CHAPTER 9

CLIMATE

JUNE 2025

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 continued use of an existing limestone quarry & associated manufacturing facilities and proposed storage yard at Cartron, Belclare, Co. Galway. This chapter will also assess the potential effects to the proposed development from climate hazards.

9.2 The application site comprises an existing operational quarry, which is L shaped, with an extraction area of 15.09 Ha and a total site area of approximately 16.3 Ha.

9.3 The quarry operations comprise extraction of limestone using blasting techniques; processing (crushing and screening) of the fragmented rock to produce aggregates for road construction, site development works and in the production of on-site value added products (asphalt and concrete).

9.4 Further information on the site infrastructure, operations, environmental management systems, and controls at the established quarry site is provided in Chapter 3 of this EIAR.

Scope of Work

9.5 The following sections of this chapter describe the potential climate change impacts on the proposed development and the carbon emissions generated by 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 the proposed development;
- assessing effects (cumulative effects and uncertainty);
- identifying alternatives and mitigation measures;
- identifying monitoring and adaptive management.

Contributors

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

Peter Kinghan

9.7 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).

9.8 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 and air quality monitoring tasks such as noise, dust, and water monitoring.

Climate Change and Greenhouse Gases

9.9 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) 2025[1]

9.10 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.

9.11 Ireland, ranked 47th in 2022, climbed 10 places to 37th in 2023, and ranked 43rd for 2024. Ireland is now ranked 29th for 2025 and is now classified as a 'medium' performer.

Ireland's Greenhouse Gas Emissions Projections 2023 - 2050 (EPA)[2]

9.12 The EPA published a document called Ireland's Greenhouse Gas Emissions Projections (2023-2050) in May 2024.

9.13 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 Ireland's 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 2022, 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 2024 Climate Action Plan.

9.14 Under the WEM scenario, the projections indicate that Ireland will cumulatively exceed its ESR 2021-2030 emissions allocation of 369.4 Mt CO2 equivalent by 80.3 Mt CO2 equivalent. Under the WAM scenario, the projections indicate that Ireland will cumulatively exceed the ESR 2021-2030 emissions allocation by 50.1 Mt CO2 equivalent.

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1 https://ccpi.org/country/irl/#:~:text=Ireland%20ranks%2029th%20in%20this,now%20among%20the%20medium%20performers.

2 https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-greenhouse-gas-emissions-projections-2023-2050.php

9.15 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. The Climate and Low Carbon Development (Amendment) Act 2021 commits Ireland to achieve climate neutrality by 2050. These national emission ceilings for tonnes of CO_2 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 (average annual reduction of 3.5%)

9.16 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.

9.17 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.

9.18 In July 2024, the EPA produced Ireland's Provisional Greenhouse Gas Emissions (1990-2023) which showed that for 2023, emissions relating to manufacturing, combustion and industrial processes combined accounted for 11.4% of Ireland's total emissions in 2023, or 6.29 Mt CO2eq.

Legislation and Policy

Climate Action and Low Carbon Development (Amendment) Act 2021

9.19 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 emphasises the importance of developing sector-specific carbon budgets, ensuring that every sector contributes to the overall reduction targets.

9.20 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.

Climate Action Plan 2025

9.21 The Climate Action Plan 2025 (CAP 25), published in December 2024 by the Department of the Environment, Climate and Communications, sets out Ireland's strategy to reduce greenhouse-gas emissions by 51 per cent by 2030 and achieve climate neutrality by 2050. CAP 25 is underpinned by legally binding carbon budgets and sectoral emissions ceilings established in the Climate Action and Low Carbon Development (Amendment) Act 2021. The plan prioritises urgent

[3] https://www.epa.ie/our-services/monitoring--assessment/climate-change/irelands-climate-change-assessment-icca/

emissions reductions across all sectors while integrating measures to strengthen climate resilience

9.22 CAP 25 includes a comprehensive suite of actions for energy, transport, agriculture, industry, the built environment and land use, designed to decarbonise operations and bolster resilience. It emphasises sustainable site operations, deployment of renewable energy, decarbonisation of freight and construction processes, and enhanced governance and reporting to ensure quarrying and related activities align with both national and EU climate objectives

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

9.23 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 emphasises 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).

9.24 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

9.25 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

9.26 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.

Galway County Development Plan 2022-2028

9.27 The Galway County Development Plan 2022-2028 outlines the following policy objectives in relation to climate change that are relevant to the proposed development:

- CC 1 - Climate Change

"Support and facilitate the implementation of European, National and Regional objectives for climate adaptation and mitigation taking into account other provisions of the Plan (including those relating to land use planning, energy, sustainable mobility, flood risk management and drainage) and having regard to the Climate mitigation and adaptation measures."

- CC 2 - Transition to a low carbon, climate-resilient society

" It is a policy objective of the Planning Authority to support the transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050, by way of reducing greenhouse gases, increasing renewable energy, and improving energy efficiency."

- CC 5 – Climate Action and Mitigation

"To promote, support and direct effective climate action policies and objectives that seek to improve climate outcomes across County Galway through the encouragement and integration of appropriate mitigation and adaptation considerations and measures into all development and decision-making processes."

- CC 8 – Climate Action and Development Location

"To implement, through the plan and future local areas plans, policies that support and encourage sustainable compact growth and settlement patterns, integrate land use and transportation, and maximise opportunities through development location, form, layout and design to secure climate resilience and reduce carbon dioxide and greenhouse emissions."

- CC 10 – Green Infrastructure

"Galway County Council shall promote the benefit of open spaces and implement the integration of green infrastructure/networks (e.g. interconnected network of green spaces (including aquatic ecosystems) and other physical features on land) into new development and regeneration proposals in order to mitigate and adapt to climate change."

Galway County Council Climate Action Plan 2024-2029

9.28 The Galway County Council Climate Action Plan 2024-2029 was adopted on the 19th of February 2024.

9.29 The Plan provides a roadmap for adapting to weather hazards, such as coastal, river and surface water flooding, coastal erosion, heatwaves and drought, which are predicted to increase in frequency and intensity in line with global trends with a wide range of impacts for County Galway. The Plan's vision around climate action in the areas of energy, built environment, transport, circular economy and land use is driven by individual actions, including a commitment by Galway County Council to reduce its emissions by 51% by 2030.

9.30 The following objectives of the plan relate to the proposed development:

- EB2

"Ensure the integration of climate action in spatial planning to enable the County of Galway to transition to a low carbon and resilient society."

- LN3

"Support nature-based solutions to mitigate against and adapt to climate change and provide additional co-benefits."

Existing Environment

Regional Context

Current Climate and Weather

9.31 Ireland has a temperate maritime climate characterised 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

9.32 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.

9.33 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 farther.
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 events in	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

Parameter	Observed	Projected	Example of Biophysical Impacts
	The largest increases are observed over the west of the country.	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 2013/2014/2025).
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

9.34 The Athenry weather station is located approx. 24.3 km southeast of the proposed development and is considered representative of conditions experienced at the application site.

9.35 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 14.55° C and mean daily minimum temperatures are typically between 5.48 to 7.12° 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 2019 to 2023 and the mean daily maximum temperature.

9.36 During the period 2011-2024, the mean daily rainfall minimum and maximum were 2.94mm and 4.36mm at the Athenry weather station (refer to table 9.2)

Table 9.2: Athenry weather station temperature and precipitation averages from 2011 to 2024

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Temperature														
Mean Daily Maximum Temperature	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	14.02
Mean Daily Minimum Temperature	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	6.47
Rainfall														
Mean Daily Rainfall (mm)	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	3.17

Impact Assessment

Methodology

9.37 The climate assessment is divided into two sections: the climate change risk assessment and the greenhouse gas emissions assessment.

9.38 The climate change risk assessment examines the effects of a changing climate on the proposed development. It evaluates the proposed developments vulnerability to climate change and identifies adaptation measures to enhance the resilience of the proposed development.

9.39 The Greenhouse Gas Emissions Assessment quantifies the project's GHG emissions over its lifetime. The assessment compares these emissions to relevant carbon budgets and national greenhouse gas emissions from previous years to assess the significance of the proposed development on climate.

Climate Change Risk Assessment

9.40 The potential risks posed by climate change to the proposed development have been assessed using the Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) - Overarching Technical Document (PE-ENV-01104) (TII, December 2022). There is currently no climate change risk assessment development for the extractive industry. The TII climate guidance includes a climate change risk assessment methodology that this assessment will follow.

9.41 The TII climate change risk assessment is guided by the principles set out in the overarching best practice guidance documents which include:

- EU (2021) Technical guidance on the climate proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021).
- The Institute of Environmental Management and Assessment (IEMA: UK) document, Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (2020).

9.42 The climate change risk assessment methodology is shown in Appendix A of this report.

Greenhouse Gas Emissions Assessment

9.43 The potential climate effects of the proposed development were determined by assessing the sources of greenhouse gas (GHG) emissions associated with the project. This evaluation was carried out in accordance with IEMA's Guidance on Assessing Greenhouse Gas Emissions and Evaluating Their Significance (2022), which recommends the use of carbon emission factors. These carbon emissions factors were obtained from:

- Transport Infrastructure Ireland (TII) Carbon Tool (2022).

9.44 At present, no industry-specific tools have been developed for calculating GHG emissions within Ireland's extraction sector. The amount of emissions from a quarry is dependent on the size and type of activities that are occurring within a site. The main sources of GHG emissions associated with the proposed development are from plant machinery, site infrastructure, and HGV transport.

Climate Change Vulnerability Assessment

9.45 The Climate Change Vulnerability Assessment determines the sensitivity of the Proposed Development to climate hazards combined with the correspondent exposure of the Proposed Development to these hazards.

9.46 The results of the exposure analysis for the proposed development are shown in table 9.3 below:

Table 9.3 Exposure analysis of the proposed development

Exposure	Climate Hazards								
	Flooding	Extreme Heat	Extreme Cold	Wildfire	Drought	Extreme Wind	Lightning & Hail	Landslides	Fog
Application Site, Cartron, Tuam, Co. Galway	2	2	1	1	2	2	1	1	1

9.47 The exposure analysis is based on the following information and data:

- Flooding: No flood events or recurring flood incidents were identified at the Site or in its vicinity. As such, the exposure of the Proposed Development to river flooding is determined as Low (refer to chapter 8 – Hydrology)
- Extreme temperature: Temperature data shows the proposed development is not as risk to extreme temperatures.
- Extreme wind: Recent storm events show it is possible for extreme winds to occur at the site. During the Winter of 2024 and 2025 storm Darragh brought violent storm force winds and Storm Éowyn brought hurricane force winds, respectively. A gust of 139km/h was recorded at the Athenry weather station during storm Éowyn in 2025.
- Lightning & hail: There is a low exposure from lightning and hail at the proposed development.

9.48 The results of the sensitivity analysis for the proposed development are shown in table 9.4 below:

Table 9.4 Sensitivity analysis of the proposed development

Asset	Climate Hazards								
	Flooding	Extreme Heat	Extreme Cold	Wildfire	Drought	Extreme Wind	Lightning & Hail	Landslides	Fog
Buildings	1	1	1	1	1	1	1	1	1
Site Infrastructure	1	1	1	1	1	1	1	1	1
Plant Machinery	1	1	1	1	1	1	1	1	1
Processing Infrastructure	1	1	1	1	1	1	1	1	1
Land and Topography	1	1	1	1	1	1	1	1	1

9.49 Regarding the sensitivity of the assets the following can be determined:

- Buildings: The existing buildings, including offices and sheds, exhibit medium sensitivity to climate hazards such as flooding.
- Site Infrastructure: The site infrastructure has been assessed as having low sensitivity (score 1) across all climate hazards. This indicates that the existing access roads, fencing, and water management systems have low sensitivity to the impacts of extreme weather.
- Plant Machinery: The excavators and loaders are designed to cope with adverse weather conditions. However, they remain moderately sensitive—especially to flood events that could temporarily halt operations.
- Processing Infrastructure: The processing infrastructure exhibits medium sensitivity to climate hazards such as extreme rainfall.
- Land and Topography: The quarry faces and adjacent land are sensitive to climate hazards such as landslides.

9.50 The vulnerability assessment combines the exposure and sensitivity analysis with the aim to identify the vulnerabilities and the potential significant climate hazards associated with the Proposed Development. The results of the vulnerability assessment are detailed in Table 9.5 below.

9.51 As outlined in the TII PE-ENV-01104-01 (2022) and EU (2021) Technical guidance, when the vulnerability of a development is low, a detailed climate assessment is not required.

Table 9.5 Vulnerability assessment of the proposed development to climate hazards

Asset	Climate Hazards																	
	Flooding		Extreme Heat		Extreme Cold		Wildfire		Drought		Extreme Wind		Lightning & Hail		Landslides		Fog	
	Sensitivity	Exposure	Sensitivity	Exposure	Sensitivity	Exposure	Sensitivity	Exposure	Sensitivity	Exposure	Sensitivity	Exposure	Sensitivity	Exposure	Sensitivity	Exposure	Sensitivity	Exposure
Buildings	1	2	1	2	1	1	1	1	1	2	1	2	1	1	1	1	1	1
Vulnerability	2		2		1		1		2		2		1		1		1	
Site Infrastructure	1	2	1	2	1	1	1	1	1	2	1	2	1	1	1	1	1	1
Vulnerability	2		2		1		1		2		2		1		1		1	
Plant Machinery	1	2	1	2	1	1	1	1	1	2	1	2	1	1	1	1	1	1
Vulnerability	2		2		1		1		2		2		1		1		1	
Processing Infrastructure	1	2	1	2	1	1	1	1	1	2	1	2	1	1	1	1	1	1
Vulnerability	2		2		1		1		2		2		1		1		1	
Land and Topography	1	1	1	2	1	1	1	1	1	2	1	2	1	1	1	1	1	1
Vulnerability	2		2		1		1		2		2		1		1		1	

9.52 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.

9.53 The effects of climate change on the Proposed Development are considered as unlikely, rarely, and not significant. Table 9.6 shows the results of the climate change risk assessment.

Table 9.6: Climate change risk assessment summary

Weather Event	Vulnerability Assessment TII Technical Document (PE-ENV-01104) (2022)	Determination of Significance of Effect (EPA 2022)
Flooding	Low vulnerability	Not Significant
Extreme Temperature	Low vulnerability	Not Significant
Wildfire	Low vulnerability	Not Significant
Drought	Low vulnerability	Not Significant
Extreme wind	Low vulnerability	Not Significant
Lightning and hail	Low vulnerability	Not Significant
Landslides	Low vulnerability	Not Significant
Fog	Low vulnerability	Not Significant

9.54 The TII Technical Document (PE-ENV-01104) (2022) guide is used to assess the vulnerability of the proposed development to weather events, such as temperature extremes, flooding, and high winds. These identified vulnerabilities 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 table 9.6, all weather events are assessed as low vulnerability under the TII 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.

Greenhouse Gas Emissions Assessment

Direct Effects

9.55 The continued use of the limestone quarry and proposed storage yard in Cartron, Belclare, 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 B.

9.56 Table 9.7 shows a summary of the carbon emissions generated by the proposed development.

Table 9.7: Carbon emissions assessment summary table

Project Phase	Activity/Description	tCO_2e Emissions
Construction	Removal of topsoil (10,000 m^3)	7.31
Operational	Annual energy use for plant machinery (1,000 l /day consumed for 275 working days / annum)	918.91
	Carbon emissions from excavating aggregate (300,000 tonnes p.a. max)	2,237.32
	Carbon emissions from processing aggregate (300,000 tonnes p.a. max)	296.7
	Transport emissions from moving aggregate off-site (HGVs travel 1,086,250km p.a.)	1,221.8
	Carbon emissions from asphalt production and concrete production	516
	Total Annual Emissions for Operational Phase	**5,190.73**
	Total Emissions for Operational Phase (33 years)	**171,294.09**
Total		**171,301.4**

9.57 The total annual greenhouse-gas emissions generated by the proposed development are 5190.73 t CO_2e. According to the EPA's Ireland's Climate Change Assessment, national emissions in 2023 were 55.01 Mt CO_2e (55 010 000 t CO_2e). The development would therefore contribute 0.0094 % of Ireland's annual greenhouse-gas emissions.

9.58 Industry accounted for 6.29 Mt CO_2e (6 290 000 t CO_2e) of emissions in 2023. On this basis, the proposed development would generate 0.0825 % of the industry sector's annual carbon emissions.

9.59 Ireland's second carbon budget (2026 – 2030) is 200 Mt CO_2e. Projected emissions from the development over that five-year period total 25 954 t CO_2e, representing 0.013 % of the second carbon budget.

9.60 The EPA's Provisional Greenhouse Gas Emissions 1990 – 2023 reports that total process emissions from the mineral-products subsector (including cement) fell by 6.5 % between 2022 and 2023, reflecting reduced production levels.

Indirect Effects

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

- **Downstream emissions from the use of asphalt, concrete and aggregates:** The aggregates, concrete and lime products 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 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.

Conclusion on Indirect Effects

9.62 While downstream emissions from the use of asphalt, 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.

9.63 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

9.64 Based on the assessment above there will be no significant effects (refer to table 9.8)

Table 9.8: Determination 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)
Plant Machinery	Climate	Negligible to low / Short-term / Likely / Minor	(Climate is globally sensitive, but the local impact is small)	Not significant
Site Infrastructure	Climate	Negligible to low / Short-term / Likely / Minor	(Climate is globally sensitive, but the local impact is small)	Not significant

Mitigation

Climate Change/Weather Events

9.65 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.

9.66 Based on the climate change risk assessment mitigation measure to improve the resilience of the proposed development are provided in table 9.9.

Table 9.9: Mitigation Measures related to weather events

Weather Event	Risks and Likely Effects	Mitigation Measures	Residual Effect
Flooding	Flooding from rising groundwater levels and rainfall 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 Proposed Development will include the following mitigation measures which would prevent and minimise the consequences of this scenario: • For additional information on water management refer to the Chapter 8 - Hydrology).	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 in operational instability. This has the potential to impact the operation of the quarry and associated manufacturing activities.	No additional mitigation proposed other than the engineering design of process systems including cooling and heating to established engineering codes and standards.	Not significant
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.	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

	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.		
Drought	Reduced water availability could affect dust suppression, and other activities on Site. A prolonged drought may lead to lower groundwater levels, potentially impacting the existing water management system and placing stress on local water resources.	Implement water conservation measures and efficient water reuse practices. Refer to Chapter 8 – Hydrology for additional details regarding the site's water management plan	Not significant
Landslides	Quarry face or embankment failures (triggered by heavy rainfall or ground instability) that could result in damage to site infrastructure or injury to personnel	The Proposed Development will comply with the Safe Quarry Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008 (S.I. No. 28 of 2008) as amended, which include requirements for slope stability to prevent landslides	Not Significant

Carbon Emissions

9.67 Table 9.10 below are some potential mitigation measures to be implemented to reduce the proposed developments carbon emissions:

Table 9.10: Mitigation Measures related to carbon emissions

Activity	Mitigation Measure	Residual Effect
	All plant and vehicles regularly serviced to ensure they are	Not significant

Plant and vehicle emissions during construction and operational phases	running as efficiently as possible.	
	Strict adherence to good operational practice such as switching off plant and vehicles when not in use.	
	Investigate the use of renewable energy sources, such as solar or wind, to power crushers and screening equipment.	
	Improve energy efficiency by using variable speed drives (VSDs) on crushers and conveyor belts to reduce energy wastage.	
	Energy consumption and emission volumes will be considered when purchasing new plant and vehicles	
Loss of vegetation	Implement Restoration plan (figure 3-2) to offset vegetation loss and increase net biodiversity.	Not significant

Residual Impacts

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

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

9.70 The residual effects are summarised in table 9.9 and 9.10.

9.71 The residual effects of the proposed development are not significant.

Cumulative Assessment

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

9.73 McTigue Quarries Ltd., located to the north of the proposed development, has been incorporated into the cumulative assessment. Planning documentation for McTigue Quarries Ltd. indicates an historic average extraction rate of approximately 100,000 tonnes per annum. Given the relatively small scale of this operation, its associated greenhouse gas (GHG) emissions are considered negligible at both regional and national levels.

9.74 Crucially, it is recognised that carbon emissions are a global issue rather than one constrained by geographic boundaries. The Intergovernmental Panel on Climate Change (IPCC, 2021) has emphasised that CO_2 and other GHGs disperse widely through the atmosphere, contributing to climate change irrespective of their specific origin. Consequently, the proximity of McTigue Quarries Ltd. to the proposed development does not increase its effect on climate. A quarry located in the east of the country, for instance, would effectively have the same overall climate impact as one immediately adjacent to this site.

9.75 On the basis of this information, no significant cumulative impact on climate is anticipated from the operation of McTigue Quarries Ltd.

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

'Do-nothing Scenario'

9.77 If the proposed development is not granted, then the continuation of the existing quarry 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.

9.78 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).

'Worst-case Scenario'

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

9.80 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.

Unplanned Events

9.81 No unplanned events that would have a major impact on GHG emissions associated with the Proposed Development could occur.

Monitoring

9.82 No monitoring of GHG emissions is required as part of the Proposed Development.

Appendix

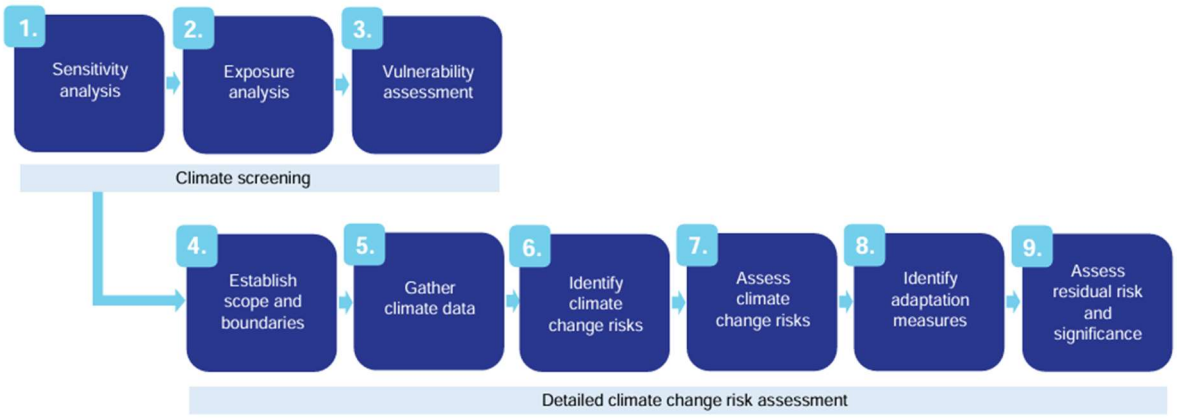
Appendix A - Climate Change Risk Assessment Methodology

Introduction

9.1 The IEMA guidance document is used to carry out a climate change risk assessment. The methodology for the climate change risk assessment is presented below.

9.2 The TII (2022) Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) - Overarching Technical Document (PE-ENV-01104) climate guidance outlines the following step by step process for completing the climate change risk assessment (refer to figure 9.A1).

Figure 9.A1 TII Climate Change Risk Assessment Guidance Methodology (PE-ENV-01104) (2022)



9.3 The climate screening consists of a sensitivity analysis, exposure analysis and vulnerability assessment. The sensitivity and exposure is used to determine the vulnerability of the proposed development to climate change.

9.4 The project asset categories must be assigned a level of sensitivity to climate hazards. TII (2022) provide a list of asset categories and climate hazards to be considered:

- Pavements e.g. road pavement, shoulders, and footpaths
- Drainage e.g. culverts, drains, pipes.
- Structures e.g. bridges, retaining walls, crash barriers.
- Earthworks, geotechnical assets – e.g. foundations, pavement subgrades, embankments.
- Utilities e.g. substations, and cabling.
- Landscaping e.g. vegetated median strips or embankments.
- Signs, light posts and fences e. g street lighting, road signs, gantries, boundary fences.
- Buildings e.g. motorway service areas, road and light rail depots

9.5 These assets categories are related to road and rail infrastructure projects, therefore for this assessment the following asset categories that are relevant to the proposed development will be assessed:

- Buildings: Offices, Machinery Shed
- Site Infrastructure: Access roads, fencing, water management systems.
- Plant Machinery: Excavators, loaders
- Processing Infrastructure: Crushing and screening plant, concrete batching plant, and asphalt plant

- Land and Topography: Quarry faces and surrounding land

9.6 With regards to climate hazards, the sensitivity analysis should consider:

- Flooding (coastal) – including sea level rise and storm surge.
- Flooding (pluvial)
- Flooding (fluvial)
- Extreme heat – including extreme heat events and increasing temperatures overtime.
- Extreme cold – including frost and snow.
- Wildfire
- Drought
- Extreme wind
- Lightning and hail
- Landslides
- Fog

9.7 To undertake the sensitivity analysis, a sensitivity score should be given for each asset category against each climate hazard. The definitions and scoring outlined in table 9.A1 should be used when assessing sensitivity.

Table 9.A1: TII Sensitivity definition and scoring (PE-ENV-01104) (2022)

Sensitivity Level	Definition	Score
High Sensitivity	The climate hazard will or is likely to have a major impact on the asset category.	3
Medium Sensitivity	It is possible or likely the climate hazard will have a moderate impact on the asset category.	2
Low Sensitivity	It is possible the climate hazard will have a low or negligible impact on the asset category.	1

9.8 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 (refer to table 9.A2).

9.9 The allocation of exposure level should be informed by the high-level climate data collected.

Table 9.A2: TII Exposure definition and scoring (PE-ENV-01104) (2022)

Sensitivity Level	Definition	Score

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.	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.	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.	1

9.10 The vulnerability assessment combines the outcomes of the sensitivity and exposure analysis with the aim to identify the key vulnerabilities and the potentially significant climate hazards associated with the proposed development. See table 9.A3 for the vulnerability assessment matrix.

Table 9.A3: TII Vulnerability matrix (PE-ENV-01104) (2022)

		Exposure		
		Low	**Medium**	**High**
Sensitivity	Low	1	2	3
	Medium	2	4	6
	High	3	6	9

Vulnerability Key	
	Low
	Medium
	High

9.11 The TII guidance (TII, 2022) and EU Technical Guidance (2021) notes that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed.

9.12 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.

Appendix B - Carbon Footprint Assessment Report

Carbon Footprint Assessment Report

Introduction

9.1 This report outlines the carbon footprint associated with the continued use of the existing quarry and proposed storage yard at Cartron, Belclare, Co. Galway. The assessment is based on the Transport Infrastructure Ireland Carbon Tool.

Construction Stage

9.2 Removal of c. 10 000 m^3 of topsoil during initial site-set-up will release 7.31 t CO_2e.

Operational Stage

9.3 The annual energy use associated with plant machinery results in 918.91 t CO_2e, based on an assumed 1,000 L/day consumed over 275 working days per annum.

9.4 The volume of aggregate to be exported off-site is 300,000 t/yr. The carbon emissions tied to excavating this aggregate are 2,237.32 t CO_2e; processing the aggregate emits 296.70 t CO_2e. Transport emissions for moving aggregate, concrete and asphalt off-site (HGVs travelling 1,086,250 km p.a.) amount to 1,221.80 tCO_2e.

9.5 Carbon emissions from on-site product manufacture (asphalt + concrete) are 516 t CO_2e per annum.

9.6 Considering the above, the annual emissions for the operational phase are estimated to be 5190.73 t CO_2e.

Decommissioning Phase

9.7 On closure all fixed plant and mobile machinery will be removed and the worked areas seeded to species-rich grassland for agricultural use. The resulting grassland habitat will act as a long-term carbon sink, so no additional decommissioning emissions are expected.

Conclusion

9.8 The quarry's operations are estimated to emit 5190.73 t CO_2e per year. Most carbon arises from diesel-powered plant and truck haulage; smaller shares come from aggregate processing and on-site asphalt/concrete production. Overall, the project adds only a minor, measurable contribution to national emissions targets.

Appendix 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 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."

COP27 Climate Change Conference Egypt

9.21 COP27 (Sharm El-Sheikh, Egypt, 6–20 November 2022) focused on turning past pledges into real-world actions. Key outcomes included:

- Loss and Damage Fund: A historic agreement to provide financial support to developing countries already experiencing climate impacts, though details on contributions and governance remain pending.
- Adaptation and Mitigation: Delegates called for accelerated emissions cuts to keep the 1.5°C target alive, along with increased adaptation finance—particularly for vulnerable nations.
- Fossil Fuels and Finance: While the phase-down of coal was singled out, oil and gas did not receive the same explicit language, and questions persist about whether the pledged funding will be delivered on schedule.

COP28 Climate Change Conference United Arab Emirates

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

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

9.24 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.

9.25 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

9.26 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.

9.27 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.

Summit of the Future, United Nations, New York 2024

9.28 The 2024 United Nations Summit of the Future, held in September 2024 in New York, brought world leaders together to strengthen global cooperation and address pressing challenges, including climate change. The Pact for the Future, adopted at the summit, reaffirmed international commitments to urgent climate action, emphasising the need for significant reductions in greenhouse gas emissions, increased climate finance, and a transition towards sustainable energy and resource management. Discussions highlighted the importance of aligning global economic and environmental policies to support long-term resilience and sustainability.

9.29 A key focus of the summit was the role of climate action in sustainable development, with leaders stressing the need for stronger environmental governance and greater investment in low-carbon solutions. The summit reinforced commitments to accelerating decarbonisation across industries, promoting nature-based solutions, and improving climate resilience in land use and resource extraction sectors. The outcomes provide a framework for strengthening sustainability measures, ensuring that industries—including quarrying and construction—align with global climate targets while maintaining economic viability.

European Green Deal - European Climate Law (2021)

9.30 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

9.31 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

9.32 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.

9.33 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

9.34 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, emphasising 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).

9.35 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 organisations to effectively deliver on climate action goals.

Local Authority Adaptation Strategy Development Guidelines December 2018

9.36 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.

9.37 Local authorities are recognised as key players in climate adaptation due to their proximity to communities and their role in delivering essential services. The guidelines emphasise 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 prioritisation 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

9.38 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.

9.39 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

9.40 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.

9.41 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)

9.42 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, 2022}

9.43 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.