

Section 11.0: CLIMATE

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11.0 CLIMATE

11.1 Introduction

This section of the rEIAR assesses potential impacts that the development may have had with regards to climate and climate change. Climate can be thought of as the 'average weather' over an extended period of time and so refers to temperature, precipitation and wind.

The topic of 'Climate' is commonly discussed with reference to 'Climate Change' which is any significant change in the measures of climate over an extended period of time. Climate change includes major changes in temperature, precipitation or wind patterns, among others, that occur over several decades or longer.

11.2 Methodology

The methodology for the description of the current climate in the region of the proposed development included a desk study of the available data from Met Eireann, the Environmental Protection Agency (EPA) and other bodies which have a responsibility for Climate records in Ireland and Europe. Met Eireann data from Malin Head recording station was used to assess the climate in the region of the application site. Malin Head is the nearest Met Eireann recording station located approximately 50 km to the north of the application site.

11.3 Climate Change

Climate change is a significant change recorded for the climate of a region. Climate change can be caused by natural occurrences such as volcanic eruptions or variations in solar intensity. Recent use of the term climate change more commonly refers to changes in the climate due to anthropogenic activity, namely the build-up of Greenhouse gases (GHGs) in the atmosphere. This build-up of GHGs is caused by emissions associated with human activity such as the burning of fossil fuels for energy, transport and heating.

11.3.1 Kyoto Protocol

The Kyoto Protocol was an historical agreement in that it was the first international agreement in which many of the world's industrial nations concluded a verifiable agreement to reduce their emissions of six greenhouse gases in order to prevent global warming. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialised countries and the European community for reducing emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012.

The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. 184 Parties of the Convention have ratified its Protocol to date. It is an international agreement linked to the United Nations Framework Convention on Climate Change.

The major distinction between the Kyoto Protocol and the United Nations Framework Convention on Climate Change is that while the Convention encouraged industrialised countries to stabilise greenhouse gas emissions, the Protocol commits them to do so. Recognizing that developed countries are principally responsible for the current high levels of emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

Under the Kyoto Protocol, Ireland was required to limit total national GHG emissions to 3.14 Mtonnes of CO₂eq over the 5-year period 2008-2012 which is equivalent to 62.8Mtonnes of CO₂eq per annum. The Kyoto Protocol limit was calculated as being 13% above Ireland's 1990 baseline which was established and fixed at 55.61 Mtonnes CO₂eq following an in-depth review of Ireland's 2006 GHG inventory submission to the UNFCCC (United Nations Framework Convention of Climate Change).

In December 2012 the Kyoto Protocol was amended. The amendment was referred to as the 'Doha Amendment to the Kyoto Protocol' which included the following amendments.

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

During the second commitment period, parties committed to reduce GHG emissions by at least 18% below 1990 levels in the eight-year period between 2013 and 2020. This placed binding targets on Ireland regarding climate change, with penalties for non-compliance.

11.3.2 Paris Agreement 2015

A legally binding global agreement on climate change was agreed in Paris on 12th December 2015. The Paris Agreement put in place the necessary framework for all countries to take ambitious mitigation action. It sets out a long-term goal to put the world on track to limit global warming to well below 2 degrees Centigrade above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 degrees. It aims to tackle 95% of global emissions through 188 Nationally Determined Contributions (NDCs). The agreement also places significant importance on actions needed, both nationally and globally, to help people adapt to climate change.

Ireland will contribute to the Paris Agreement via the NDC tabled by the EU in March 2015 on behalf of Member States, which commits to at least a 40% reduction in EU-wide emissions by 2030 (compared with 1990 levels): this is based on reductions in the Emissions Trading Scheme (ETS) and non-ETS sectors of 43% and 30% respectively (compared to 2005).

In July 2016, the European Commission presented a legislative proposal, The Effort Sharing Regulation (ESR) setting out binding annual GHG targets for Member States for the period 2021 to 2030. Under the ESR, targets have been proposed for Member States based on GDP per capita and the cost-effectiveness of domestic emissions reductions within individual Member States. The final agreement sets a target of 30% reduction in greenhouse gas emissions (compared to 2005 levels) by 2030 for Ireland. This will be Ireland's contribution to the overall EU objective to reduce its emissions in the non-ETS sectors by 30% by 2030 compared to 2005. The ESR was provisionally agreed by the European Council and the European Parliament in December 2017 and was formally adopted in May 2018.

It is clear that meeting its climate change obligations will be a huge challenge for Ireland. It will require substantial investment by both the public and private sectors, as well as a broad range of non-financial policy tools, including regulations, standards, education initiatives and targeted information campaigns. Work is ongoing to cost various suites of measures that could meet the 2030 target as cost-effectively as possible.

11.3.3 Compliance with EU and International Commitments

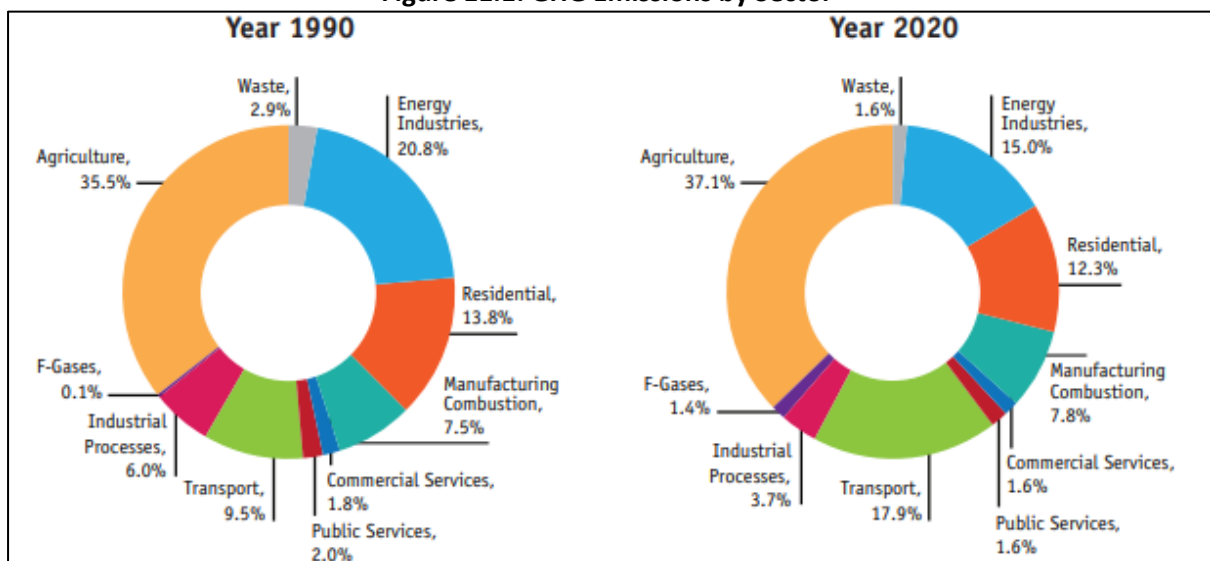
The latest data available is taken from the publication 'Ireland's Provisional Greenhouse Gas Emissions 1990-2020' produced by the EPA in October 2021. Key findings in the report are listed below.

- 2020 total national greenhouse gas emissions are estimated to have declined by 3.6% on 2019 levels to 57.70 million tonnes carbon dioxide equivalent (Mt CO₂eq). This reduction in total emissions was driven by the COVID impact on Transport and less peat used for electricity generation. It highlights that further transformative measures will be needed to meet National Climate ambitions

- The Provisional estimates of greenhouse gas emissions indicate that Ireland will exceed its 2020 annual limit set under the EU’s Effort Sharing Decision (ESD) by 6.73 Mt CO₂eq, the 5th year in a row limits were exceeded. The cumulative exceedance for the 2013-2020 period is 12.02 Mt CO₂eq.
- In 2020, emissions from Ireland’s Emissions Trading Sector (ETS) decreased by 6.2% or 0.89 Mt CO₂ eq while non-ETS emissions decreased by 2.8% or 1.26 Mt CO₂ eq. Since 2005, emissions in the ETS sector have decreased by 40.8% or 9.15 Mt CO₂ eq whereas emissions under the non-ETS only decreased by 7.0% or 3.33 Mt CO₂ eq, considerably short of Ireland’s 20% reduction commitment
- Emissions in the Energy Industries sector show a decrease of 7.9% or 0.74 Mt CO₂eq in 2020, which is attributable to a 51% decrease in peat used in electricity generation. Electricity generated from wind increased by 15.3% in 2020. The reduced peat use and increased wind and hydro-electricity resulted in a 8.1% decrease in the emissions intensity of power generation in 2020 to 295 g CO₂/kWh.
- Agriculture emissions increased by 1.4% or 0.3 Mt CO₂eq in 2020, driven by increased fertiliser nitrogen use (3.3%) increased numbers of livestock including dairy cows (3.2%), other cattle (0.6%), sheep (4.8%) and pigs (2.5%). Total milk production increased by 3.8% in 2020, with only a marginal increase in the milk output per cow (0.6%).
- Greenhouse gas emissions from the Transport sector decreased by 15.7% or 1.92 Mt CO₂eq in 2020. This decrease was largely driven by the impact of COVID restrictions on passenger car and public transport usage. International aviation, not included in national total emissions, declined by 65% in 2020 or by 2.17 Mt CO₂ eq.
- Greenhouse gas emissions from the Residential sector increased by 9.0% or 0.59 Mt CO₂eq due to substantial increases in carbon intensive fossil fuel use; coal +6%, peat +3% and Kerosene +19%. Natural gas use decreased marginally by -0.3%. Accelerated retrofitting required to decarbonise home heating.

Figure 11.1 below illustrates the change in contribution by sector to GHG from 1990 to 2019.

Figure 11.1: GHG Emissions by Sector



(from EPA provisional report)

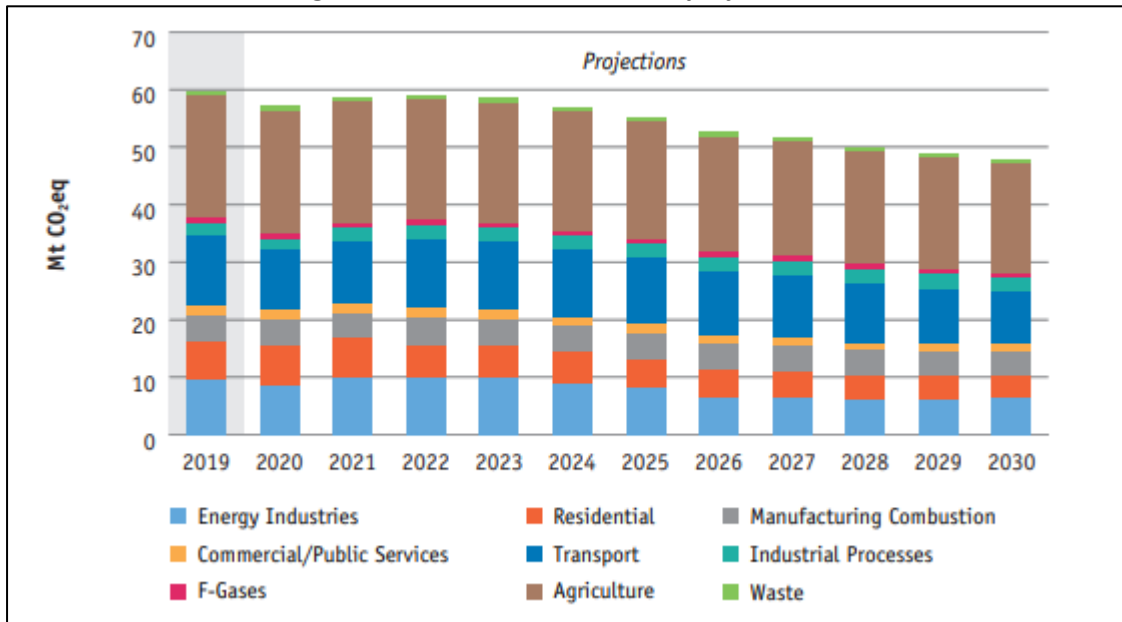
GHG emission projections for the period 2020 – 2040 have been made and published by the EPA in July 2021 'Ireland's Greenhouse Gas Emissions Projections 2020-2040'. Key findings in the report are listed below.

- Implementation of "Additional Measures" (including those in the 2019 Climate Action Plan) is projected to save 58 Mt CO₂ eq over the period 2021-2030 compared to the "With Existing Measures". This represents a reduction of 1.8% per annum in emissions over the period.
- Ireland's emissions covered by the 2013-2020 EU Effort Sharing Decision target are estimated to have been 7% below 2005 levels in 2020. Ireland is estimated to have cumulatively exceeded its compliance obligations by 12.2 Mt CO₂ eq over the 2013- 2020 period and will need to use credits and/or purchase surplus annual emission allocations from other member states to achieve compliance.
- These Projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 to 2030 assuming full implementation of the 2019 Climate Action Plan and the use of the flexibilities available. Future, more ambitious targets as presented in the European Climate Law and Ireland's Climate Bill will require many (as yet unidentified) additional measures.
- Increased renewable electricity generation, including a projected 5GW of offshore wind generation, is expected to contribute to a 70% contribution of renewable energy in electricity generation by 2030. Energy industries emissions are projected to decrease by one third by 2030 compared to the most recent figures in 2019.
- Agriculture emissions are projected to decline by 1.2% per annum over the 2021- 2030 period, provided the 16.5 Mt CO₂ eq savings from the agriculture sector identified in the 2019 Climate Action Plan are realised. Increase use of protected urea fertilisers and low emission slurry spreading, along with other measures targeting methane emissions from animals, will be required.
- The impact of COVID is projected to have led to a 14% reduction in transport emissions in 2020 compared to 2019. The measures in the 2019 Climate Action Plan include 936,000 electric vehicles on the road by 2030 and are projected to reduce emissions to 25.5% below 2019 levels by 2030. It will be necessary to avoid a post COVID surge in emissions to achieve that reduction.
- The projected impact of COVID in the residential sector in 2020 is an increase of almost 9% in emissions compared to 2019, driven by increased working from home. This highlights the need for our houses to become far more efficient, particularly in the context of broader home working. Implementing the 2019 Climate Action Plan measure for the installation of over 600,000 heat-pumps by 2030 as well as retrofitting 500,000 homes to a B2 equivalent BER will help achieve this
- A strong impact from COVID is seen in the emissions projections for 2020 and 2021. A decrease of transport emissions and increase in residential emissions are the most obvious effects projected. Agriculture emissions are projected to have been little affected and energy emissions decreases are not primarily COVID related. As the economy exits from COVID restrictions, a "green recovery" where investment is targeted at measures which reduce or avoid greenhouse gas emissions, can result in better outcomes for society and the environment.
- The scale and pace of the changes needed to achieve the targets set out in the 2019 Climate Action Plan are significant, but the extent of change required to meet the Climate Bill and

European Climate Law targets is unprecedented. Further ambitious measures in key sectors such as agriculture, transport and power generation will need to be identified, planned and implemented as soon as possible.

Total GHG emissions projections by sector under the 'with additional measures' scenario to the year 2030 are represented graphically below in Figure 11.2.

Figure 11.2: Total GHG emission projections to 2030



(from EPA GHG projections 2020-2040)

11.3.4 Local and Regional Climate

Ireland has a typical maritime climate, with relatively mild and moist winters and cool, cloudy summers. The climate of the application site is typical of the Irish climate. The climate is influenced by warm maritime air associated with Gulf Stream which has the effect of moderating the climate, and results in high average humidity across the country. The area of highest precipitation is along the western coast.

Data from Met Eireann’s Malin Head weather station for mean monthly temperature, and monthly rainfall for the past three complete years is shown in Table 11.1.

Table 11.1: Monthly values for temperature and precipitation for Malin Head 2019, 2020 & 2021

MONTHLY VALUES FOR MALIN HEAD UP TO 12-FEB-2022													
Total rainfall in millimetres for MALIN HEAD													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2022	93.1	55.6											148.7
2021	126.9	96.1	90.7	31.6	99.3	49.0	52.0	69.1	68.3	156.2	95.4	115.2	1049.8
2020	79.3	210.4	79.4	20.1	37.3	106.3	133.8	123.1	115.7	148.4	130.0	144.3	1328.1
2019	81.5	59.7	138.8	49.9	79.9	67.3	85.9	162.9	124.5	83.4	91.7	124.2	1149.7
LTA	119.7	87.4	88.4	64.7	58.4	70.2	80.8	95.4	96.4	120.6	108.6	116.4	1107.0

Mean temperature in degrees Celsius for MALIN HEAD													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2022	7.3	6.9											7.2
2021	5.1	6.1	7.5	7.3	9.4	13.2	14.9	14.4	14.3	11.8	9.6	7.2	10.1
2020	7.1	5.6	6.6	8.8	11.2	12.5	13.5	14.5	13.2	10.4	9.1	6.4	9.9
2019	6.4	8.1	7.6	9.3	10.0	12.4	15.4	15.1	13.5	10.2	7.3	7.0	10.2
LTA	5.9	5.8	6.8	8.2	10.3	12.5	14.3	14.5	13.1	10.7	8.2	6.4	9.7

(Met Eireann)

Long term averages are calculated from the latest complete 30-year data set. The latest available long-term average is calculated from data recorded between 1981-2010. The long-term average annual precipitation value for Malin Head is 1,076 mm. The long-term average annual mean temperature for Malin Head is 9.8 degrees Celsius.

According to Met Eireann the average hourly wind speed in Donegal experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 5.6 months, from October 11 to March 29, with average wind speeds of more than 14.0 miles per hour. The calmer time of year lasts for 6.4 months, from March 29 to October 11. Table 11.2 show the number of days with mean wind speeds exceeding 15 m/s for 10 minutes or more for the years 2018-2020 inclusive.

Table 11.2: No of days with 10 min wind speeds > 15 m/s (2018-2020 inc.).

Number of days with a maximum 10-min. mean wind speed >= 15m/s													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2021	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a			
2020	19	26	10	3	4	4	5	3	5	15	11	15	
2019	11	10	13	9	1	3	0	4	7	9	10	16	
2018	21	13	11	9	2	2	1	1	9	9	11	11	

(Met Eireann)

11.3.5 Land Use

The site is located in rural area with one-off houses, farmsteads, agricultural land and forestry plantations. Land use is predominantly agriculture with grazing of sheep and cattle on improved grassland.

11.4 Characteristics of the Development

The development of the site as a quarry has been sporadic but ongoing for perhaps 200 years. The applicant has been in control of the site since 1978. Activities on site by the current applicant have been relatively simple in quarrying terms with the extraction, crushing and screening of rock and transport to market. The requirement for blasting has been infrequent and most of the extraction has taken place by mechanical means.

Mobile crushers/screeners have been employed moving around the site following extraction activity. Stockpiles of product were generally located near the screeners and transport to market was via rigid lorry. Customers could also bring their own transportation and purchase product directly from the site. No washing of product took place on this site.

Effluent treatment has been by settlement. Current effluent generated in the quarry void is pumped to Settlement Pond 1 for settlement treatment and then flows through Settlement Pond 2 for further treatment before discharge off site to a tributary of the St Johnston Stream. The site discharge has been under licence (Lwat67) from Donegal County Council since 2009. Noise abatement and dust control measures have been employed by the applicant for all activities on site.

Mature landscaped berms have been created on the perimeter of the site to screen workings. Currently the quarry employs 4 persons and output is estimated at approximately 5 loads per day. Historically for periods of boom times there may have been up to 10 people working in the quarry and output would have peaked during these times at approximately 20 loads per day.

Further details on the characteristics of development are provided in *Section 3, Project Description*, of this rEIAR.

11.5 Impact Assessment

There was an initial construction phase and then extraction and processing has taken place. The potential impacts for the construction and operational phases are outlined below.

11.5.1 Construction Impacts

11.5.1.1 Plant and Vehicle Emissions

The operation of plant and movement of vehicles will generate exhaust emissions. These emissions are an inevitable consequence of construction. The quantities of exhaust emissions and CO₂ released from construction activities will not result in an adverse impact to the local micro-climate or the broader macro climate. These impacts will be temporary as construction of site infrastructure and screening berms took less than 12 months. Emissions associated with the development are assessed as imperceptible.

11.5.2 Operational Impacts

11.5.2.1 Plant and Vehicle Emissions

The operation of plant and movement of vehicles generate exhaust emissions. These emissions are an inevitable consequence of the production of quarry product. Inevitably over the lifetime of the development plant and quarry vehicles needed replaced. Priority was given to energy efficient low emission vehicles and plant when considering new replacement plant and vehicles.

The development of the site as a quarry supplying quality product to the local market is likely to have reduced emissions by reducing the distance customers have to travel to source product. This may have an overall positive effect of emissions levels in a regional context. Overall, the development is assessed as having a slightly positive impact.

11.5.2.2 Loss of Vegetation

There has been an inevitable loss of vegetation with clearance for site infrastructure and to facilitate extraction. This will be offset with the landscaping plan for the site which will increase biodiversity in the overall site and introduce a tree planting scheme for carbon sequestration. Some of the screening berms host semi-mature native trees. The exhausted works area around Settlement Pond 2 has recolonised as a wetland habitat which will also contribute to carbon capture, increase biodiversity and offset the loss of vegetation. Overall, the impact is assessed as long term neutral.

11.5.3 Unplanned Events

The proposed development must also be assessed in relation to unplanned events in terms of vulnerability to the risks of major accidents or disasters relevant to the project. The types of event considered are floods, extreme temperatures and storms.

- Flooding. Extreme rainfall events are becoming more common. This site has been assessed in a basic flood risk assessment as part of Section 8, Water, and found to be not at risk of flooding.
- Extreme Temperatures. Operational procedures have been in place for times when the temperature is low enough to cause freezing including gritting areas and re-scheduling potentially hazardous dispatches of material. The quarry does not operate when a 'red' level weather warning is issued by Met Eireann.
- Storm Events. Extreme windy conditions could potentially lead to damage to infrastructure and buildings. Plant and buildings on the application site have been regularly inspected for structural integrity. Loose items that may be moved by high winds are secured. The quarry does not be operational when a 'red' level weather warning is issued by Met Eireann.

11.5.4 Cumulative Impact

The application site must also be considered in association with other developments located within or close to the application site.

11.5.4.1 Other Developments

There are no other authorised developments in the vicinity of the application site which would result in a significant cumulative impact. A search of the planning portal of the Donegal County Council website revealed no planned development which may result in significant cumulative impact in the vicinity of the application site. The application site is situated in a rural environment where the two main land uses are livestock farming and private commercial forestry. Agriculture is a significant contributor to Ireland's GHG emissions, but the type of agriculture practiced in the vicinity of the application site is low intensity livestock farming. The many private forestry stands in the area surrounding the application site will be acting as a carbon sink for greenhouse gases.

There is another stone quarry immediately to the east of application site. This quarry appears to have been longer in operation than the application site and appears to be more compact with less redundant areas than the application site. Consequently, the adjoining quarry may not offset its carbon footprint to the same extent as the application site. However, due to the small scale of the adjacent quarry there is not expected to be any significant cumulative negative effect from the adjacent quarry.

11.5.5 Do-Nothing Option

If the proposed is not granted substitute consent then the site will close. Employment from the operational phase will not continue. The likely significant secondary benefit to the wider local economy with the development of the project will not occur with the do-nothing option.

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).

11.6 Mitigation Measures

The following mitigation measures have been practiced at the development to reduce greenhouse gas emissions in order to limit the effects of the development on the local and regional climate.

- Strict adherence to good operational practice such as switching off plant and vehicles when not in use.
- All plant and vehicles regularly serviced to ensure they are running as efficiently as possible.
- Energy consumption ratings considered when upgrading new vehicles associated with the site.
- Regular energy audits in order to assess energy requirements and areas where energy usage can be reduced. This will lead to a reduction in greenhouse gas emissions.
- Landscaping plan (section 15) to offset vegetation loss and increase net biodiversity.

11.7 Residual Impacts

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

No residual impacts are expected, other than the slight positive impact on climate due to the reduced travel distance customers are to travel for quarry product.

11.8 Determination of Significance of Impact Pre-Mitigation

Impact	Receptor	Description of Impact (Character/Magnitude/Duration/Probability/Consequences) Negligible - High	Existing Environment (Significance / Sensitivity) Negligible -High	Significance Imperceptible - Profound
Plant & Vehicle emissions during construction and operational phases	Climate	Low-Negligible	Medium	Not Significant
Loss of vegetation	Climate	Low	Medium	Slight

11.9 Summary of Mitigation Measures

Summary of Mitigation Measures Implemented
Strict adherence to good operational practice such as switching off plant and vehicles when not in use
All plant and vehicles regularly serviced to ensure they are running as efficiently as possible.
Energy consumption ratings and emission levels considered when upgrading new vehicles associated with the site.
Regular energy audits implemented to assess energy requirements and areas where energy usage can be reduced. This will lead to a reduction in greenhouse gas emissions.
Landscaping plan (section 15) to offset vegetation loss and increase net biodiversity.

11.10 Determination of Significance of Impact Following Mitigation

Impact	Receptor	Description of Impact (Character/Magnitude/ Duration/Probability/ Consequences) Negligible - High	Existing Environment (Significance / Sensitivity) Negligible -High	Significance Imperceptible - Profound
Plant & Vehicle emissions during construction and operational phases	Climate	Low-Negligible	Medium	Imperceptible
Loss of vegetation	Climate	Low	Medium	Neutral

11.11 Impact Assessment Conclusion

There is expected to be a slight positive impact on climate following the implementation of the recommended mitigation measures.

11.12 Technical Difficulties

There were no technical difficulties encountered.