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Environmental Impact Assessment Report

Client: Harringtons Concrete and Quarries

Ref. No.: 03.24

Project: Proposed Lateral Extension to a Limestone Quarry at Ardgaheen, Claregalway, Co. Galway

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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 lateral extension to the existing limestone quarry at Ardgaheen, Co. Galway.
- 9.2 The application site is surrounded by agricultural lands and adjoins the operational quarry. The nearest urban centers are Claregalway and Tuam, located approximately 8 km south and 12 km north of the quarry, respectively. The proposed development site is described further in chapter 3 – Project Description.

Scope of Work

- 9.3 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 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 Harrington's Concrete and Quarries Ltd. 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) 2025¹

9.8 Es 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 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 2024 - 2055 (EPA)²

9.10 The Environmental Protection Agency issued a new report, Ireland's Greenhouse Gas Emissions Projections 2024-2055, in May 2025, updating the national outlook to 2055.

9.11 As before, two forecast paths are modelled: With Existing Measures (WEM), which includes only policies in force by the end of 2023, and With Additional Measures (WAM), which layers on full delivery of planned actions such as those in the 2025 Climate Action Plan.

9.12 Against Ireland's revised Effort Sharing Regulation (ESR) budget of 366.3 Mt CO₂-eq for 2021-2030, the EPA now projects a cumulative excess of 68.1 Mt CO₂-eq under WEM and 47.6 Mt CO₂-eq under WAM.

Ireland's Climate Change Assessment 2025 (EPA)³

9.13 The Environmental Protection Agency published Ireland's first National Climate Change Risk Assessment (NCCRA) in June 2025. The study screens 115 climate-related risks across nine natural, social, infrastructure and economic systems; 43 are classed as nationally significant, and nine priority risks already (or by mid-century) reach a "Critical" level of consequence.

9.14 Four of those priority risks require urgent action in the next five years:

- disruption of energy transmission and distribution by extreme wind,

1

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

² chrome-

extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/07875-EPA-GHG-Projections-Report-FINAL.pdf

³ chrome-

extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.ie/publications/monitoring--assessment/climate-change/EPA_NCCRA_Main-Report_Published_June_2025.pdf

- damage to communication infrastructure from extreme wind,
- loss of transport infrastructure through sea-level rise, coastal erosion and flooding, and
- damage to buildings from the same coastal hazards.

9.15 Risk severity intensifies over time: many of the 43 significant risks escalate from Limited/Substantial today to Critical by 2050 and could become Catastrophic by 2100 if left unmanaged, with cascading impacts rippling between energy, built environment, health and economic systems.

9.16 The NCCRA provides the evidence base for the forthcoming revision of the National Adaptation Framework and sectoral adaptation plans. Key recommendations include closing data gaps on hazards and vulnerability, assessing transboundary and compounding risks, and prioritising resilience investment in line with the report's findings.

National Legislation and Policy

Climate Action and Low Carbon Development (Amendment) Act 2021

9.17 Established 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.

9.18 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 Action Plan 2025

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

9.20 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'

- 9.21 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).
- 9.22 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

- 9.23 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

- 9.24 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

9.25 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

9.26 Climate change is expected to bring significant changes to Ireland's climate and weather patterns. The increase in greenhouse gas concentrations, primarily carbon dioxide (CO₂) and methane (CH₄), is contributing to global warming and altering the Earth's climate systems.

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 minimize the negative impacts on its environment, economy, and society.

9.28 In 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	<p>Average temperatures have increased by 0.8°C since 1900, an average of 0.07°C per decade.</p> <p>The number of warm days (over 20°C) has increased while the number of cold days (below 0°C) has decreased.</p>	<p>Projections indicate an increase in average temperatures across all seasons (0.9-1.7°C).</p> <p>The number of warm days is expected to increase and heat waves are expected to occur more frequent.</p>	<p>Incidences of cold stress are likely to decrease while incidences of heat stress will increase.</p> <p>The duration of the growing season will increase, occurring earlier and extending farther.</p>
Precipitation	<p>Increase in average annual national rainfall of approximately 60mm or 5% in the period 1981-2010, compared</p>	<p>Significant reductions are expected in average levels of annual, spring and summer rainfall.</p>	<p>The increased occurrence of dry spells will result in increased pressure on water supply.</p>

	<p>to the 30-year period 1961-1990.</p> <p>The largest increases are observed over the west of the country.</p>	<p>Projections indicate a substantial increase in the frequency of heavy precipitation events in Winter and Autumn (approx. 20%)</p>	<p>An increase in the frequency of extreme precipitation events will result in increased fluvial and pluvial flood risk.</p>
<p>Wind Speeds and Storms</p>	<p>No long-term change in average wind speed or direction can be determined with confidence.</p> <p>The number and intensity of storms in the North Atlantic has increased by approx. three storms per decade since 1950.</p>	<p>Projections indicate an overall decrease in wind speed and an increase in extreme wind speeds, particularly during winter.</p> <p>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.</p>	<p>Increases in extreme wind speeds may impact on wind turbines and the continuity of power supply.</p> <p>Infrastructure will be at risk due to the increased occurrence of intense storms (e.g. winter 2013/2014).</p>
<p>Sea Level and Sea Surface Temperature</p>	<p>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.</p> <p>Sea surface temperatures have increased by 0.85°C since 1950, with 2007 the warmest year in Irish coastal records.</p>	<p>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.</p> <p>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</p>	<p>Significant increase in areas at risk of coastal inundation and erosion.</p> <p>Increased risk to coastal aquifers and water supply.</p> <p>Change in distribution fish species.</p> <p>Implications for fisheries and aquaculture industries.</p>

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Local Context

- 9.29 The Athenry weather station is located approx. 17 km southwest 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 14.55° C and mean daily minimum temperatures are typically between 5.25 to 7.12° C for the area surrounding Athenry weather station, refer to table 9.2. There has been an overall upward increase in mean daily minimum temperature from 2010 to 2024. Trends are less apparent in the mean daily maximum temperature and mean daily rainfall.
- 9.31 During the period 2010-2024, the mean daily rainfall minimum and maximum were 2.66mm and 4.36mm at the Athenry weather station (refer to table 9.2)

Environmental Impact Assessment Report

Client: Harringtons Concrete and Quarries

Project: Proposed Lateral Extension to a Limestone Quarry at Ardgaheen, Claregalway, Co. Galway

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Table 9.2: Athenry weather station temperature and precipitation averages from 2010 to 2024

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
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	14.02
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	6.48
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	3.17

Impact Assessment

Methodology

- 9.32 The climate assessment is divided into two sections: the climate change risk assessment and the greenhouse gas emissions assessment.
- 9.33 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.
- 9.34 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

- 9.35 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.
- 9.36 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).
- 9.37 The climate change risk assessment methodology is shown in Appendix A of this report.

Greenhouse Gas Emissions Assessment

- 9.38 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).
- 9.39 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

- 9.40 The Climate Change Vulnerability Assessment determines the exposure of the Proposed Development to climate hazards combined with the corresponding sensitivity of the Proposed Development to these hazards.

9.41 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, Ardgaheen, Co. Galway	2	2	1	1	2	2	1	1	1

9.42 The exposure analysis is based on the following information:

- 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 at low risk to extreme temperatures.
- The proposed development is at a low risk from wildfires.
- The proposed development is at a low risk from droughts due to the existing water management system on site (refer to Chapter 8 – Water)
- 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.
- Lightning & hail: There is a low exposure from lightning and hail at the proposed development.
- The GSI landslide susceptibility mapping shows the site and extension area has a low susceptibility to landslides.
- The proposed development is at a low risk from fog.

9.43 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

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

- Buildings: The existing buildings, including offices and sheds, exhibit low 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.
- Processing Infrastructure: The processing infrastructure exhibits low sensitivity to climate hazards.
- Land and Topography: The quarry faces and adjacent land have low sensitivity to climate hazards.

9.45 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.

9.46 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.

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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	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
Vulnerability	1		2		1		1		1		2		1		1		1		
Site Infrastructure	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
Vulnerability	1		2		1		1		1		2		1		1		1		
Plant Machinery	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
Vulnerability	1		2		1		1		1		2		1		1		1		
Processing Infrastructure	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
Vulnerability	1		2		1		1		1		2		1		1		1		
Land and Topography	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
Vulnerability	1		2		1		1		1		2		1		1		1		

9.47 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.

9.48 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

9.49 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

9.50 The proposed lateral extension to a limestone quarry at Ardgaineen, Claregalway, 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.

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

Table 9.7: Carbon footprint assessment summary table

Project Phase	Activity/Description	tCO ₂ e Emissions
Construction	Site Clearance	2.68
Operational	Annual energy use for plant machinery (800 l /day consumed for 275 working days / annum)	586.83
	Carbon emissions from excavating aggregate (400,000 tonnes p.a. max)	2996.07
	Carbon emissions from processing aggregate (400,000 tonnes p.a. max)	395.60
	Transport emissions from moving aggregate off-site (HGVs travel 1,040,000km p.a.)	1115.88
	Total Annual Emissions for Operational Phase	5,094.38
	Total Emissions for Operational Phase (25 years)	127,359.5
Decommissioning	No direct carbon impact	0
Total		127,362.18

9.52 The total annual carbon emissions generated from the proposed development are 5,094.38 tCO₂e (operational phase). Using the EPA figure of 55.01 MtCO₂eq for Ireland's 2023 total emissions, this equates to ~0.0093% of Ireland's annual greenhouse-gas emissions. Over a 25-year operational period, total operational emissions would be 127,359.50 tCO₂e; including the one-off construction emission of 2.68 tCO₂e, the whole-of-project total is 127,362.18 tCO₂e.

9.53 Industry accounted for 6.29 MtCO₂eq of annual carbon emissions in 2023. The proposed development's annual operational emissions represent ~0.081% of the industry sector's emissions.

9.54 The EPA has produced provisional estimates of greenhouse-gas emissions for 1990–2023 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.

9.55 The EPA EIAR guidelines (2022) describe “indirect effects” as effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway. Two potential pathways can be identified here:

- **Use-phase emissions from quarry products.** Aggregates produced on site will, when incorporated into roads, civil engineering, etc., ultimately drive further CO₂-eq emissions in their manufacture of end-products, transport to those sites, on-site processing and eventual demolition and recycling.
- **Wider economic knock-on.** By sustaining local construction and manufacturing activity, the quarry helps underpin off-site jobs, energy use and transport services, which in turn generate further emissions beyond the site boundary.

9.56 Conversely, many of the quarry’s products enable low-carbon and climate-resilient solutions— e.g. foundations for wind turbines and solar arrays —thus yielding indirect climate benefits.

9.57 These downstream activities, whether positive or negative, are deemed too remote and variable to be meaningfully attributed to this single development. They depend on innumerable end-uses, alternate sourcing strategies, product lifespans and recycling rates—none of which can be reliably forecast at the project design stage. Therefore, while acknowledged, they are not carried forward as quantified effects in this chapter.

9.58 In the context of Ireland’s total 55 Mt CO₂-eq annual emissions (EPA, 2023) and the quarry’s own footprint (≈ 0.0093 %), any such unquantified downstream or secondary-economy emissions would be an order of magnitude smaller and dispersed across multiple sectors. They are not considered to represent a significant indirect climate impact of the proposed extension.

Significance of Effects

9.59 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
HCV Transport	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

9.60

Mitigation

Climate Change/Weather Events

9.61 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.

9.62 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 distillate fuel or other 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 Environmental Report 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
Temperatures Extremes	Increasing atmospheric temperatures could result in the operational instability This has the potential to impact the operation of the quarry	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	Not significant

	<p>This can cause harm to people working at the Proposed</p> <p>Development, damage to the Site infrastructure and harm to the environment in the event of a major fire.</p> <p>Lightning could also present a source of ignition to flammable materials resulting in a major fire. which could harm people both onsite and offsite.</p>	<p>safety codes, standards and Directives.</p>	
Landslides	<p>Quarry face or embankment failures (triggered by heavy rainfall or ground instability) that could result in damage to site infrastructure or injury to personnel</p>	<p>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</p>	Not Significant

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Carbon Emissions

9.63 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
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.	
	Investigate the use of renewable energy sources, such as solar or wind, to power	

	<p>crushers and screening equipment.</p> <p>Improve energy efficiency by using variable speed drives (VSDs) on crushers and conveyor belts to reduce energy wastage, where possible.</p> <p>Optimise transport routes to minimise empty return trips and improve load efficiency.</p>	<p>RECEIVED: 27/08/2025</p>	
Loss of vegetation	<p>Implement Landscape and Restoration plan (Figure 3.2) to offset vegetation loss and increase net biodiversity.</p> <p>Plant screening berms with native species to sequester carbon.</p> <p>Explore the creation of on-site carbon offset projects, such as habitat restoration or wetland creation, to absorb CO₂ emissions over time.</p> <p>Replace c. 6.81 hectares of removed commercial forestry with equivalent off-site forestry as part of felling licence requirements.</p>		<p>Not significant</p>
Overburden movement and site restoration	<p>Reduce unnecessary overburden movement by strategically planning excavation sequences.</p> <p>Reuse overburden material for site restoration or landscaping to minimise transport emissions.</p>	<p>Not significant</p>	

Residual Impacts

- 9.64 Residual impacts are those that remain after the implementation of the mitigation measures.
- 9.65 Assuming implementation of the mitigation measures, the residual effects of the proposed development during construction, operational and restoration / decommissioning are assessed to be not significant.
- 9.66 The residual effects are presented in the mitigation measures table 9.8 and 9.9.
- 9.67 The residual effects of the proposed development are not significant.

Cumulative Assessment

- 9.68 Potential cumulative effects on climate between the proposed development and other developments in the vicinity were also considered as part of the assessment.
- 9.69 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'

- 9.70 If the proposed development is not granted, then the extension to 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.
- 9.71 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).
- 9.72 The land will be kept as agricultural use and will continue to generate carbon emissions associated with agricultural due to nitrogen fertilizer use and machinery.

'Worst-case Scenario'

- 9.73 Under worst-case conditions, the quarry's operations do not significantly impact global carbon levels.
- 9.74 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 dust suppression and processing activities.
 - Prolonged heavy rains and increased storm intensity lead to soil saturation and instability within the quarry void.
 - Increased frequency of heatwaves results in dangerously high temperatures on site.

Impact Assessment Conclusion

- 9.75 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.
- 9.76 The carbon footprint assessment shows that the proposed development will not make a significant contribution to global carbon concentrations.

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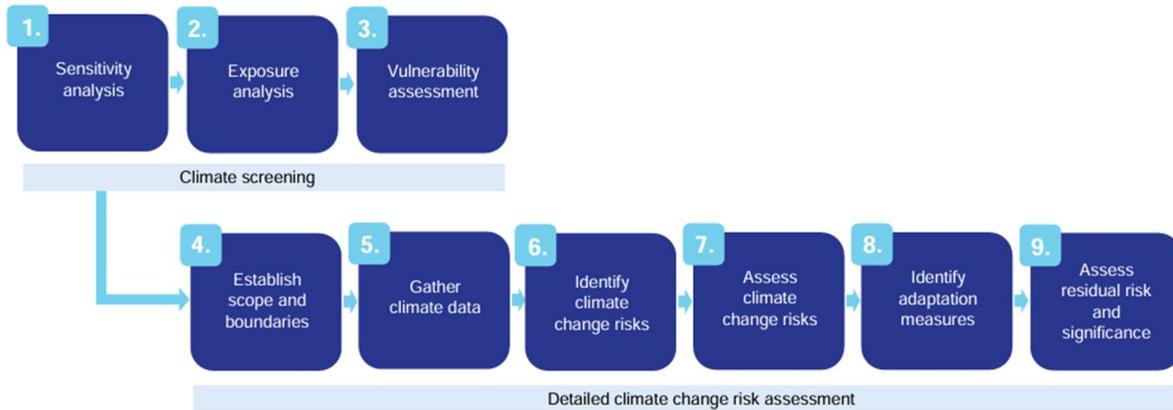
Appendix A - Climate Change Risk Assessment Methodology

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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, Storage Shed
- Site Infrastructure: Access roads, fencing, water management systems.
- Plant Machinery: Excavators, loaders
- Processing Infrastructure: Crushing and screening plant, 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.

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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

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Carbon Footprint Assessment Report

Introduction

- 9.1 This report outlines the carbon footprint associated with the proposed lateral extension of an existing limestone quarry in Ardgaheen, Claregalway, 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 586.83 tCO₂e, based on an assumed 800 l /day consumed for 275 working days / annum.
- 9.3 The maximum potential volume of aggregate to be exported off-site is 400,000 tonnes per annum, although the actual quantity is expected to be lower. The carbon emissions tied to excavating this aggregate are 2996.04 tCO₂e. The carbon emissions tied to processing this aggregate are 395.06 tCO₂e. The transport emissions connected with moving the aggregate off-site amount to 1,115.88 tCO₂e. The HGVs are estimated to travel 1,040,000km annually.
- 9.4 Considering the above, the annual emissions for the operational phase are estimated to be 5,094.38 tCO₂e.

Decommissioning Phase

- 9.5 The decommissioning phase will involve allowing groundwater levels to their natural states. As the groundwater levels rebound in the quarry void, there will be an enhancement in habitat diversity. There is anticipated to be no direct carbon impact during this decommissioning phase.

Conclusion

- 9.6 The proposed development activities contribute carbon emissions across different stages. However, initiatives like the establishment of habitats in the operational phase represent positive steps towards offsetting some of these emissions. With effective planning and management, the carbon efficiency throughout the quarry's lifecycle can be further optimised.

Appendix C - Relevant Guidance

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International Greenhouse Gas Emission Targets

Kyoto Protocol 2005

- 9.7 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.
- 9.8 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

- 9.9 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.
- 9.10 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.
- 9.11 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

- 9.12 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.
- 9.13 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

9.14 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

9.15 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.

9.16 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

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

9.18 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

9.19 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

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

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

9.22 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.

9.23 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

9.24 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.

9.25 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

- 9.26 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.
- 9.27 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)

9.28 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

9.29 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

9.30 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.

9.31 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

9.32 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).

- 9.33 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

- 9.34 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.
- 9.35 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

- 9.36 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.
- 9.37 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

- 9.38 Directive 2014/52/EU of the European parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment 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.
- 9.39 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}

- 9.40 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}

- 9.41 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.