Lobinstown Quarry

Environmental Impact Assessment Report

Section 8

Climate

2024

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8 CLIMATE

This section of the Environmental Impact Assessment Report (EIAR) describes the Climate, Impact on Climate and Resilience to Climate Change in respect to the proposed development at the quarry at Heronstown, Lobinstown, Navan, Co. Meath. The development will consist of the continuance of operation of the existing permitted quarry and associated infrastructure (ABP Ref. 17.QD.0017; P.A. Ref. LB200106 & ABP Ref. 309109-21), deepening of the quarry extraction area by 1 no. 15 metre bench from 50 m OD to 35 m OD, a lateral extension to the quarry over an area of c. 4.8 ha to a depth of 35 m OD, provision for aggregates and overburden storage, and restoration of the site to natural habitat after uses following completion of extraction, within an overall application area of c. 18.5 hectares. An extraction capacity of up to 300,000 tonnes per annum is sought to provide the applicant with the ability to respond to demand for aggregates in the region. Permission is sought for a period of 20 years in order to extract a known resource with a further 2 years to fully restore the site.

Blasting will continue to be used as the method of extraction, to fragment the rock prior to crushing, screening and aggregate washing using mobile plant on the quarry floor. The existing site infrastructure includes site entrance with c. 350 m long paved internal roadway, internal access roads, weighbridge, wheelwash, portacabin office, car park, mobile crushing, screening and washing plant, settlement lagoon system, and other ancillaries, which will be maintained onsite for the duration of the works. An effluent treatment system also exists on-site (Refer to EIAR Figure 3.1). Discharge of water from the settlement lagoon at the northern boundary of the existing quarry into the adjacent Killary Stream, Keeran River and ultimately the Dee River is undertaken in compliance with existing trade effluent discharge licence consent (Ref. 20/01).

Climate is defined as an environmental factor under Directive 2011/92/EU, whilst Directive 2014/52/EU requires the vulnerability of a project to climate change to be addressed, particularly the risk of major accidents and/or disasters that are relevant to the project, including those caused by climate change.

The Intergovernmental Panel on Climate Change (IPCC 2021) define "Climate in a narrow sense, as the average weather or more rigorously as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization (WMO). The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system."

The Intergovernmental Panel on Climate Change (IPCC 2021) define "Climate Change as a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use." The United Nations Framework Convention on Climate Change (UNFCCC), in its Article 1, defines Climate Change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." In this section of the EIAR, we will apply the latter more restrictive definition of Climate Change, which refers to change due to human activity.

In the context of an EIAR, climate may refer to local climatological conditions (long-term weather patterns, e.g., local wind flow, temperature, rainfall or solar radiation) and particular "microclimate" effects of the project location (e.g., due to localised heat island effects, the effects of buildings / shade or coastal effects).

Climate may also refer to the impact of the project in the context of greenhouse gas (GHG) emissions and potential effects associated with climate change. Determining whether a project will have a significant impact on current and future climate requires an understanding of the vulnerability of the project to climate change, the likely magnitude of GHG emissions associated with the activity as well as an understanding of the likely local impacts of climate change throughout the timescale of the project.

8.1 INTRODUCTION

"Sustainable development is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission 1987), and is the principle underpinning all current planning legislation. There is no greater challenge to meeting the latter obligation than the issue of human-induced global climate change. Developments can have implications on a national or global scale, where for example, it may represent a significant proportion of the national contribution of greenhouse gases. In the context of most Environmental Impact Assessment (EIA) however, climate is restricted in scope to the local climatological conditions or "microclimate" of an area, such as local wind flow, temperature, rainfall or solar radiation patterns.

For the purposes of Environmental Impact Assessment, a development may be seen to have potential climatic implications if its emissions are likely to alter meteorological conditions with possible weather effects.

This section of the EIAR describes the climate for the proposed extension, laterally and to depth, of the Lobinstown Quarry, and its impact on the climate of the application site and its environs as a result of the activities undertaken.

The prevailing weather systems are described with emphasis on the long-term patterns and trends. It involves an assessment of the prevailing climatic conditions and assesses the potential impact of the development on the latter.

8.2 REGULATORY BACKGROUND

8.2.1 CLIMATE CHANGE

8.2.1.1 Background

The EPA define climate change as a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period of decades or longer. The IPCC (2013) define climate change as “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer”.

Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions). The Directive also requires the vulnerability of a project to climate change to be addressed, particularly ‘the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change.

Natural factors that can give rise to climate change include: (a) changes in the sun's intensity, (b) volcanic eruptions; (c) slow changes in the Earth's orbit around the sun; and (d) variations within the climate system, such as changes in ocean current circulation. However, climate change has been attributed more recently to human activities through our emissions of greenhouse gases that are changing the composition of the earth’s atmosphere. The main human activities that contribute to climate change include: (a) carbon dioxide emissions through burning fossil fuels, such as coal, oil and gas and peat; (b) methane and nitrous oxide emissions from agriculture; and (c) emissions through land use changes, such as deforestation, reforestation, urbanization, and desertification. Since the beginning of the industrial revolution, the increased burning of fossil fuels and deforestation have caused the concentrations of heat-trapping greenhouse gases to increase significantly in the atmosphere, which prevents heat from escaping to space.

The Fifth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC) published in 2013, states that “Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century. Cumulative emissions of CO_2 largely determine global mean surface warming by the late 21st century and beyond. Most aspects of climate change will persist for many centuries even if emissions of CO_2 are stopped. This represents a substantial multi-century climate change commitment created by past, present and future emissions of CO_2”. The Sixth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC) published in 2021, states that “It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.”

The 2018 IPCC Special Report on Global Warming of 1.5°C states that the impacts of human-induced global warming of 1°C are already being felt in the intensity and frequency of some climate and weather extremes. Internationally, climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and will increase further if warming reaches 2°C. DoCCE (2021) state that observations show that Ireland's climate is changing, at a scale and rate consistent with regional and global trends.

8.2.1.2 Kyoto Protocol 1997

Member countries, including Ireland, ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994. It was soon augmented by an international agreement linked to the existing treaty, known as the Kyoto Protocol, with stricter demands for reducing greenhouse-gas emissions. The protocol was adopted in 1997 and entered into force on 16 February 2005. The Protocol's major feature is that it has mandatory targets on greenhouse-gas emissions for the world's leading economies. These targets range from -8 per cent to +10 per cent of the countries' individual 1990 emissions levels, with a view to reducing their overall emissions of such gases by at least 5 per cent below existing 1990 levels in the commitment period 2008 to 2012. In almost all cases, the limits call for significant reductions in currently projected emissions. A mechanism to set future more stringent mandatory targets for subsequent "commitment periods" after 2012 was established.

8.2.1.3 Paris Agreement 2015

The UNFCCC has continued on-going, detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The Conference of the Parties (COP21) was convened in Paris in 2015, and was an important milestone in terms of international climate change agreements. The so-called "Paris Agreement" builds upon the convention, and for the first time, brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. As such, it charts a new course in the global climate effort.

The Paris Agreement was signed by over 200 nations (166 parties have ratified the agreement at the time of writing). The central aim of the agreement is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5°C. The objective is to limit global GHG emissions to 40 giga tonnes as soon as possible, while acknowledging that peaking of GHG emissions will take longer for developing countries. Significant progress was also made on elevating adaption onto the same level as action to cut and curb emissions. The agreement requires all parties to put forward their best efforts through based on intended nationally determined contributions (INDCs), which will form the foundation for climate action post 2020.

The agreement also aims to strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives.

The EU agreed the "2030 Climate and Energy Policy Framework" on the 23/24th of October 2014 (EU 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the emissions trading system (ETS) and non-ETS sectors, amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all member states will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

8.2.1.4 Glasgow Climate Pact 2021

The United Nations Climate Change Conference COP26 was held recently in Glasgow UK from 31st October to 12th November 2021. The four primary objectives of COP26 were:

1 **Secure Global Net Zero by Mid-Century and Keep 1.5 Degrees Within Reach.** Countries are being asked to come forward with ambitious 2030 emissions reductions targets (NDCs) that align with reaching net zero by the middle of the century. Countries will need to accelerate the phase-out of coal, encourage investment in renewables, curtail deforestation and speed up the switch to electric vehicles.

COP26 secured commitments to cut emissions to keep within reach the global warming limit of 1.5°C set in the Paris Agreement. Before COP26, the planet was on course for a dangerous 2.7°C of global warming, it is now estimates that we are on a path to between 1.8°C and 2.4°C of warming. COP26 also marks a turning point for action on fossil fuels, as the COP decision text contains the first ever references, although compromised, to coal and fossil fuel subsidies. COP26 agreed to accelerate efforts towards the phase-down of unabated coal power and inefficient fossil fuel subsidies and recognised the need for support towards a just transition.

2 **Adapt to Protect Communities and Natural Habitats.** The climate is already changing and will continue to change even as emissions are reduced. Collaboration is vital to enable countries affected by climate change to protect and restore ecosystems, build defences, install warning systems and make infrastructure and agriculture more resilient.

3 **Mobilise Finance.** In order to realise the first two goals, developed countries must deliver on their promise to raise at least $100bn per annum in climate finance. At COP26, the target of 100 billion dollars per year of climate finance to developing and vulnerable countries was secured. The parties also committed to a process to agree on long-term climate finance beyond 2025.

4 **Work Together to Deliver.** The global community can only rise to the challenges of climate change by working together. COP26 resulted in completion of the Paris Agreement rulebook (the rules needed to implement the Paris Agreement) and kept the Paris targets alive, giving us a chance of limiting global warming to 1.5°C.

8.2.1.5 National Policy, Plans & Legislation

The National Climate Policy Position established the national objective of achieving a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050 (DoCCE 2021). It sets out the level of greenhouse gas mitigation ambition needed and establishes the process to achieve the overall objective. The National Policy Position envisages that policy development will be guided by a long-term vision based on:

- an aggregate reduction in carbon dioxide (CO_2) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors
- an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

The evolution of national climate policy will be based on the adoption by government of a series of national plans which will include early identification and ongoing updating of possible transition pathways to 2050 to inform sectoral strategic choices. National plans will be adopted and reviewed on a structural basis to ensure a coherent policy across all key sectors.

The enactment of the Climate Action and Low-Carbon Development Act 2015 was a landmark national milestone in the evolution of climate change policy in Ireland. The Act provides the statutory basis for the national transition objective laid out in the national policy position. As set out in the Act, the Minister for Communications, Climate and Environment must submit to government a series of successive plans and frameworks that will ensure the national transition objective is achieved by the implementation of cost-effective measures.

The National Adaptation Framework (NAF) was developed under the above Act and was published in January 2018 (DoCCE 2018). The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. It provides a framework to ensure local authorities, regions, and key sectors can assess the key risks and vulnerabilities of climate change, implement actions to build resilience to climate change, and ensure climate adaptation considerations are mainstreamed into all local, regional, and national policy. Under NAF, seven government departments with responsibility for priority sectors were required to prepare sectoral adaptation plans. Each plan identifies the key risks faced across the sector and the approach being taken to address these risks and build climate resilience for the future. These plans are now in the implementation phase.

Local authorities have essential local knowledge and have a critical role to play in managing climate risks and vulnerabilities and identifying adaptation actions that will build resilience locally. Consequently, local authorities are required to prepare local adaptation strategies. NAF also aims to improve the enabling environment for adaptation through ongoing engagement with civil society, the private sector and the research community.

The Climate Action Plan 2021 set out an ambitious course of action to adapt to climate disruption, which is having diverse and wide ranging impacts on Ireland's environment, society, economic and natural resources. The Climate Action Plan is Ireland's plan to tackle climate breakdown and achieve net zero greenhouse gas emissions by 2050. The plan clearly identifies the nature and scale of the challenge, and outlines the current state of play across key sectors, including electricity, transport, built environment, industry and agriculture, and charts a course towards ambitious decarbonisation targets.

8.2.1.5.1 Climate Action and Low Carbon Development (Amendment) Act 2021

The Climate Action and Low Carbon Development (Amendment) Act 2021 was passed into law on 23rd July 2021, and places Ireland on a legally binding path to net-zero emissions no later than 2050, and to a 51% reduction in emissions (compared to 2018 levels) by the end of this decade. The key highlights of the Act are as follows:

1. This Act embeds the process of setting binding and ambitious emissions-reductions targets in law;
2. The Act provides for a national climate objective, which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally-sustainable and climate-neutral economy;
3. The Act provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% over the period to 2030, relative to a baseline of 2018;
4. The role of the Climate Change Advisory Council has been strengthened, enabling it to propose carbon budgets to the Minister which match our ambition and international obligations;
5. The government must adopt carbon budgets that are consistent with the Paris agreement and other international obligations;
6. The Government will determine, following consultation, how to apply the carbon budget across the relevant sectors, and what each sector will contribute in a given five-year period;
7. Actions for each sector will be detailed in the Climate Action Plan which must be updated annually;
8. Government Ministers will be responsible for achieving the legally-binding targets for their own sectoral area; and
9. Local Authorities must prepare individual Climate Action Plans which will include both mitigation and adaptation measures and will be updated every five years.

8.2.1.5.2 Climate Action Plan 2021 (CAP21)

The Climate Action Plan 2021 provides a roadmap to achieving Ireland's commitment to halving greenhouse gas emissions by 2030 (compared to 2018 levels) and reaching net zero by 2050 at the latest. In simple terms, the Plan sets out those measures to be taken to reach the targets in each sector of the economy. These sectoral targets will be set by the government in each five year period. Each sector will need to adapt rapidly, and this will allow Irish society and economy to realise the opportunities of the transition, and to remain competitive and resilient. Thus, implementation of the Climate Action Plan will create jobs, new economic opportunities and protect people and the planet.

The Climate Action Plan 2021 has been broadly welcomed by the construction sector, particularly inclusion of whole life carbon targets for construction in the Climate Action Plan, such as a 44-56% reduction for the housing industry. Key targets within the Plan include:

- The enabling of 500,000 daily sustainable travel journeys by 2030 through major public transport projects such as BusConnects and Connecting Ireland; the expansion of rail services and cycling and walking infrastructure.
- The increase in the proportion of renewable electricity to up to 80% by 2030, including an increased target of up to 5 Gigawatts of offshore wind.
- Small-scale generation scheme for farmers, businesses and communities to generate their own electricity and feed this back into the national grid.
- Delivery of three new transmission grid connections or interconnectors to Northern Ireland, Great Britain, and the EU.
- A new National Retrofit Plan and grant scheme, including the training of more skilled retrofit workers, and a programme to decarbonise the heating and cooling sectors by 2050 - 600,000 homes to be fitted with heat pumps, 400,000 of them existing homes.
- An increase in the number of EVs to circa 1 million by 2030.

The plan sets out indicative ranges of emissions reductions for each sector of the economy. The emissions reductions per sector by 2030 are:

- Electricity: 62-81%
- Transport: 42-50%
- Buildings: 44-56%
- Industry/Enterprise: 29-41%
- Agriculture: 22-30% reduction
- Land Use, Land Use Change and Forestry (LULUCF): 37-58%

Delivery of the plan could require €45bn of additional investment compared to a baseline where Ireland took no climate action. Of this €45bn in capital expenditure, €25bn (55%) will be invested in the buildings sector, €15bn (35%) in the power sector, and €5bn (10%) in transport. The Government will support the changes through major public investment over the period 2021 to 2030, which was announced recently in the €165bn National Development Plan (NDP). This will bring public investment to 5% per cent of gross national income, well above the recent EU average of 3% of gross domestic product.

Extensive efforts were made to ensure that the NDP supports the Government's climate ambitions. Thus, for the first time in Ireland, climate and environmental assessment of the measures in the NDP was undertaken, along with an assessment of the alignment of the plan as a whole with the ideals of a green recovery plan.

8.2.1.5.3 Climate Action Plan 2023 (CAP23)

The government published the Climate Action Plan 2023 (CAP23) in December 2022, which is the first updated plan since the introduction of the Climate Action and Low Carbon Development (Amendment) Act 2021. Although Ireland has committed to reducing emissions by 51% by 2030 (from the 2018 baseline), energy related emissions were up by over 5% in both 2021 and 2022. CAP23 is a roadmap to enable Ireland to meet its emissions reduction requirements and aims put the country back on a trajectory to its 2030 targets. The plan is sets out six vital sectoral targets, which are:

Renewables:

A 75% reduction in emissions by 2030 through large-scale deployment of renewables that will be critical to decarbonising the power sector as well as enabling the electrification of other technologies. In particular, accelerate the delivery of onshore wind, offshore wind, and solar, ramping up to 9 GW onshore wind, 8 GW solar, and at least 7 GW of offshore wind by 2030 (with 2 GW earmarked for green hydrogen production).

Buildings:

A 45% and 40% reduction in emissions from commercial and residential buildings, respectively, by 2030, through increasing energy efficiency of existing buildings, putting in place policies to deliver zero-emissions new builds and continuing to ramp up our retrofitting programme. In particular, ramping up retrofitting to 120,000 dwellings to BER B2 by 2025, jumping to 500,000 by 2030; and installing heat pumps into 45,000 existing and 170,000 new dwellings by 2025, up to 400,000 existing and 280,000 new dwellings by 2030.

Travel:

A 50% reduction in emissions by 2030 by driving policies to reduce transport emissions by improving our town, cities and rural planning, and by adopting the Avoid-Shift-Improve approach, which will reduce or avoid the need for travel, shift to public transport, walking and cycling and improve the energy efficiency of vehicles. In particular, reduce the total distance driven across all car journeys by 20%; facilitate a modal shift to walking, cycling and public transport (account for 50% of journeys); and facilitate nearly 1 in 3 private cars becoming an Electric Vehicle.

Farms:

A 25% reduction in emissions by 2030 through support to farmers to continue to produce worldclass, safe and nutritious food while also seeking to diversify income through tillage, energy generation and forestry. In particular, reduce our use of chemical nitrogen as a fertilizer significantly; increase uptake of protected urea on grassland farms to 90-100%; and increase organic farming to up to 450,000 hectares, the area of tillage to up to 400,000 ha.

Business & Industry:

A 35% reduction in emissions by 2030 by changing how we produce, consume, and design our goods and services by breaking the link between fossil fuels and economic progress. Decarbonising industry and enterprise is key to Ireland's economy and future competitiveness. In particular, decrease embodied carbon in construction materials produced and used in Ireland by at least 30%; reduce fossil fuel use from 64% of final consumption (2021) to 45% by 2025 and further by 2030; increase total share of heating to carbon neutral to 50-55% by 2025, up to 70-75% by 2030; and significantly grow the circular economy and bioeconomy.

Land Use:

The reduction target for this sector has not been established as of yet. Once current land usage is mapped out, it will inform the most effective way to capture and store carbon and to produce better, greener food and energy.

8.2.1.6 Guidance

There is no guidance on the general climate other than, in respect of EIARs, the EPA's Draft Advice Notes for Preparing an Environmental Impact Statement (EPA 2015). Some of the guidance available specifically with respect to climate change is given below.

DoCCE (2018). Sectoral Planning Guidelines for Climate Change Adaptation. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/129614/9bcbb18e-7203-4079-9a59-833842e932f2.pdf#page=null

EU (2013). Guidance on Integrating climate change and Biodiversity into Environmental Impact Assessment. Available at: https://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf

EU (2016). Climate Change and Major Projects. Available at: https://ec.europa.eu/clima/sites/clima/files/docs/major_projects_en.pdf

IEMA (2017). Assessing Greenhouse Gas Emissions and Evaluating their Significance. Available at: https://www.iaia.org/pdf/wab/EIA%20Guide_GHG%20Assessment%20and%20Significance_IEMA_16May17.pdf

Meath County Council (2023). *Draft Climate Action Plan*. Meath County Council, Navan, Co. Meath , Ireland. Available at:

https://www.meath.ie/council/council-services/environment/climate-action/meath-county-council-climate-action

8.3 METHODOLOGY

The objective of this study was to:

- Assess the prevailing climatic conditions of the development area on a local and regional level;
- Determine the impact, if any, of the development on the local microclimate and regional macroclimate;
- Determine any interaction between other aspects of the development and the climate of the area;
- Estimate the developments GHG emissions; and
- Determine vulnerability of development to climate change.

8.3.1 STUDY

The study of climate in respect of the proposed development was entirely a desktop study, involving the compilation and analysis of data and information on weather, climate, climate change, and impact of, and vulnerability to, climate change.

8.3.2 SOURCES OF INFORMATION

The principal sources of information include:

1. Met Eireann, Glasnevin, Dublin, Ireland;
2. Environmental Protection Agency (EPA), Johnstown Castle, Wexford, Ireland;
3. Sustainable Energy Authority of Ireland SEAI), Dublin, Ireland;
4. Intergovernmental Panel on Climate Change (IPCC), New York, USA; and
5. European Union, Brussels, Belgium.

8.4 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

8.4.1 CLIMATE

Lobinstown Quarry is located within the Townland of Heronstown, c. 2 km southeast of Lobinstown, c. 9 km northwest of Slane, c. 9 km west of Collon, c. 10 km southwest of Ardee, c. 14.5 km north-northeast of Navan.

The quarry is located on the north side of, and with direct access onto, the L1603 local road, which extends from the N52 south before crossing the L1604 local road (i.e., Collon Road) c. 1.2 km east of Lobinstown and continuing on to the N51 at Harlinstown Cross Roads c. 1.5 km west of Slane (Refer to Figure 1.1 & 1.2). The L1603 is known as the Slane Road south of the intersection with the L1604 at McEntegart's Crossroads and in the vicinity of the site. Access to the N51 Delvin to Drogheda National Secondary Road is gained c. 1 km west of Slane.

The site is located in a rural setting at elevations between c. 85-120 m Above Ordnance Datum (AOD) and overlies Palaeozoic rocks of the Longford-Down Massif, close to the northeastern margin of the Irish Midlands limestone terrain. The topography of the region is characterised by relatively flat to undulating landform to the northwest, which is largely devoid of lakes and peatlands, and is relatively typical of the lowlands in County Meath. However, a series of NE-SW trending hills, known as the Ferrard Hills are located c. 1 km southeast of the site, the highest of which, Mount Oriel, rises to 251 m OD. The elevation of the lands in the vicinity of the site gradually increase to the southeast from c. 84 m OD at the northwestern boundary of the landholding to c. 112 m OD at the southeastern boundary and 225 m OD at Slieve Bengh, c. 2. 5 km to the southeast.

The existing quarry is surrounded by agricultural fields, mostly pasture, with minor levels of scrub and forestry plantation in the wider area, although a large tract of afforestation lies c. 75 m to the east of the site bordering the landholding.

A 220 kV overhead transmission line traverses the eastern side of the landholding in a NNW-SSE orientation. A 10 and 20 m standoff will be maintained to the application and extraction areas, respectively.

The proposed extension occurs within four contiguous fields, which are bounded by discontinuous hedgerows and stock fencing. A perimeter earthen berm will be constructed and seeded on the boundaries of the extension to screen the quarry workings from outside views.

The Killary Stream (KILLARY WATER_010, IE_NB_06K010100) flows along the northern site boundary which drain into the Killary Water River c. 2.5 km to the west. The Killary Water flows into the River Dee almost 10 river kilometres downstream, which discharges into the Dundalk Bay SAC (Site Code: 000455) and SPA (Site Code: 004026) a further 33 river kilometres downstream.

As a small island downwind of an extensive ocean, the climate of Ireland is profoundly impacted by the Atlantic Ocean. The dominant influence on Ireland's climate is the Atlantic Ocean, such that Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. The warm North Atlantic Drift or Current has a marked influence on sea temperatures, the influence of which is strongest near the Atlantic coasts and decreases with distance inland.

The Atlantic circulation, which includes ocean currents such as the North Atlantic Current, moves heat northwards, which is then carried by the prevailing winds towards Ireland. The prevailing winds are westerly to southwesterly, and break on the hills and mountains of the west coast, which provide shelter from both the strong winds and from the direct oceanic influence. Rainfall is therefore a particularly prominent aspect of the climate in the west, with annual average precipitation highest on the west coast and in inland areas of high relief. Rainfall is much less prominent in the eastern half of the island.

The climate of Ireland is described as a typical "Temperate Maritime Climate", which is modified by the North Atlantic Current, and is overcast about half the time with consistently high average humidity. Winters tend to be cool, moist and windy, while summers are mostly mild, cloudy and less windy, when the depression track is further north and depressions less deep. For the greater part of the year, warm maritime air associated with the Gulf Stream helps to moderate the climate from the extremes of temperature experienced by many other countries at similar latitude.

A prominent feature of the atmospheric circulation in the North Atlantic, the polar front, plays an important role in the Irish climate (Met Eireann 2017). It's a zone of transition between warm, moist air (often of tropical origin) moving northwards and colder, denser, drier air (typically of polar origin) moving southwards. In winter, the polar front usually extends north eastwards from the east coast of the United States, whereas in summer it is less well-defined. Disturbances on the front sometimes amplify and deepen to form the large-scale depressions of the middle latitudes. These depressions often move north eastwards across the North Atlantic and pass to the northwest of Ireland. Ahead of the depression centres, warm moist air is swept northwards, while behind them colder, drier air is swept southwards. This gives the sequence of cloudy, humid weather with rain, followed by brighter, colder weather with showers so typical of the Irish climate.

Ireland experiences a range of air masses with different sources and tracks, giving us our variable weather. Air masses of polar origin are most common, but they usually have a long track over the Atlantic before reaching Ireland. Even southerly or southwesterly winds can bring us returning polar air, albeit highly modified by its excursion into the warm waters of the mid Atlantic. Air masses of direct tropical or polar origin are uncommon.

The World Meteorological Organization (WMO) recommends that climate averages are computed over a 30-year period of consecutive records. The period of 30 years is considered long enough to smooth out year to year variations. By collecting weather data from around the country every hour and by analysing these records over a long period of time, 30-year average values are calculated. Met Éireann now reference 1981 to 2010 as the baseline period for day-to-day weather and climate comparisons. The closest synoptic weather station to the Lobinstown site with 30-year averages for the 1981 to 2010 period is at Mullingar, Co. Westmeath, c. 55 km to the southwest, which was automated in 1998. There is also a synoptic weather station at Dunsany(Grange).

Ireland has a typical temperate maritime climate, with relatively mild, moist winters and cool, cloudy summers. The prevailing winds are westerly to southwesterly. For the greater part of the year, warm maritime air associated with the Gulf Stream helps to moderate the climate from the extremes of temperature experienced by many other countries at similar latitude. The average humidity is high. Annual average precipitation is highest on the west coast and in inland areas of high relief.

8.4.1.1 Rainfall

Rainfall in Ireland normally arises from Atlantic frontal systems, which travel in a northeasterly direction delivering cloud and rain. Highest rainfall occurs in the Western half of the country and on high ground; rainfall generally decreases towards the northeast (See Figure 8.1). Averaged over all Ireland, the average annual rainfall is approximately 1,230 mm. The driest seasons are spring and summer, with an all-Ireland average of approximately 260 mm, autumn and winter have all Ireland averages of approximately 350mm. The driest months are April, May, June and July, with an all-Ireland average of approximately 80mm each month. February, March, August and September have average rainfall totals of approximately 100mm, while October, November, December and January have all Ireland averages of approximately 130mm.

On an annual basis, averaged over the country, there has been an increase of approximately 5% in rainfall totals between the two normal periods (1961-1990 and 1981-2010), with the higher increases in the western half of the country. All seasons show an overall increase in rainfall but there are regional differences. There are decreases of up to 10% rainfall in the South and East in winter, with corresponding increases in the West and Northwest. Spring and summer show increases of 5-10%. While most months show an increase in rainfall of 5-10%, January and February had decreases of 5-10% in the South and East, while September had a general decrease of up to 10%. In July, the average increase in rainfall was in the order of 15%.

Local weather data are provided by the nearest synoptic station to the site, which is Dunsany (Grange), which suggests that the average annual potential evapotranspiration (PE) rates are 536 mm. Actual evapotranspiration (AE) is conventionally estimated by multiplying PE by 0.95, to allow for the reduction in evapotranspiration during periods when a soil moisture deficit is present (Water Framework Directive Working Group GW5, 2004). Actual evapotranspiration is therefore 509 mm/yr (0.95 PE). Refer to EIAR Section 7.3.1 for details in Meteorology.

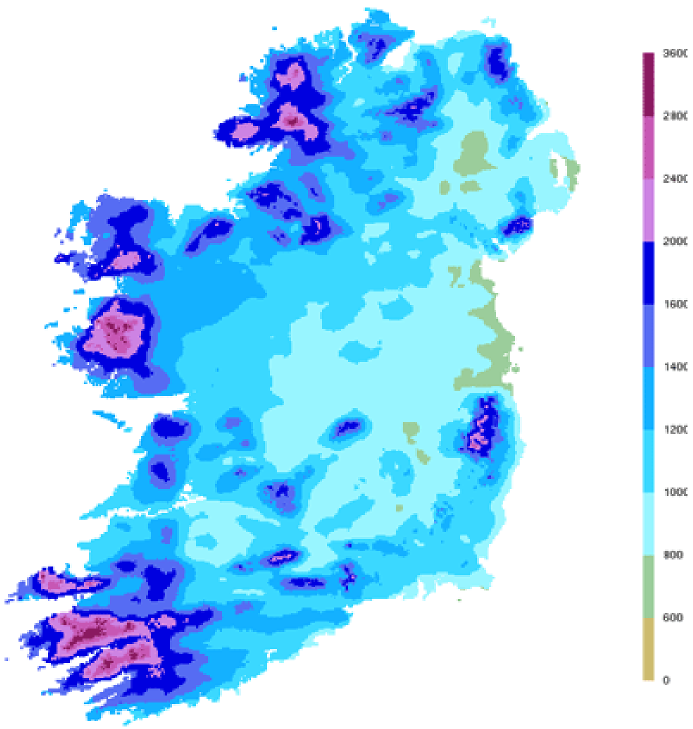

Figure 8.1 Mean Annual Rainfall (mm).

Sourced from Met Eireann (2018).

8.4.1.2 Temperature

The temperature regime in Ireland is greatly affected by the moderating effect of the sea, and height above sea level. Mean annual temperatures generally range between 9°C and 10°C with the higher values in coastal regions. Summer is the warmest season, followed by autumn, spring and winter. Highest temperatures occur inland during the summer, with mean seasonal maxima between 18°C and 20°C, while highest values during the winter occur in coastal regions. July is the warmest month, followed by August and June; the coldest month is January followed closely by February and then December.

Generally, there has been an increase of approximately +0.5°C in mean temperature between the 1961-1990 and the 1981-2010 periods, with the highest increases in the Southeast. Maximum and minimum temperatures have also increased by approximately +0.5°C. All seasons show a rise in mean temperature with the spring and summer seasons displaying the largest differences between the two periods of approximately +0.7°C. Almost all mean monthly temperatures show an increase, except October and December, which show small decreases of up to -0.2°C in the West and Northwest.

The average daily air temperatures at Dublin Airport (1991-2020) range from 5.2ºC to 15.4ºC, with a mean 9.7ºC. These values can be considered comparable to those expected at the application site.

8.4.1.3 Wind

The prevailing wind direction over Ireland is between south and west. Average annual wind speeds range from 3 m/s in parts of South Leinster to over 8 m/s in the extreme north. On average there are less than 2 days with gales each year at some inland places like Carlow, but more than 50 a year at northern coastal locations such as Malin Head.

During the course of a typical day, the range (difference between the highest and lowest) of mean hourly wind speed is considerable. At Belmullet, a western coastal station, the mean diurnal range is 11.5 m/s in January and is still as high as 8.4 m/s in July. At Clones, a typical inland station the mean diurnal range is 8.4 m/s in January and 6.2 m/s in July. The diurnal variation is much more pronounced in summer than in winter.

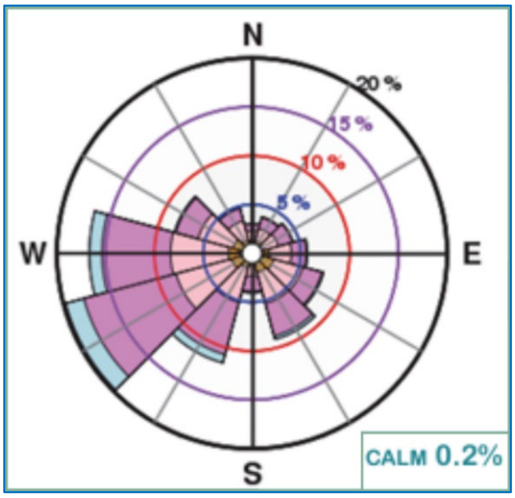

Figure 8.2 Dublin Airport Wind Rose based on 1981-2010 Averages.

Sourced from Met Eireann (2021)

Wind blows most frequently from the south and west for open sites, while winds from the northeast or north occur least often. In January, the southerly and southeasterly winds are more prominent than in July, which has a high frequency of westerly winds. Easterly winds occur most often between February and May and are commonly accompanied by dry weather.

The prevailing winds in this area are from the southwest and west as illustrated by the wind rose for the synoptic weather station at Mullingar (Refer Figure 8.2). Notable is the low percent calm value of 3.1%.

8.4.2 CLIMATE CHANGE

8.4.2.1 Kyoto Protocol 1997

As a signatory nation to the Kyoto Protocol, and for the purposes of the EU burden sharing agreement under Article 4 of the protocol, Ireland agreed to limit the net anthropogenic growth of the six Greenhouse gases (GHGs; principally CO_2 emissions) under the protocol to 13% above the 1990 level (i.e., 55.5Mt Co_{2eq}) over the period 2008 to 2012 (ERM, 1998). There have been substantial reductions in Ireland's GHG emissions in recent years, due in significant part to the impact of the economic downturn. Under the Kyoto Protocol, Ireland's total emissions are limited to an average of 62.8 Mt CO_{2eq} per annum for the first commitment period 2008-2012. By 2012, Ireland was 5.68 Mt CO_{2eq} below the Kyoto commitment for the period, and thus broadly on track to meet its commitment under the Kyoto Protocol first commitment period. When the impact of the EU Emissions Trading Scheme and forest sinks are taken into account, Ireland exceeded the Kyoto limit by 2.1 Mt CO_{2eq} (EPA 2014a).

Although Ireland is currently on track to meet its Kyoto second commitment period 2013-2030 targets, there remains significant risk that these will not be met, even under the most ambitious emission reduction scenario. Ireland's GHG emissions increased from 1990 to 2001, where it peaked at 70.46 Mt CO_{2eq}, before displaying a downward trend to 2014. In 2019, provisional estimates of total national GHG emissions amounted to 59.78 Mt CO_{2eq}, indicating that Ireland's GHG emissions have increased by 7.93% during 1990-2019.

In 2019, the energy industries, transport and agriculture sectors accounted for 71.4% of total GHG emissions. Agriculture is the single largest producer of GHG emissions with 35.3%, whilst transport, energy industries and the residential sector are the next largest producers with 20.3%, 15.8% and 10.9%, respectively.

Emissions are projected to increase in 2020-2030 (12% in total), with strong growth in emissions from transport and agriculture, indicating that Ireland is not on a pathway to a low-carbon economy (EPA 2014b). Thus, rather than rely on economic recession, Ireland needs to develop as a low carbon economy in order to meet future targets.

8.4.2.2 Paris Agreement 2015

In terms of 2030 reduction targets, the EU Effort Sharing Regulation (ESR) requires that Ireland reduce its non-Emissions Trading Scheme (non-ETS) emissions by 30% on 2005 levels by 2030. However, projections indicate that Ireland will exceed the carbon budget of 378.3 Mt CO_{2eq} by 50.8 Mt CO_{2eq} over the 2021-2030 period.

In August 2017, the Trump Administration notified the UN that the USA was formally withdrawing from the Paris Agreement, although no country was supposed to be able to give notice of its departure until November 4, 2019. Notwithstanding the former notification, many US states and cities (e.g., California and Philadelphia) pledged to meet their commitments under the agreement irrespective of the Federal government's position on climate change.

Shortly after taking office, President Biden issued an executive order that returned the US to the Paris Climate Agreement.

Ireland's National Policy position is to reduce CO_2 emissions in 2050 by 80% on 1990 levels across the energy generation, built environment and transport sectors, with a view to Climate neutrality in the agriculture and land-use sector. The extent of the challenge to meet the national 2050 targets is clear, and will require robust measures at the national policy and regulatory level.

8.4.2.3 Glasgow Climate Pact 2021

There is a general consensus that not enough was done at the COP26 meeting in Glasgow to reduce emissions consistent with avoiding climate change in coming decades. The 2030 national emission reduction targets agreed to by governments place us on a trajectory towards warming of 2.4℃ by 2100.

The Glasgow Climate Pact calls on governments to substantially increase their nationally-determined contributions (NDCs) by the end of 2022. COP26 marks a turning point for action on fossil fuels. The COP26 decision text contains the first ever references to coal and fossil fuel subsidies.

8.4.2.4 Sharm el-Sheikh Implementation Plan (SHIP) 2022

After the disappointments of COP26 in Glasgow, COP27 in Sharm el-Sheikh delivered the historic decision to establish a fund for responding to loss and damage, which would support the most vulnerable, especially in the least developed countries and small islands developing states. The conference did not achieve much in respect of mitigation, such as phasing out of coal, which impedes efforts to limit the average global temperature increase to 1.5°c (above pre-industrial levels).

8.4.2.5 Dubai Climate Summit 2023

COP28 marks the conclusion of the first global stocktake (GST), the main mechanism through which progress under the Paris Agreement is assessed every five years. It is clear the world is not on track to meet the agreement's goals, but it is hoped that governments will deliver a roadmap to accelerate climate action and initiate a "dramatic course correction" at COP28. Two other critical tasks confronting negotiators are implementation of the loss and damage fund that was established at COP27, and agreement on a framework for the Paris Agreement's global goal on adaptation (GGA). Other notable issues include energy transition and food systems transformation, as well as negotiations on climate finance.

8.4.2.6 Climate Action Plan 2023

The recently published Climate Action Plan 2023 provides a roadmap to achieving Ireland's international commitments with respect to national emission reduction targets. These will halve greenhouse gas emissions by 2030 (compared to 2018 levels) and reach net zero no later than 2050. The Plan sets out the measures to be taken to reach the targets in each sector of the economy, and these sectoral targets will be set by the government for five year periods. For example, the emissions reductions for the "Buildings" sector is 40-45% by 2030.

8.4.2.7 Impact of Climate Change on Ireland

Much of the discussion on climate change revolves around the issue of rising global temperatures. Global mean surface air temperatures have increased by on average 0.85°C over the last century, but the rate of warming has almost doubled since 1975 to c. 1.65°C per century, suggesting an accelerating trend in global warming. Average global air temperatures for the 5 years 2015–2019 were the highest since records began in the mid- to late 1800s.

The 2nd Edition of The Status of Ireland's Climate published by the EPA, Met Eireann and the Marine Institute (Walther et al. 2021) notes that the temperature records show a mean surface air temperature increase of 0.9℃ between 1900 and 2020, with a rise in temperature being observed in all seasons, and corresponds to an increase of 0.078℃ per decade. Other indicators include:

(a) 15 of the 20 warmest years on record in Ireland have occurred since 1990;

(b) increase of 6% in annual precipitation in the period 1989-2018 compared to 30-year period 1961-1990, with the 2006-2015 decade being the wettest on record;

(c) sea level rise of 2-3 mm/year since early 1990s, with a c. 1.7 mm per year rise in Dublin Bay since 1938;

(d) increase in mean sea surface temperatures at Malin Head of 0.47℃ over the 2009-2018 decade above the mean for the 1981-2010 30-year period; and

(e) a reduction in the number of frost days and shortening of frost season length.

Furthermore, ocean acidification has emerged as another significant issue (i.e., -0.05 pH units between 1991 and 2013), which will have harmful effects on marine organisms and has the potential to disrupt global marine ecosystems.

Climate change impacts are projected to increase during the rest of this century, with significant uncertainties remaining in relation to the scale and extent of these impacts. Projections of global temperatures to 2030, and beyond, based on multiple climate models, indicate widening band of potential trajectories, with predicted temperatures of 0.5–2℃ above 1960–1990 temperatures. The greatest uncertainly lies in how effective global actions will be in reducing greenhouse gas emissions. Predicted adverse impacts include:

- Sea level rise, with minor inundation of low lying coastal areas;
- More intense or extreme storms (incl. storm surges) and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding;
- Water shortages in summer in the east;
- Adverse impacts on water quality;
- Changes in distribution of plant and animal species; and
- Effects on fisheries sensitive to changes in temperature.

Paradoxically, some studies have reported that global warming due to climate change could shut-down or retard the North Atlantic Current and result in colder average temperatures in Ireland. A huge amount of heat is circulated by a single ocean current system - the Atlantic Meridional Overturning Circulation (AMOC), also known as the Atlantic Conveyor Belt. The system is driven by density, with denser waters that are cold or salty sinking to the ocean floor in the North Atlantic and flowing southwards, while warm tropical waters at the surface flow northwards in the North Atlantic Current or Gulf Stream, rendering northern Europe unusually mild for its latitude.

The AMOC is a density-driven mechanism that could become weakened if the northern waters get too warm or too fresh from melting ice. IPCC (2013, 2021) report that the AMOC will most likely weaken over the 21st century, with a best estimate of 34% loss. However, the IPCC AR6 Synthesis Report states that there is medium confidence that the AMOC "will not collapse abruptly before 2100, but if it were to occur, it would very likely cause abrupt shifts in regional weather patterns, and large impacts on ecosystems and human activities" (IPCC 2023).

8.4.2.8 Vulnerability to Climate Change

Vulnerability to climate change has been defined as "the degree to which a system [natural or human] is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity" (IPCC 2013). Thus, exposure is viewed as an external dimension, while sensitivity and adaptive capacity are viewed as internal dimensions of vulnerability.

Exposure to climate variation is primarily a function of geography, in that coastal communities will have higher exposure to sea level rise and cyclones, while communities in semi-arid areas may be most exposed to drought. IPCC (2013) state that "Sensitivity is the degree to which a given community or ecosystem is affected by climatic stresses", while "Adaptive Capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences". Access to and control over natural, human, social, physical and financial resources is one of the most important factors shaping the adaptive capacity of individuals and communities. Whereas climate impacts can generally be described quantitatively by changes in biophysical indicators or in socio-economic indicators, there is no agreed metric to quantitatively describe the vulnerability of a natural system or sector. Consequently, vulnerability seems to be a relative measure rather than a quantity that can be expressed in absolute terms. Therefore, a vulnerability assessment might consider climate change projections, the socio-economic setting, and estimates of the adaptive capacity of the project.

Resilience is the ability of a system to resist, absorb, and recover from the effects of hazards in a timely and efficient manner, preserving or restoring its essential basic structures, functions and identity. Resilience is a familiar concept in the context of disaster risk reduction (DRR) and is increasingly being discussed in terms of adaptation to climate change. Resilience enables management of hazards to minimize their effects and/or to recover quickly from any negative impacts and needs to be incorporated into the fabric of projects to future-proof them against increasingly extreme weather.

It is expected that climate change will increasingly impact on Ireland over the coming decades. The most immediate risks to Ireland are mainly those associated with changes in extremes such as floods, precipitation and storms. The impact of climate change at Lobinstown is likely to manifest as more intense storms and rainfall events, as well as increased likelihood and magnitude of flooding.

Ireland's Catchment Flood Risk Assessment and Management (CFRAM) Programme is central to the medium and long-term strategy for the reduction and management of flood risk throughout Ireland. The CFRAM flood maps are now the primary reference for flood risk planning in Ireland. These flood maps are 'predictive' maps showing areas predicted to be inundated during a theoretical or 'design' flood event with an estimated probability of occurrence. The maps give the probability of a flood event of a given severity occurring in any given year, and can be expressed as odds (e.g., 100 to 1) of the event occurring in any given year or in terms of a return period (e.g., the 100-year flood). The low annual exceedance probability corresponds to odds of flooding of 1,000:1 or a 1,000 year flood.

A site-specific flood risk assessment was carried out by Envirologic in November 2023 and is included as Appendix 7.2.

With respect to an existing bedrock quarry at Heronstown, Lobinstown, Co. Meath, the two primary aims of the model and simulation runs were:

1. to quantify the capacity of the stream route to receive maximum permitted quarry discharge waters;
2. to ascertain whether a proposed quarry extension area is within the active floodplain serving the Killary Stream.

Hydraulic modelling was used predict river water levels under various flow regimes. Results of these simulations showed that during a Q_{1000} event the Killary Stream is not at risk of flooding. Addition of the maximum quarry discharge (0.02 m^3/sec) to the river when it is under flood conditions does not cause any discernible increase in flood elevations downstream of the discharge point. The proposed discharge from the quarry will not cause any increase in flood risk to downstream receptors during flood conditions. Hence upgrade works are not deemed necessary on the route to facilitate the predicted discharge during a storm event. The input from the quarry discharge is small relative to the stormflows and will become smaller as the catchment size increases progressing downstream.

Hydraulic modelling of the surface water system, based on cross sections and surveying, has demonstrated that the local area's surface water network can accommodate the envisaged dewatering amounts, in combination with flood flows and allowances for climate change (Refer to EIAR Section 7.6).

8.4.2.9 Greenhouse Gas Emissions

All projects have the potential to emit greenhouse gas (GHG) emissions to the atmosphere during the construction, operational and decommissioning phases. Direct GHG emissions are generated by operational activities and project decommissioning. Indirect GHG activities are linked to the implementation of the proposed project and may include transport, space heating of buildings (e.g., office). The significance of a project's GHG emissions should be based on its net impact, which may be positive or negative. Where GHG emissions cannot be avoided, the significance of project emissions shall be reduced by project design and/or mitigation. Where GHG emissions remain significant but cannot be reduced further, approaches to compensate project emissions should be considered.

Ireland currently tracks its GHG emissions under the Kyoto Protocol. The Kyoto Protocol requires Ireland to limit total national greenhouse gas emissions to 314.2 Mt of CO_{2eq} over the five-year period 2008–2021, which is equivalent to 62.8 Mt CO_{2eq} per annum. The Kyoto Protocol limit is calculated as 13% above Ireland's 1990 baseline value, which was established and fixed at 55.61 Mt CO_{2eq} following an in-depth review of Ireland's 2006 greenhouse gas inventory submission to the United Nations Framework Convention on Climate Change (UNFCCC). Provisional figures for Ireland's greenhouse gas (GHG) emissions in 2022 are 60.76 Mt CO_{2eq}, based on SEAI's energy balance released in June 2023 (EPA 2023).

Currently in Ireland, there is no set methodology to evaluate significance criteria or a defined threshold for GHG emissions for the mineral extraction industry. Due to inconsistencies between the different methods of assessment and their assumptions, there is no single agreed method by which to assess a project's carbon budget. The method of assessment varies according to the type and scale of the development.

Due to a lack of guidelines and established methodology, the assessment of significance of GHG emissions is based on whether the development's GHG emissions represent a significant contribution to Ireland's GHG emissions and the global atmosphere. Where the GHG emissions cannot be avoided, mitigation should aim to reduce the development emissions at all stages.

The proposed development (i.e., active quarry with progressive restoration to agricultural/amenity use) requires the use of heavy plant and machinery for extraction, processing, and transportation of materials and products each of which are energy intensive. Most plant used in a quarry runs on diesel. Unless this is green electricity, all the plant and machinery will result in the direct generation of GHG emissions.

For the purposes of this assessment, GHG emissions have been calculated for the quarry based on the following assumptions:

- The application seeks an annual extraction rate of up to 300,000 tonnes of material from the site. In determining the daily traffic volumes associated with the development, an average of 43 loads per weekday was used. Material will be transported from the site in both 20 tonne and 28 tonne loads (25 tonne load average assumed).
- The approved ready-mix concrete batching plant will generate 28 HGV trips at the quarry site for an average weekday.

- The quarry will continue to employ 4 staff members and it is not anticipated that these numbers will increase. Staff movements will therefore continue to generate 8 peak hour trips, 4 trips inbound in the morning and 4 trips outbound in the evening peak.
- A total of 5 trips has been assumed to occur daily to cater for possible miscellaneous trips associated with the site. These miscellaneous trips allow for operations meetings, site inspections, maintenance operations for plant and machinery, etc.

The total daily trips associated with the quarry operation accounts for 132 movements daily, 114 of which relate to HGVs (86.4%). These numbers are arrived at by summing the following components:

- 86 daily truck movements, associated with the export of materials from the quarry, enter and exit the site.
- 28 daily truck movements, associated with the ready-mix concrete batching plant, enter and exit the site.
- 8 staff trips daily.
- 10 miscellaneous trips daily.

It is a basic principle that minerals can only be worked where they naturally occur – they are a "tied resource". The products are generally of low unit value. The most significant cost is transportation, and as a result most quarries typically operate within a radius of c. 25 km of their market for aggregates and up to c. 40 km where the quarry is producing value added products (e.g., concrete, asphalt, etc.).

The annual GHG emissions during the operational stage of the quarry were calculated using emissions data from Klanfar et al. (2016) and conversion factors from SEAI (2022) and DBEIS & DEFRA (2022), and are given in Table 8.1 of Appendix 8.

The calculated GHG emissions for Lobinstown quarry are based on the assumption that the operating hours for truck movements are from 07:00 hours to 18:00 hours Monday to Friday and 07:00 hours to 14:00 hours on Saturday. This equates to 62 hours a week or 3,100 hours a year based on 50 working weeks per annum.

The GHG emission for Lobinstown were calculated based on current quarry production levels of 200,000 tpa (i.e., 910 CO_{2eq} tonnes); and maximum quarry production levels of 300,000 tpa with concrete production levels of c. 25,000 cu.m per annum (i.e., 1,593 CO_{2eq} tonnes). Refer to Tables 8.1 & 8.2, respectively, of Appendix 8 with respect to details of calculations of Annual GHG emissions for the above scenarios.

Thus, using current standard material handling and processing methods, infrastructure and plant, Lobinstown Quarry, as currently operating, is expected to produce 910 CO_{2eq} tpa.

The proposed development involves the continuance of use of the existing quarry, with extension at depth and a lateral extension at the eastern boundary of the quarry, and as such the construction phase will be very brief with minimal GHG emissions—mostly related to the stripping of overburden and construction of screening berms. All of the necessary plant and infrastructure is in-situ. Breedon are seeking to increase the production levels to 300,000 tpa, while a concrete plant was permitted under planning permission P.A. Ref. 22/328. The calculated GHG emissions of the quarry at production levels of 300,000 tpa and accompanied by a 25,000 cu.m per annum readymix concrete plant (Refer to Table 8.2 in Appendix 8). The projected GHG emissions are 1,593 CO_{2eq} tpa, which represents a 75% increase in GHG emissions. The proposed life of the development is up to 20 years with an additional two years required to complete final restoration works.

Based on the calculated annual total of 1,593 tpa CO_{2eq} for the quarry during its operational stage, and a comparison to Ireland's 2022 emissions value of 60.76 Mt CO_{2eq}, the proposed development at Lobinstown would represent a maximum of just 0.0026% of Ireland's recent annual CO_{2eq} emissions. It is notable that the HGVs used to transport the quarry aggregates and readymix concrete account for approximately 37% of the GHG emissions, which emphasises the importance of having a fleet of well maintained, modern trucks.

The decommissioning and restoration phase is expected to last only two years, and the overburden from the existing berms and stockpiles will be used to restore the site to a wildlife amenity with water feature. The largest producers of GHG emissions, the HGVs delivering product to market, crushing and screening plants, and readymix concrete plant will have ceased operating during the closing phase, and as such, it is estimated the GHG emissions during this closing phase at c. 56 CO_{2eq} tonnes (Refer to Table 8.3 in Appendix 8). Most of the decommissioning and closure works will take place within the first 3 months. The closing phase will be a factor of 30 less energy intensive and an order of magnitude shorter in duration then the operational phase.

The GHG emissions associated with the quarry are expected to generate likely, direct, long term, imperceptible, negative effects with respect to global climate change.

Based on the GHG monitoring results, Breedon shall establish short, medium, and long-term objectives and targets for a GHG reduction programme and energy management plan.

Breedon Ireland are committed to continual improvement of energy performance and have clearly defined energy management targets and objectives as part of an energy management system which is implemented across the business. This Energy Management System meets the requirements of ISO 50001:2018. Breedon Ireland is due to receive accreditation to ISO50001:2018 in January 2024.

Breedon Ireland implements the Energy Management System to analyse and manage the energy uses and energy consumption. The Energy management includes an internal audit procedure. Each Breedon Ireland site is internally audited on energy management by trained employees once a year or if the need arises for a more regular audit. Through this Energy Management system Significant energy users are identified. A significant energy user is a site that uses >5% of Breedon Irelands energy consumption. Through the process of identifying significant energy users Breedon Ireland can:

- Establish priorities for energy management.
- Make decisions on resource allocation.
- Implement operational control procedures.
- Measure and monitor consumption.
- Set targets to reduce consumption (kWh/t).
- Implement projects and action plans to reduce consumption.

Senior management pledge to provide information and necessary resources to achieve targets and objectives and to continually improve energy performance and the performance of the Energy Management System.

8.4.3 AIR QUALITY

Air quality in Ireland is of a high standard across the country and is among the best in Europe, meeting all EU air quality standards in 2010, as set out in the 2001 National Emissions Ceiling (NEC) Directive. This is due largely to prevailing clean Atlantic air and a lack of large cities and heavy industry. Over the past decade, levels of particulate matter have decreased in cities and large urban areas, arising principally from improvements in vehicle engine technology.

For Ireland to comply with its international commitments on air quality and air emissions, industrial emissions of pollutants to air must continue to be rigorously controlled; policies must be implemented to increase the use of alternatives to the private car and improve efficiencies of motorised transport. Government departments, national agencies and local authorities must make air quality an integral part of their traffic management and planning processes. Households and businesses must shift from solid fuel to cleaner and more efficient alternatives including gas.

Refer to Section 9.2.1.3 for a full discussion of the national and European policy and legislative background to air quality.

8.5 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 8.1 Climate - Impact Matrix

'Do Nothing' Impacts	**X**		
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	**X**	**X**	**X**
Indirect Impacts	**X**	**X**	**X**
Cumulative Impacts	**X**	**X**	**X**
Residual Impacts	**X**	**X**	**X**
`Worst Case' Impacts	**X**	**X**	**X**

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.

Refer to Appendix 3 for definition of Significance

8.5.1 'DO NOTHING' IMPACTS

If the development did not proceed, the aggregate resource would continue to be worked within the confines of what is permitted under the current planning permission (P.A. Ref. 200106), while the remainder of the proven greywacke resource would remain unused in situ, and the local supply of quality aggregates would be more restricted. Under the 'Do Nothing' scenario, all quarrying and ancillary activities would be completed under P.A. Ref. LB200106 and operations would cease thereafter. The site would then be restored as per the requirements of the existing planning permission (P.A. Ref. LB200106).

If the proposed development is not granted planning permission, local demand for road aggregate may require materials to be transported from further afield, with a consequential impact in terms of increased vehicular exhaust emissions. It is considered that failure to continue the quarry will nonetheless have an imperceptible negative long-term impact with respect to climate.

8.5.2 DIRECT IMPACTS

The proposed development is for a maximum annual extraction rate of up to 300,000 tpa with concrete production levels of c. 25,000 cu.m per annum. A quarry of this size would be considered to be a medium size scale of operation and would have an imperceptible negative long-term impact with respect to regional or local climatic conditions.

8.5.3 INDIRECT IMPACTS

GHG emissions from plant, machinery and HGVs at the Lobinstown Quarry will represent of the order of 0.0026 % of Ireland's national carbon budget (i.e., 1,593 t of 60.76 Mt), which is a long-term, imperceptible impact in terms of Ireland's contribution to climate change.

8.5.4 CUMULATIVE IMPACTS

Cumulative Impacts are defined as the addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects (See Appendix 3.3).

The effect of climatic conditions (e.g., rainfall, wind, etc.) on other potential impacts of the development (e.g., dust deposition, drainage, etc.), are dealt with in the relevant sections of this EIAR. The cumulative impact of the quarry with respect to other developments has also been taken into consideration elsewhere in the preparation of the EIAR. The absence of large scale commercial and industrial developments with emissions to air within 4.5 km of the quarry negates any significant cumulative impact on the climate or climate change.

A separate Cumulative Impacts Assessment has been included as Appendix 15, which provides an assessment of other projects located within the wider area that are potentially significant with respect to cumulative impacts.

As detailed in EIAR Section 8.4.2.9 above, the GHG emissions associated with the quarry are expected to generate likely, direct, long term, imperceptible, negative effects with respect of global climate change.

An EMS, which is accredited to ISO 14001 standard, is in place at Lobinstown Quarry. It addresses monitoring of water, noise and dust, and may be revised to comply with any new condition of planning. The potential cumulative impacts with respect to dust will be assessed through the existing environmental monitoring programmes that has been established in compliance with the planning permission associated with the quarry. Mitigation measures are also in place at Lobinstown Quarry and included in the EMS. Continual monitoring and measurement will ensure the effective application of these mitigation measures and ensure that activity at Lobinstown Quarry should not result in any significant cumulative impact (Refer to Section 8.6 below).

8.5.5 TRANSBOUNDARY IMPACTS

The EIA Directive 2014-52-EU invokes the Espoo Convention on Environmental Impact Assessment in a Transboundary Context, 1991, and applies its definition of transboundary impacts (Refer Appendix 8.1). Given the location (c. 30 km from the border with N. Ireland), nature, size and scale of the proposed development, it is expected that the impacts of the development would not have any significant transboundary effects on the climate or climate change.

8.5.6 RESIDUAL IMPACTS

It is considered that because of the mitigation measures incorporated into the design that the only residual impact in terms of the local climate may arise from the GHG emissions, albeit likely, direct, long term, imperceptible, negative effects with respect of global climate change.

It is considered that following completion of the extraction and restoration works there will be an imperceptible positive impact with respect to climate due to restoration of the lands to a wildlife amenity. The land-use change from a quarry to a wildlife amenity will result in a net increase in carbon sequestration, and thus a long-term, imperceptible, positive impact in terms of climate change.

8.5.7 'WORST CASE' IMPACT

There is no worst case impact on the regional or local climatic conditions with respect to the proposed development.

Table 8.2 Likely Direct and Indirect Impacts by Stage of Development

Environmental Attribute/ Receptor	Significance / Sensitivity of Impact	Description of Impact	Overall Significance of Impact	Construction Stage	Operational Stage	Decommissioning Stage	Post Closure Stage
Local/ Regional Climate	Negligible	Negligible	Imperceptible		Unlikely, direct/ indirect, long-term, neutral, imperceptible effects expected based on scale of development.	Unlikely, direct/ indirect, short term, neutral, imperceptible effects based on minimal scale of decommissioning works.	Unlikely, direct/ indirect, positive, permanent, imperceptible effects due to closure and final restoration to agricultural land.
GHG Emissions	Low to Negligible	Negligible	Imperceptible		Unlikely, indirect, long- term, negative, imperceptible effects based on scale of development.	Unlikely, indirect, short term, neutral, imperceptible effects due to closure and greatly reduced HGV emissions during final restoration works.	Unlikely, indirect, positive, imperceptible, permanent, effects due to closure and ongoing carbon sequestration in soil and vegetation.

8.6 MITIGATION & MONITORING

As the development is not expected to affect the local climate or microclimate of the area, there is no requirement for mitigation or monitoring within this development proposal in respect of climatic issues beyond those in place to mitigate the impact of dust on the environment in general. Therefore, there are no mitigations proposed specifically with regard to the local or regional climate. Any impact on the natural environment will be mitigated to the greatest degree practical, thereby minimising any associated impact on the climate.

Climate change mitigation can also be integrated into the proposed development, in order to reduce the emissions of GHGs. For example, significant avoidance of GHG emissions can be achieved by the use of powered by mains electricity as compared to diesel generators. Where GHG emissions cannot be avoided, the significance of a project's emissions can be reduced by mitigation, such as use of energy efficient plant, appropriately sized plant, and maintaining equipment to optimise process efficiency.

The applicant, Breedon Ireland, have implemented an Energy and Carbon Policy (Refer to Appendix 5). This policy commits to operating in a manner that ultimately eliminates its contribution to global warming by mitigation of climate change impacts through industrial innovation and the application of industry best practice (Breedon 2021). Some of the more relevant commitments are given below and indicate different measures that can be taken to lower the carbon footprint of the development:

- create and maintain a robust energy and carbon data collection and reporting system, that provides the data required to assess performance, identify opportunities for progress and to deliver improvements in performance;
- set targets for the short and medium-term with a goal of achieving carbon neutrality by 2050;
- monitor and measure performance regularly to ensure continual improvement and sharing of best practice;
- report annual climate-related emissions data and ensure that the reported data is externally verified by a recognised, accredited body;
- seek to reduce carbon emissions through optimizing energy efficiency and, where practicable, the use of alternative and renewable energy sources;
- regularly audit operations for energy efficiency opportunities and implement cost-effective solutions; and
- endeavour to transition operational fleets from traditional combustion engines to alternative forms of energy and, through collaboration with suppliers, make our fleets more efficient through new technology.

The proposed development will ultimately lead to the restoration of the quarry lands to wildlife amenity, which will generate no further emissions from fossil fuels or dust, further lessening any impact on the climate.

8.6.1 CLIMATE CHANGE RESILIENCE

Climate change mitigation not only addresses the local climate, air quality and GHG emissions, but also the resilience of the development to climate change and its capacity to absorb climate related shocks.

Resilience to climate change is defined as the capacity to prepare for, respond to, and recover from the impacts of hazardous climatic events, while incurring minimal damage to societal wellbeing, the economy and the environment. In the context of the quarry at Lobinstown, it is considered that its vulnerability to climate change related hazards can be ranked as:

(1) Low - rising sea levels, flooding, landslides, free-thaw damage, drought, heat and wildfires.

(2) Medium – Cold periods and snow

(3) High – Extreme rainfall, flash floods, storms and high winds.

The impact of climate change at Lobinstown Quarry is likely to manifest as more intense storms and rainfall events.

As detailed above (Refer to Section 8.4.2.8) a site-specific flood risk assessment was carried out by Envirologic in November 2023 and is included as Appendix 7.2.

With respect to an existing bedrock quarry at Heronstown, Lobinstown, Co. Meath, the two primary aims of the model and simulation runs were:

1. to quantify the capacity of the stream route to receive maximum permitted quarry discharge waters;
2. to ascertain whether a proposed quarry extension area is within the active floodplain serving the Killary Stream.

Hydraulic modelling was used predict river water levels under various flow regimes. Results of these simulations showed that during a Q_{1000} event the Killary Stream is not at risk of flooding. Addition of the maximum quarry discharge (0.02 m^3/sec) to the river when it is under flood conditions does not cause any discernible increase in flood elevations downstream of the discharge point. The proposed discharge from the quarry will not cause any increase in flood risk to downstream receptors during flood conditions. Hence upgrade works are not deemed necessary on the route to facilitate the predicted discharge during a storm event. The input from the quarry discharge is small relative to the stormflows and will become smaller as the catchment size increases progressing downstream.

Hydraulic modelling of the surface water system, based on cross sections and surveying, has demonstrated that the local area's surface water network can accommodate the envisaged dewatering amounts, in combination with flood flows and allowances for climate change (Refer to EIAR Section 7.6).

The resilience of infrastructure to withstand storms, heavy rainfall events and high winds associated with extreme weather events triggered by climate change needs to be integrated into the design of the on-site infrastructure. However, as all the required site infrastructure is already in-situ, there are only limited opportunities to augment climate resilience.

For ease of reference, the mitigations measures contained in this EIAR are itemised in a compendium of mitigations, which is provided as Appendix 16 of the EIAR.

8.7 REFERENCES

Breedon (2021). Energy and Carbon Policy Statement. Breedon Group, Dublin, Ireland.

DoCCE (2018). Sectoral Planning Guidelines for Climate Change Adaptation. Department of Communications, Climate and Environment (DoCCE), Dublin, Ireland. Available at https://www.gov.ie/pdf/?file=https://assets.gov.ie/129614/9bcbb18e-7203-4079-9a59-833842e932f2.pdf#page=null

DoCCE (2018). *National Adaptation Framework* (NAF). Department of Communications, Climate and Environment (DoCCE), Dublin, Ireland. Available at https://www.gov.ie/en/publication/fbe331-national-adaptation-framework/

DoCCE (2019). *Climate Action Plan 2019*. Department of Communications, Climate and Environment (DoCCE), Dublin, Ireland. Available at https://www.gov.ie/en/publication/ccb2e0-the-climate-action-plan-2019/

DoCCE (2021). *National Climate Policy*. Department of Communications, Climate and Environment (DoCCE), Dublin, Ireland. Available at https://www.gov.ie/en/policy-information/56654e-national-climate-policy/

EPA (2014a). *Ireland's Greenhouse Gas Emissions in 2012*. Environmental Protection Agency (EPA), Johnstown Castle, Wexford, Ireland, 8 p.

EPA (2014b). *Ireland's Greenhouse Gas Emission Projections 2013-2030*. Environmental Protection Agency (EPA), Johnstown Castle, Wexford, Ireland, 16 p.

EPA (2021). *Greenhouse Gas Emissions*. Online website. Environmental Protection Agency (EPA), Johnstown Castle, Wexford, Ireland. Available at https://www.epa.ie/ghg/

EU (2013). *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*. Available at https://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf

EU (2016). *Climate Change and Major Projects*. Available at https://ec.europa.eu/clima/sites/clima/files/docs/major_projects_en.pdf

IPCC (2013). *Climate Change 2013: The Physical Science Basis*. Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press. Available at www.cambrdige.org

IPCC (2023). *Climate Change 2023: Synthesis Report.* Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press. Available at www.cambrdige.org

Met Éireann (2012). *A summary of Climate Averages for Ireland 1981-2010*. Climatological Note No.14. Met Éireann, Glasnevin Hill, Dublin, Ireland, 16 p.

Met Éireann (2014). *Online website*. Met Éireann, Glasnevin Hill, Dublin 9, Ireland. Available at http://www.met.ie

SEI (2009). *Energy in Ireland: Key Statistics 2009*. Sustainable Energy Ireland (SEI), Dublin, Ireland, 31 p.

SLR (2018). *Environmental Impact Assessment Report: Continuance of Use and Deepening of Permitted Quarry Aghamore near and Carrownamaddoo Townlands, Co. Sligo*. SLR Consulting, Dublin, Ireland.

SLR (2019). *Environmental Impact Assessment Report, Coolaclevane Quarry, Kilmichael, Co. Cork*. SLR Consulting, Dublin, Ireland.

SLR (2020). *Environmental Impact Assessment Report: Continued Operation & Deepening of Permitted Quarry Area, Heronstown, Lobinstown, Co. Meath.* SLR Consulting, Dublin, Ireland.

SLR (2021). *Environmental Impact Assessment Report, Belgard Quarry, Fortunestown, Tallaght, Dublin 24*. SLR Consulting, Dublin, Ireland.

UN (1987). *Our Common Future*. World Commission on Environment and Development (Bruntland Commission), United Nations (UN), New York, US. Available at www.un-documents.net/our-common-future.pdf

IEMA (2017). *Assessing Greenhouse Gas Emissions and Evaluating their Significance*. Available at https://www.iaia.org/pdf/wab/EIA%20Guide_GHG%20Assessment%20and%20Significance_IEMA_16May17.pdf

Internet Sources

DoCCE (2023). https://www.gov.ie/en/policy-information/37d691-adapting-to-climate-breakdown/

EPA (2023). https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/latest-emissions-data/#

Floodmaps (2023). https://www.floodinfo.ie/map/floodmaps/

ICF (2023). https://www.irishconcrete.ie/backbone-sustainable-construction/quarries-and-aggregates/