce the proposed developments carbon emissions:

Table 9.7: Mitigation Measures related to carbon emissions

Activity	Mitigation Measure	Residual Effect
Plant and vehicle emissions during construction and operational phases	All plant and vehicles regularly serviced to ensure they are running as efficiently as possible.	Not significant
	Strict adherence to good operational practice such as switching off plant and vehicles when not in use.	Not significant

Loss of vegetation	Implement Restoration plan (Appendix 3.1) to offset vegetation loss and increase net biodiversity.	Not significant

Residual Impacts

9.50 Residual impacts are those that remain after the implementation of the mitigation measures.

9.51 Assuming implementation of the mitigation measures, the residual effects of the proposed development during construction, operational and decommissioning are assessed to be not significant.

9.52 The residual effects are presented in the mitigation measures table 9.6 and 9.7 above.

Cumulative Assessment

9.53 Potential cumulative effects on climate between the proposed development and other developments in the vicinity were also considered as part of the assessment.

9.54 With appropriate mitigation measures in place, the predicted cumulative impacts on climate associated with the construction and operational phase of the proposed development are deemed short-term and not significant.

'Do-nothing Scenario'

9.55 If the proposed development is not granted, then the extension and continuation of use of the existing quarry and concrete facility will not occur. Employment will be affected as the life of the quarry will be reduced. There will be no carbon impact under the 'do-nothing scenario'. The likely significant secondary benefit to the wider local economy with the development of the project will not occur with the do-nothing option.

9.56 Any benefit from a reduction in greenhouse gas emissions from the proposed activities are likely to be outweighed by increased greenhouse gas emission relating to customers in the locality/region having to source quarry products from much further afield. A reduction in the greenhouse gas emissions at the application site is likely to result in an increase in greenhouse gas emissions at an alternative quarry (or quarries) and concrete facilities.

'Worst-case Scenario'

9.57 Under worst-case conditions, the quarry's operations do not significantly impact global carbon levels.

9.58 The list below outlines the potential worst-case scenarios due to climate change, emphasising the need for mitigation strategies:

- Heavy rainfall and severe storms become more frequent and intense, leading to significant flooding of the quarry site.
- Prolonged droughts reduce the availability of water necessary for manufacturing activities, dust suppression, and processing activities.
- Prolonged heavy rains and increased storm intensity lead to soil saturation and instability in and around the quarry.

- Increased frequency of heatwaves results in dangerously high temperatures on site.
- Climate change impacts global markets, affecting demand and pricing for limestone products.

Impact Assessment Conclusion

9.59 The proposed development is at low risk to increased weather events associated with climate change as detailed in the climate change risk assessment. The impacts of weather events on the proposed development after mitigation measures are implemented will be not significant.

9.60 The carbon footprint assessment shows that the proposed development will not make a significant contribution to global carbon concentrations.

Appendices

Appendix 9.A - Climate Change Risk Assessment Methodology

Introduction

9.1 The IEMA guidance document is used to carry out a climate change risk assessment. The methodology for how the climate change risk assessment is carried out is provided in appendix 1 of the guidance document.

9.2 The following steps are used to carry out the assessment:

- identifying potential climate change risks to a scheme or project;
- assessing these risks (potentially prioritising to identify the most severe); and
- formulating mitigation actions to reduce the impact of the identified risks.

9.3 The guidance note states:

'Definitions of likelihood and magnitude will vary from scheme to scheme and should be tailored to a specific project. It is not within the scope of this guidance to prescribe a single approach to the assessment of likelihood and magnitude of climate impacts.'

9.4 Table 9.A1 shows the severity scores used in Canadian Risk Assessment methodology PIEVC. This severity scoring system will be used as part of the assessment on the proposed development.

Table 9.A1: Severity scores

Score	Severity
0	Negligible or Not Applicable
1	Very Low/Unlikely/Rare/Measurable Change
2	Low/Seldom/Marginal/Change in Serviceability
3	Occasional Loss of Some Capacity
4	Moderate Loss of Some Capacity
5	Likely Regular/Loss of Capacity and Loss of Some Function
6	Major/Likely/Critical Loss of Function
7	Extreme/Frequent/Continuous/Loss of Asset

9.5 Table 9.A2 shows the probability scores used in Canadian Risk Assessment methodology PIEVC. This probability scoring system will be used as part of the assessment on the proposed development.

Table 9.A2: Probability scores

Score	Probability	
0	<0.1%	< 1 in 1,000
1	1%	1 in 100
2	5%	1 in 20
3	10%	1 in 10
4	20%	1 in 5
5	40%	1 in 2.5
6	70%	1 in 1.4
7	>99%	> 1 in 1.01

9.6 Table 9.A3 shows the risk rating matrix.

Table 9.A3: Risk rating matrix

Severity									
7	0	7	14	21	28	35	42	49
6	0	6	12	18	24	30	36	42
5	0	5	10	15	20	25	30	35
4	0	4	8	12	16	20	24	28
3	0	3	6	9	12	15	18	21
2	0	2	4	6	8	10	12	14
1	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
	0	1	2	3	4	5	6	7
				Probability				

Low Risk | Medium Risk | High Risk

Assessment Results

9.7 Table 9.A4 shows the weather events that have potential to impact the proposed development. The assessment shows risk of different weather events impacting the proposed development.

Table 9.A4: Summary table of weather events assessment

Weather Event	Probability Score	Severity	Risk rating
Temperature Extremes	4	1	4
Flooding	3	3	9
High Wind Speeds	3	2	6
Fire	1	5	5

Landslide	1	4	4
Lightning	2	3	6

Appendix 9.B - Carbon Footprint Assessment Report

Carbon Footprint Assessment Report

Introduction

9.1 This report outlines the carbon footprint associated with the proposed continued operation and extension of an existing limestone quarry and continued use of an existing concrete manufacturing facility at Barretspark, Athenry, Co. Galway. The assessment is based on the Transport Infrastructure Ireland Carbon Tool.

Operational Stage

9.2 The annual energy use associated with plant machinery results in 477.8 tCO2e, based on an assumed 520 litres/day consumed for 275 working days per annum.

9.3 The carbon emissions tied to the quarry operations are broken down as follows:

- Excavating aggregate: 3,207.6 tCO2e (for maximum 400,000 tonnes per annum).
- Processing aggregate: 393.9 tCO2e (for maximum 400,000 tonnes per annum).
- Transporting aggregate off-site: 726.6 tCO2e (HGVs travel approximately 670,000 km per annum).
- Concrete production emissions: 235.8 tCO2e (includes emissions from the concrete batching plant and truck movements for exporting concrete).

9.4 Total annual emissions for the operational phase, including all activities, are estimated to be 5,141.7 tCO2e.

9.5 Additional emissions include:

- Existing vegetated screening berms (covering 2.1 hectares) act as a carbon sink, offsetting emissions by -208.7 tCO2e (refer to Figure 9.B1).

Decommissioning Phase

9.6 The decommissioning phase will involve allowing the quarry void to fill with water, habitat diversity is expected to improve. There are no anticipated direct carbon emissions during this phase.

Total Carbon Emissions

9.7 The projected total emissions for the entire 20-year operational period are estimated to be 102,625 tCO2e, considering all operational and decommissioning phases.

Conclusion

9.8 The proposed development activities contribute carbon emissions across different stages of the quarry's lifecycle. However, the existing vegetated screening berms represent a positive step towards offsetting some of these emissions. With effective planning and management, the carbon efficiency throughout the quarry's lifecycle can be improved, reducing the overall environmental impact.

Figure 9.B1: Existing Vegetated Screening Berms

Appendix 9.C - Relevant Guidance

International Greenhouse Gas Emission Targets

Kyoto Protocol 2005

9.9 Ireland is a party to the Kyoto Protocol, which is an international agreement that sets limitations and reduction targets for greenhouse gases for developed countries. It is a protocol to the United Nations Framework for the Convention on Climate Change. The Kyoto Protocol came into effect in 2005, as a result of which, emission reduction targets agreed by developed countries, including Ireland, are now binding.

9.10 Under the protocol, countries must meet their targets primarily through national measures, although market-based mechanisms (such as international emissions trading) can also be utilised.

Doha Amendment to the Kyoto Protocol

9.11 In Doha, Qatar, on 8th December 2012, the "Doha Amendment to the Kyoto Protocol" was adopted. The amendment includes:

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020;
- A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

9.12 During the first commitment period, 37 industrialised countries and the European Community committed to reduce GHG emissions to an average of 5% below 1990 levels. During the second commitment period, Parties committed to reduce GHG emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020. The composition of Parties in the second commitment period is different from the first; however, Ireland and the EU signed up to both the first and second commitment periods.

9.13 Under the Kyoto Protocol, the EU agreed to achieve a significant reduction in total greenhouse gas emissions in the period 2008 to 2012. These EU emission targets are legally binding on Ireland. Ireland's contribution to the EU commitment for the period 2008 – 2012 was to limit its greenhouse gas emissions to no more than 13% above 1990 levels.

United Nations Climate Change Conferences

COP21 Paris Agreement

9.14 COP21 was the 21st session of the Conference of the Parties (COP) to the United Nations Convention. Every year since 1995, the COP has gathered the 196 Parties (195 countries and the European Union) that have ratified the Convention in a different country, to evaluate its implementation and negotiate new commitments. COP21 was organised by the United Nations in Paris and held from 30th November to 12th December 2015.

9.15 COP21 closed on 12th December 2015 with the adoption of the first international climate agreement (concluded by 195 countries and applicable to all). The twelve-page text, made up of a preamble and 29 articles, provides for a limitation of the temperature rise to below 2°C above pre-industrial levels and even to tend towards 1.5°C. It is flexible and takes into account the needs and capacities of each country. It is balanced as regards adaptation and mitigation, and durable, with a periodical ratcheting-up of ambitions.

COP25 Climate Change Conference

9.16 The 25th United Nations Climate Change conference COP25 was held in Madrid and ran from December 2nd to December 13th, 2019. While largely regarded as an unsuccessful conference, the European Union launched its most ambitious plan, 'The European Green New Deal' which aims to lower CO2 emissions to zero by 2050. The deal includes proposals to reduce emissions from the transport, agriculture and energy sectors and will affect the technology chemicals, textiles, cement and steel industries. Measures such as fines and pay-outs by member states who rely on coal power will be in place to encourage the switch to renewable clean energies such as wind. On the 4th of March 2020, the European Commission put forward the proposal for a European climate law. This aims to establish the framework for achieving EU climate neutrality. It aims to provide a direction by setting a pathway to climate neutrality and to this end, aims to set in legislation the EU's 2050 climate-neutrality objective.

COP26 Climate Change Conference Glasgow

9.17 COP21 COP26 took place in Glasgow, Scotland between the 31st October and 12th November 2021. The summit was centred around the fact that "climate change is the greatest risk facing us all." The UK, as hosts for the summit, have developed a ten point plan to deliver a green industrial revolution, seeking to lead the world in tackling and adapting to climate change.

9.18 The key items COP26 seeks to achieve are:

- Secure global net zero by mid-century and keep 1.5 degrees within reach
- Adapt to protect communities and natural habitats
- Mobilise finance
- Work together to deliver

9.19 All world leaders at the summit confirmed the need to urgently address the gaps in ambition and work together to achieve climate action.

9.20 The summit highlighted that the Paris Agreement is working, with leaders outlining national targets and efforts to further reduce emissions. There was a clear commitment to working together to achieve climate aims, with significant announcements including:

- "Over 40 leaders joined the Breakthrough Agenda, a 10-year plan to work together to create green jobs and growth globally, making clean technologies and solutions the most affordable, accessible and attractive option before 2030 – beginning with power, road transport, steel, hydrogen and agriculture.
- Over 120 countries covering more than 90% of the world's forests endorsed the Glasgow Leaders' Declaration on Forests & Land Use committing to work collectively to halt and reverse forest loss and land degradation by 2030, backed by the biggest ever commitment of public funds for forest conservation and a global roadmap to make 75% of forest commodity supply chains sustainable.
- A Just Energy Transition Partnership was announced to support South Africa's decarbonisation efforts; a powerful example of collaboration between an emerging economy and international partners.
- The launch of the Global Methane Pledge saw over 100 countries committing collectively to reduce global methane emissions by 30% by 2030."

COP28 Climate Change Conference United Arab Emirates

9.21 All world leaders at the summit confirmed the need to urgently address the gaps in ambition and work together to achieve climate action.

9.22 COP28 took place from the 30th of November to the 12th of December in Dubai.

9.23 COP 28 is an opportunity to identify global solutions for limiting global temperature rise to 1.5 degrees, inform countries' preparations for revised and more ambitious Nationally Determined Contributions (national climate plans) due by 2025, accelerate the green transition that is already happening and ultimately achieve the delivery of the Paris Agreement goals.

9.24 The results of the COP 28 climate conference are:

- One of the first outcomes of COP28 was the establishment of a loss and damage fund. It will provide financial support to the developing countries that are already suffering from the effects of climate change, such as extreme weather events, sea level rise, and biodiversity loss.
- A historic result of COP28 was the adoption of a fossil fuel phase-out agreement, which commits the parties to transition away from fossil fuels in energy systems, in a just, orderly and equitable manner, so as to achieve net-zero emissions by 2050. This was the first time that the COP explicitly addressed the need to end the use of coal, oil, and gas, the main drivers of the climate crisis. The agreement also calls for a tripling of renewable energy capacity globally by 2030, and the acceleration of technologies such as carbon capture and storage.

COP29 Climate Change Conference Baku

9.25 All The 29th United Nations Climate Change Conference (COP29) was held in Baku, Azerbaijan, from 11 to 22 November 2024. This conference brought together representatives from nearly 200 countries to advance global climate action.

9.26 Key Outcomes of COP29:

- Climate Finance Agreement: Developed nations committed to tripling climate finance for developing countries, aiming to mobilise at least $300 billion annually by 2035. This funding is intended to support mitigation and adaptation efforts in vulnerable regions. However, this figure falls short of the estimated $1.3 trillion per year that experts deem necessary.
- Operationalisation of the Loss and Damage Fund: Building on decisions from previous COPs, COP29 finalised the framework for the Loss and Damage Fund. This fund is designed to provide financial assistance to countries severely affected by climate-related disasters, with disbursements expected to begin in 2025.
- International Carbon Market Standards: Delegates agreed on standards to facilitate and regulate the international trading of carbon credits. This move aims to enhance transparency and integrity in carbon markets, promoting global cooperation in emission reductions.

United Nations Sustainable Development Summit 2023

9.27 The 2023 United Nations Sustainable Development Goals (SDG) Summit, held on 18–19 September 2023 in New York, marked the halfway point to achieving the 2030 Agenda for Sustainable Development. World leaders adopted a political declaration reaffirming their commitment to the SDGs, calling for urgent action to address challenges exacerbated by global crises such as the COVID-19 pandemic, conflicts, and economic instability. The declaration emphasised transformative actions, enhanced international solidarity, and significant reforms in the global financial architecture to ensure equitable financing for developing nations.

9.28 Key discussions at the summit highlighted the interconnectedness of climate action and sustainable development, with a renewed push to integrate resilience measures into all sectors.

Despite setbacks, the summit reinforced global commitments to accelerate progress, especially in critical areas such as poverty alleviation, health, education, and climate change mitigation. The outcomes serve as a roadmap for the next phase of SDG implementation, focusing on inclusivity, equity, and sustainability.

European Green Deal - European Climate Law (2021)

9.29 The European Green Deal, initially introduced by the European Commission in December 2019, sets out the 'blueprint' for a transformational change of the 27-country bloc from a high- to a low-carbon economy, without reducing prosperity and while improving people's quality of life, through cleaner air and water, better health and a thriving natural world. The Green Deal is intended to work through a framework of regulation and legislation setting clear overarching targets, e.g. a bloc-wide goal of net zero carbon emissions by 2050 and a 55% cut in emissions by 2030 (compared with 1990 levels). This is a substantial increase compared to the existing target, upwards from the previous target of at least 40% (2030 Climate & Energy Framework), and furthermore, these targets demonstrate the ambition necessary to keep the global temperature increase to well below 2°C and pursue efforts to keep it to 1.5°C as per the Paris Agreement. With regard to the energy sector, the Green Deal focuses on 3 no. key principles for the clean energy transition, which will help reduce greenhouse gas emissions and enhance the quality of life for citizens:

- Ensuring a secure and affordable EU energy supply;
- Developing a fully integrated, interconnected and digitalised EU energy market; and
- Prioritising energy efficiency, improving the energy performance of our buildings and developing a power sector based largely on renewable sources (e.g. the subject development)
- The European Climate Law 2021 writes into law the objectives set out above in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. Climate neutrality by 2050 means achieving net zero greenhouse gas emissions for EU countries as a whole, mainly by cutting emissions, investing in green technologies and protecting the natural environment. The Climate Law includes:
- A legal objective for the Union to reach climate neutrality by 2050;
- An ambitious 2030 climate target of at least 55% reduction of net emissions of greenhouse gases as compared to 1990, with clarity on the contribution of emission reductions and removals;
- A process for setting a 2040 climate target, taking into account an indicative greenhouse gas budget for 2030-2050 to be published by the Commission;
- A commitment to negative emissions after 2050;
- The establishment of European Scientific Advisory Board on Climate Change, that will provide independent scientific advice;
- Stronger provisions on adaptation to climate change; and
- Strong coherence across Union policies with the climate neutrality objective

9.30 The law aims to ensure that all EU policies contribute to this goal and that all sectors of the economy and society play their part. All 27 no. EU Member States have committed to turning the EU into the first climate neutral continent by 2050. One third of the 1.8 trillion-euro investments from the NextGenerationEU Recovery Plan, and the EU's seven-year budget, will finance the European Green Deal. On 14th July 2021, the European Commission adopted a set

of proposals to make the EU's climate, energy, transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. Achieving these emission reductions in the next decade which is crucial to Europe becoming the world's first climate-neutral continent by 2050 would clearly be assisted by the Proposed Development.

Intergovernmental Panel on Climate Change

9.31 The Intergovernmental Panel on Climate Change released their Sixth Assessment Report Climate Change 2021: The Physical Science Basis in August 2021 which categorically states the rise in global temperatures and increase in frequency and severity of natural disasters experienced across the world is related to human activity. It indicates that climate change has and will negatively impact all aspects of human life and unless immediate action is taken. It states that the aim to curtail global temperature rise to 1.5 degrees is now not possible however, maintaining just a 2-degree rise may be possible, only with immediate and large-scale action is taken to reduce greenhouse gas emissions. The report is hopeful that if global emissions can be cut in half by 2030 and that if net zero emissions can be achieved by 2050 the rise in temperatures can be halted and possibly reversed. This report is a stark warning that de-carbonisation must be increased additional efforts made to reduce carbon emissions across all sectors.

9.32 Greenhouse gas (GHG) emissions resulting from the provision of energy services have contributed significantly to the historic increase in atmospheric GHG concentrations with most of the observed increase in global average temperature since the mid-20th century is very likely due to the observed increase in anthropogenic GHG emissions with the consumption of fossil fuels accounts for the majority of global anthropogenic GHG emissions. There are multiple options for lowering GHG emissions from the energy system while still satisfying the global demand for energy services. Wind energy has significant potential to reduce GHG emissions. Moreover, attempts to measure the relative impacts of various electricity supply technologies suggest that wind energy generally has a comparatively small environmental footprint.

Adaptation Strategy Development Guidelines

Public Sector Climate Action Strategy 2023 - 2025

9.33 The "Public Sector Climate Action Strategy 2023-2025" document outlines Ireland's commitment to reducing greenhouse gas emissions and improving energy efficiency within the public sector. The strategy, supported by the Climate Action Plan 2023, aims to achieve a 51% reduction in greenhouse gas emissions and a 50% improvement in energy efficiency by 2030. The strategy highlights the importance of governance, leadership, and accountability, emphasizing the need for coordinated efforts across all public sector bodies to lead the nation's climate action initiatives. Key components include the establishment of Green Teams, Climate and Sustainability Champions, and the implementation of the European Eco-Management and Audit System (EMAS).

9.34 The document further details specific measures and frameworks designed to support public sector bodies in achieving these ambitious targets. This includes mandatory reporting through the SEAI Monitoring and Reporting (M&R) system, the development of climate action roadmaps, and the strategic management of building portfolios to meet high energy performance standards. The strategy underscores the role of the public sector as a catalyst for broader societal changes, promoting sustainability practices and influencing communities towards a low-carbon future. Additionally, it addresses the need for continuous learning and capacity building within public sector organizations to effectively deliver on climate action goals.

Local Authority Adaptation Strategy Development Guidelines December 2018

9.35 The Local Authority Adaptation Strategy Development Guidelines, mandated by Ireland's National Adaptation Framework (NAF), provide a structured approach for local authorities to develop climate adaptation strategies. These guidelines underscore the necessity for local authorities to integrate climate resilience into their policies and operations by the deadline of 30 September 2019. The guidelines are structured around a five-step planning cycle: Preparing the Ground, Assessing the Adaptation Baseline, Identifying Future Climate Impacts, Vulnerabilities, and Risks, Identifying, Assessing and Prioritising Adaptation Actions, and Drafting, Implementing, and Monitoring the Strategy. The establishment of Climate Action Regional Offices (CAROs) plays a crucial role in coordinating efforts and providing support, ensuring a consistent and collaborative approach across different regions.

9.36 Local authorities are recognized as key players in climate adaptation due to their proximity to communities and their role in delivering essential services. The guidelines emphasize the importance of involving a wide range of stakeholders, including internal departments and external experts, to ensure a comprehensive and effective adaptation strategy. The development process involves detailed assessments of current and future climate risks, the establishment of adaptation goals, and the identification and prioritization of actions. The ultimate aim is to embed climate resilience into all aspects of local governance, ensuring that Ireland can effectively manage and mitigate the impacts of climate change at the local level.

Guidance Documents for Climate

Catchment Flood Risk Assessment and Management (CFRAM} Programme

9.37 The current Catchment Flood Risk Assessment and Management (CFRAM) Programme (see www.cfram.ie) is the mechanism established to facilitate future adaptation to climate change. It provides for long-term flood risk management in Ireland and the embedment of flood risk assessment in the future development of capital projects. The future scenario flood maps produced under the CFRAM Programme will facilitate this approach, inform other industrial sectors, and provide a valuable resource for local adaptation planning and sustainable land use management and planning.

9.38 For further information see chapter 8 – hydrology.

EIA Directive 2014/52/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment

9.39 Directive 2014/52/EU10 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 had to be transposed into national law by 16 May 2017, necessitating changes in laws, regulations, and administrative provisions across a number of legislative codes.

9.40 Key changes introduced in the 2014 Directive (in Annex IV - Information referred to in Article 5(1) - Information for the Environmental Impact Assessment Report) and the national transposing regulations (the European Union (Planning and Development)(Environmental Impact Assessment) Regulations, S.I. No. 296 of 2018) include a requirement for information on the impact of a project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change to be provided in the Environmental Impact Assessment Report.

Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment {EC, 2012)

9.41 EU Guidelines provide recommendations how to integrate climate change and biodiversity in Environmental Impact Assessment (EIA). The need for action on climate change and biodiversity loss is recognised across Europe and around the world. The guidelines contain explanation as to why climate change and biodiversity are so important in EIA, present the relevant EU-level policy background, provide advice on how to integrate climate change and biodiversity into selected stages of the EIA process. The annexes provide sources of further reading and links to other relevant information, data, and tools.

Assessing Greenhouse Gas Emissions and Evaluating their Significance {IEMA, 2017}

9.42 IEMA Guidance provides information to assist practitioners with addressing greenhouse gas {GHG) emissions assessment and mitigation in statutory and non-statutory Environmental Impact Assessment (EIA). It complements IEMA's earlier guide on Climate Change Resilience and Adaptation and builds on the Climate Change Mitigation and EIA overarching principles. The requirement to consider this topic has resulted from the 2014 amendment to the EIA Directive.