

Castlepollard Quarry, Deerpark, Castlepollard, Co. Westmeath

Castlepollard Quarry

Environmental Impact Assessment Report

Section 9

Air Quality

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Prepared by:

J Sheils Planning & Environmental Ltd

31 Athlumney Castle, Navan, Co. Meath



Part of the Breedon Group

Westmeath County Council Planning Authority - Inspection Purposes Only!

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9 AIR QUALITY

9.1 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) pertains to a proposed development at an existing limestone quarry at Deerpark, Castlepollard, Co. Westmeath, known as Castlepollard Quarry. The proposed development, will consist of the continued use and operation of the existing quarry (permitted under P.A. Ref. 01/525), including deepening of the quarry, along with minor amendments to the permitted quarry layout comprising an extraction area of c. 4 ha within an overall application area of c. 11.4 ha. The development will include provision of new site infrastructure including water management system, wheelwash and other ancillaries.

This section of the EIAR deals with the issue of air quality associated with the proposed development at Deerpark. It will assess the level of airborne dust and particulate matter in the vicinity of the site, the impacts and appropriate mitigation measures, if required, by the applicant to remedy any significant adverse effects on the environment.

9.2 REGULATORY BACKGROUND

9.2.1 INTERNATIONAL AGREEMENTS, DIRECTIVES AND IRISH LAW

9.2.1.1 Climate Change

Recent climate change has been attributed to human activities through our emissions of greenhouse gases that are changing the composition of the earth's atmosphere. 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 (IPCC 2013). It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century. Cumulative emissions of CO₂ 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 CO₂ are stopped".

The United Nations Framework Convention on Climate Change (UNFCCC) was ratified by member countries, including Ireland, in April 1994. It was soon augmented in 1997 by an international agreement linked to the existing treaty, known as the Kyoto Protocol, with stricter demands for reducing greenhouse-gas emissions. The Paris Agreement (COP21) was signed in 2015 by over 200 nations, and for the first time, brings all nations into a common cause to undertake ambitious efforts to combat climate change. 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 Glasgow Agreement (COP26) was signed in November 2021, and 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, and it is now estimated 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.

The EU agreed the “2030 Climate and Energy Policy Framework” in 2014 (EU 2014), with a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. It was agreed the target will be delivered collectively by the EU, and that all member states will participate in this effort, balancing considerations of fairness and solidarity.

The EU’s Green Deal 2019 is its main strategy to transition the EU to a sustainable economic model. The overarching objective of the EU Green Deal is for the EU to become the first climate neutral continent by 2050, resulting in a cleaner environment, more affordable energy, better quality of life for its citizens, etc.

The government published the Climate Action Plan 2021 on the 4th November 2021, which provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting us on a path to reach net-zero emissions by no later than 2050.

Refer to section 8.4.2 for discussion of Climate Change.

9.2.1.2 Transboundary Pollution

The Convention on Long-Range Transboundary Air Pollution (LRTAP convention) is the main international framework for cooperation and measures to limit and gradually reduce and prevent air pollution. Fifty-one countries, including all EU member states, Canada, the United States and several countries in Central Asia, are parties to the convention. Since its signature in 1979, the LRTAP convention has been extended by 8 specific protocols, including the 1999 Gothenburg Protocol to stop acidification, eutrophication and ground-level ozone. The protocol was approved by the Council on behalf of the EU member states, including Ireland, and was transposed into EU law, mostly through the 2001 National Emissions Ceiling (NEC) Directive and the 2001 Directive on emissions from large combustion plants.

The initial objective of the Protocol was to control and reduce emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs) and ammonia (NH₃). To achieve its initial targets, Ireland was required to meet national emission ceilings of 42 kt for SO₂ (67% below 2001 levels), 65 kt for NO_x (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH₃ (6% reduction) by 2010. In 2012, the protocol was modified with the changes aimed at strengthening efforts to meet the objectives on the long-term protection of human health and the environment. The amendments not only introduced commitments for parties to reduce emissions of volatile organic compounds (VOCs), but also mandatory emission limit values for the main air pollutants by 2020 and beyond, and to include emission reduction

commitments for PM_{2.5}. The 2020 emission targets for Ireland are 25 kt for SO₂ (65% on 2005 levels), 65 kt for NO_x (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH₃ (1% reduction on 2005 levels) and 15.6 kt for PM_{2.5} (18% reduction on 2005 levels).

European Commission's 2001 NEC Directive prescribed the same emission limits as the 1999 Gothenburg Protocol. A national programme for the progressive reduction of emissions of the four main transboundary pollutants has been in place since April 2005 (DoEHLG 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO₂, VOCs and NH₃, but failed to comply with the ceiling for NO_x.

Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants, amended Directive 2003/35/EC and repealed Directive 2001/81/EC, applied the 2010 NEC Directive limits until 2020, and established new national emission reduction commitments that are applicable from 2020 and 2030 for SO₂, NO_x, VOC, NH₃, CH₄, and PM_{2.5}. In relation to Ireland, 2020-29 emission targets are for SO₂ (65% below 2005 levels), for NO_x (49% reduction), for VOCs (25% reduction), for NH₃ (1% reduction) and for PM_{2.5} (18% reduction). In 2030, Ireland's emission targets are for SO₂ (83% below 2005 levels), for NO_x (75% reduction), for VOCs (32% reduction), for NH₃ (7% reduction), for PM_{2.5} (35% reduction) and for CH₄ (7% reduction).

9.2.1.3 Air Quality Standards

The principal national legislation for the control of air pollution is the Air Pollution Act, 1987 (SI No. 6 of 1987). This Act provides a comprehensive statutory framework for the control of air quality by Local Authorities, specifically through 'orders' or 'plans' produced under Part IV Special Control Areas and Part V Air Quality Management Plans and Standards to which Local Authorities must have regard to in planning. Part V of the Act also makes provision for transposing Air Quality Standards into law.

The Act also has relevance to potential nuisance emissions of dust and or odours. Section 24(2) of the Act states 'The occupier of any premises shall not cause or permit an emission from such premises in such a quantity, or in such a manner, as to be a nuisance'.

In order to protect our health, vegetation and ecosystems, EU Directives set down air quality standards for a wide variety of pollutants. The current standards are contained in the Clean Air for Europe (CAFE) Directive (2008/50/EC) and the Fourth Daughter Directive (2004/107/EC). These Directives also include rules on how Member States should monitor, assess, and manage ambient air quality.

The CAFE Directive was transposed into Irish legislation as the Air Quality Standards Regulations 2011 (S.I. 180 of 2011), which revoked and replaced three earlier statutory instruments (i.e., S.I. 33 of 1999, S.I. 271 of 2002 and S.I. 53 of 2004).

These regulations set limit values/ target values for a range of pollutants, including sulphur dioxide (SO₂); nitrogen dioxide and other oxides of nitrogen (NO_x); particulate matter (PM₁₀ and PM_{2.5}); lead; benzene; carbon monoxide (CO); and ground level ozone (O₃).

The above directives require that Member States divide their territory into zones for the assessment and management of air quality. The zones adopted in Ireland are Zone A, the Dublin conurbation; Zone B, the Cork conurbation; Zone C, comprising 21 large towns in Ireland with a population >15,000; and Zone D, the remaining area of Ireland.

Under the EU Directives, Ireland is required to monitor a number of air pollutants that have an impact on health and vegetation. These include NO_x, SO₂, CO, O₃, PM₁₀ and PM_{2.5}, benzene, heavy metals and polycyclic aromatic hydrocarbons (PAHs). Across Europe the most problematic pollutants have consistently been NO_x, PM and O₃. Recently PAHs have also been identified as pollutants of concern.

Particulate matter (PM) is the main pollutant of concern in Ireland and is responsible for a broad range of health impacts and decreased quality of life (EPA 2021a). PM consists of very small particles, which can be solid or liquid and can be natural or man-made. The health impacts of these particles derive from their ability to penetrate deep into the respiratory tract. PM₁₀ and PM_{2.5} are particles with diameters less than 10 and 2.5 micrometres, respectively. Although PM₁₀ can penetrate and become lodged deep in the lungs, PM_{2.5} is even more damaging because the tiny particles can penetrate the alveolar–capillary membrane of the lungs and enter the blood system. Chronic exposure to these particles contributes to the risk of developing cardiovascular and respiratory diseases and lung cancer. In Ireland, the main source of PM is domestic use of solid fuels in stoves and open fires for home heating, especially for the more impactful PM_{2.5} particles (EPA 2021a). The combustion occurs at low temperatures and is inefficient, such that the solid fuel is incompletely combusted.

As PM_{2.5} is a better indicator of anthropogenic (man-made) emissions and is more impactful in terms of human health, the EPA now preferentially reports it rather than PM₁₀. Figure 9.1 shows the long-term trends in PM_{2.5} for zones in Ireland during the 2010 to 2020 period. It is apparent that the impact of PM_{2.5} is not confined to the larger cities and towns that are connected to the natural gas grid but is actually more prevalent in smaller towns and villages, where the burning of solid fuel arises from the limited alternatives for home-heating. As a consequence of these factors, the levels of PM_{2.5} were similar across all zones, while there was a notable decline in total emissions over the ten-year period (EPA 2021a).

Under the CAFE Directive, Ireland was required to achieve reductions in concentrations of PM_{2.5} with limit or target values of 25 µg/m³ in 2010 dropping to 20 µg/m³ in 2020. Ireland achieved these targets.

The total national emissions data for five key NEC pollutants given in Table 9.1 is plotted in Figure 9.2 and Figure 9.3, and clearly show a steady decline in PM_{2.5} emissions over the 1990 to 2019 period that equates to a 63.5% reduction (See Figure 9.3). As a result, Ireland met its emissions ceiling of 15.6 kt PM_{2.5} for 2020 with a value of 11.79 kt PM_{2.5} in 2019 and is projected to be compliant with an emissions ceiling of 11.18 kt in 2030 (EPA 2021b).

NO_x are one of the main pollutants that impact people's health in Ireland. NO_x refers to the two gaseous pollutants nitric oxide (NO) and nitrogen dioxide (NO₂), which are emitted during high temperature combustion processes. The main sources of these pollutants are vehicle exhausts, particularly diesel engines and combustion sources. Exposure to NO₂ is harmful to health, while NO_x contributes to the formation of ground-level ozone and acid rain.

The total national emissions data for NO_x are given in Table 9.1 and plotted in Figure 9.2 and Figure 9.3, and clearly show a steady decline in NO_x emissions from 177 to 98 kt NO_x over the 1990 to 2019 period, which equates to a 44.5% reduction (See Figure 9.2 and Figure 9.3). However, Ireland failed to meet its emissions ceiling of 65 kt NO_x for 2010 with the above value of 98 kt PM_{2.5} in 2019 and is projected to exceed its reduction commitments of 69 and 42 kt in 2020 and 2030, respectively (See Figure 9.4; EPA 2021b). Under a flexibility mechanism in Directive (EU) 2016/2284, Ireland is allowed an adjustment for compliance purposes, where non-compliance with national emission reduction commitments arose from applying improved emission inventory methods.

Road transport is the principal source of NO_x emissions, accounting for c. 38.6% of 2019 total NO_x emissions, while agriculture is the second largest source, mainly from the application of synthetic fertiliser and emissions from urine and dung deposited by grazing animals, accounting for c. 34.4% of the 2019 total NO_x emissions. Under the With Additional Measures (WAM) scenario, NO_x emissions are projected to be in non-compliance with the 2020 emission reduction ceiling of 69 kt NO_x but in compliance with the 2030 emission reduction ceiling of 42 kt NO_x (EPA 2021b).

SO₂ is the major precursor to 'acid rain' and acid deposition, which is associated with the acidification of soils and surface waters and the accelerated corrosion of buildings and monuments. Emissions of SO₂ are largely derived from the sulphur in coal and oil used in combustion activities. Ireland's national emissions ceiling for SO₂ under the NEC Directive was 42 kt for 2010 with ceilings of 25.5 kt for 2020 and 10.9 kt for 2030 (EPA 2021b). The national emissions fell from 183.6 kt in 1990 to 10.9 kt SO₂ in 2019 equating to a massive reduction of 94.1% over the 1990-2019 period. The latter reflects a switch from the use of oil and solid fuels to natural gas, reduced sulphur content in coal and oil, and the implementation of abatement measures in electricity generation. National SO₂ emissions have been compliant with the NEC ceiling for 2010 of 42 kt since 2010 and are projected to meet the 2020 and 2030 reduction commitments of 25.5 and 10.9 kt SO₂, respectively (See Figure 9.5; EPA 2021b).

The sources of PAHs include industry, traffic emissions and domestic use of solid fuels such as wood and coal. Long-term exposure to low levels of PAHs may cause a number of diseases including lung cancer. PAHs were monitored in Ireland for the first time in 2009 at five monitoring stations. From 2013 to 2015 PAH concentrations were relatively stable, however, Benzo[a]pyrene (BaP) concentrations are above the EEA air quality estimated reference level at four out of five stations. Reductions in emissions from traffic and from domestic use of solid fuels are required to reduce ambient levels of PAHs.

Ozone is a gas that is formed as a secondary pollutant at ground-level by the reaction of a mixture of other chemicals – NO_x, CO, and VOCs – in the presence of sunlight. Ozone is a powerful oxidising agent and can affect health and vegetation.

The total national emissions data for Non-Methane Volatile Organic Compounds (NMVOC) are given in Table 9.1 and plotted in Figure 9.2 and Figure 9.3. The NMVOC emissions show a moderate reduction over the 1990-2019 period from 147 to 114 kt, but continue to be non-compliant with, and substantially exceed, the national 2010 and 2020 ceilings of 55 and 43 kt SO₂. This is primarily due to the inclusion of a new major source category, namely emissions from manure management in agriculture, which accounts for c. 40% of the emissions. Total NMVOC emissions under the 'With Additional Measures' (WAM) scenario are projected to be 68.2 and 69.2 kt in 2020 and 2030, respectively, and thus predict substantial non-compliance with the ceilings extending to 2030 and beyond.

Short acute ozone pollution episodes are infrequent in Ireland; however, they have happened in the past, and will happen in the future. They are most likely to occur in summer months when a stable anti-cyclone is established over Ireland, bringing settled, warm weather combined with transmission of polluted air masses from other European countries. Reducing ozone requires limiting emissions of its precursors locally, regionally, and globally. The objectives of both the Convention on Long-range Transboundary Air Pollution (CLrTAP) and National Emissions Ceilings (NEC) Directive include addressing ground-level ozone (EPA 2012).

The other health-relevant pollutants measured are CO, benzene, lead, arsenic, cadmium, nickel, and mercury. Levels of all these pollutants are low in Ireland and below all relevant limit and target values (EPA 2012, 2020).

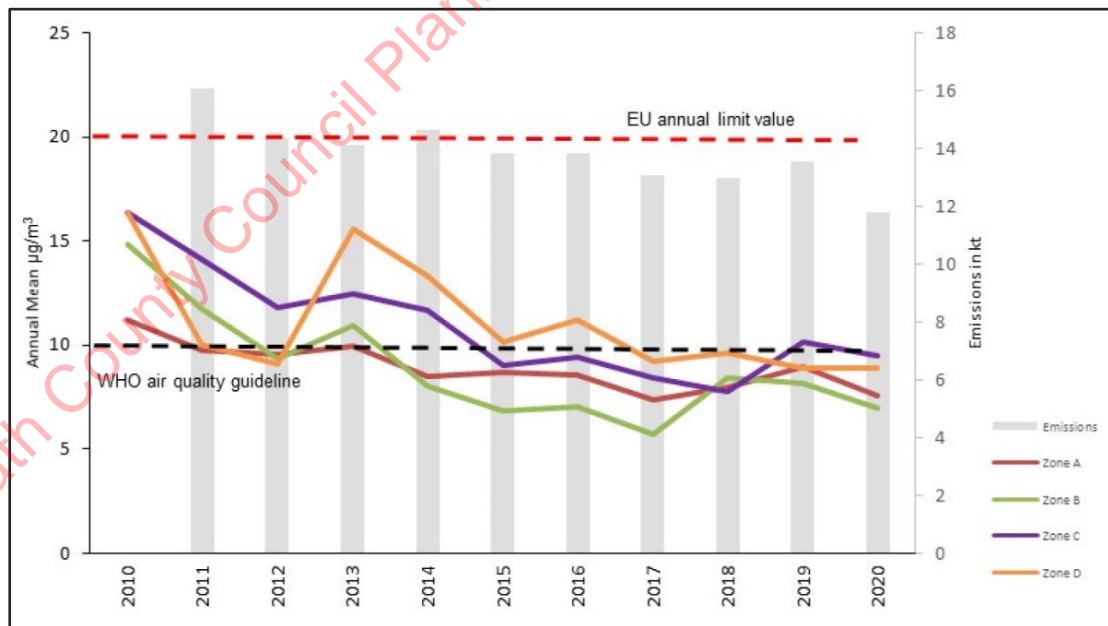


Figure 9.1 Annual Mean PM_{2.5} Concentrations in Four Zones 2010-2020

Note: National emissions given by bar chart. (Redrawn from EPA 2021b).

Table 9.1 National Total Emissions of Key NEC Air Pollutants 1990-2019

Year	SO ₂	NO _x	NMVOC	NH ₃	PM _{2.5}
1990	183.64	176.63	147.05	109.61	32.31
1991	183.74	179.21	148.14	111.60	32.09
1992	171.37	186.03	144.15	114.39	28.03
1993	162.26	176.96	141.54	113.78	27.42
1994	177.37	175.39	138.15	114.83	25.08
1995	163.24	171.75	136.64	115.57	23.30
1996	150.09	175.58	137.71	119.86	23.69
1997	168.54	165.99	134.09	122.96	21.55
1998	178.62	169.96	135.39	127.48	22.64
1999	160.87	167.57	126.67	125.22	19.24
2000	143.90	165.92	119.84	119.66	19.28
2001	141.98	166.92	120.48	119.80	19.10
2002	106.40	158.83	120.77	120.29	18.27
2003	82.44	160.66	119.62	120.35	18.06
2004	73.12	164.13	119.27	117.74	18.21
2005	72.81	167.92	120.09	119.56	18.95
2006	60.74	163.62	120.20	121.22	18.35
2007	54.95	157.43	119.29	114.45	17.66
2008	45.63	147.89	116.04	116.54	17.62
2009	32.66	124.04	113.84	116.75	16.94
2010	26.67	117.45	110.73	114.81	16.06
2011	24.87	104.78	107.92	110.43	14.35
2012	23.50	108.24	109.13	117.08	14.13
2013	23.76	109.76	110.99	117.92	14.66
2014	17.59	108.20	108.01	114.24	13.85
2015	15.89	107.47	108.54	119.53	13.82
2016	14.44	110.18	109.80	124.82	13.09
2017	14.99	108.17	114.85	128.64	12.99
2018	14.62	107.95	115.09	135.21	13.56
2019	10.87	98.03	113.74	125.40	11.79
NEC Target	25.5	65	43	108	15.6
Achieved	Y	N	N	N	Y

Note: NMVOC denotes Non-Methane Volatile Organic Compounds; NEC Target: NECD Ceiling for 2020. Data (in kt). (Source: EPA 2021b).

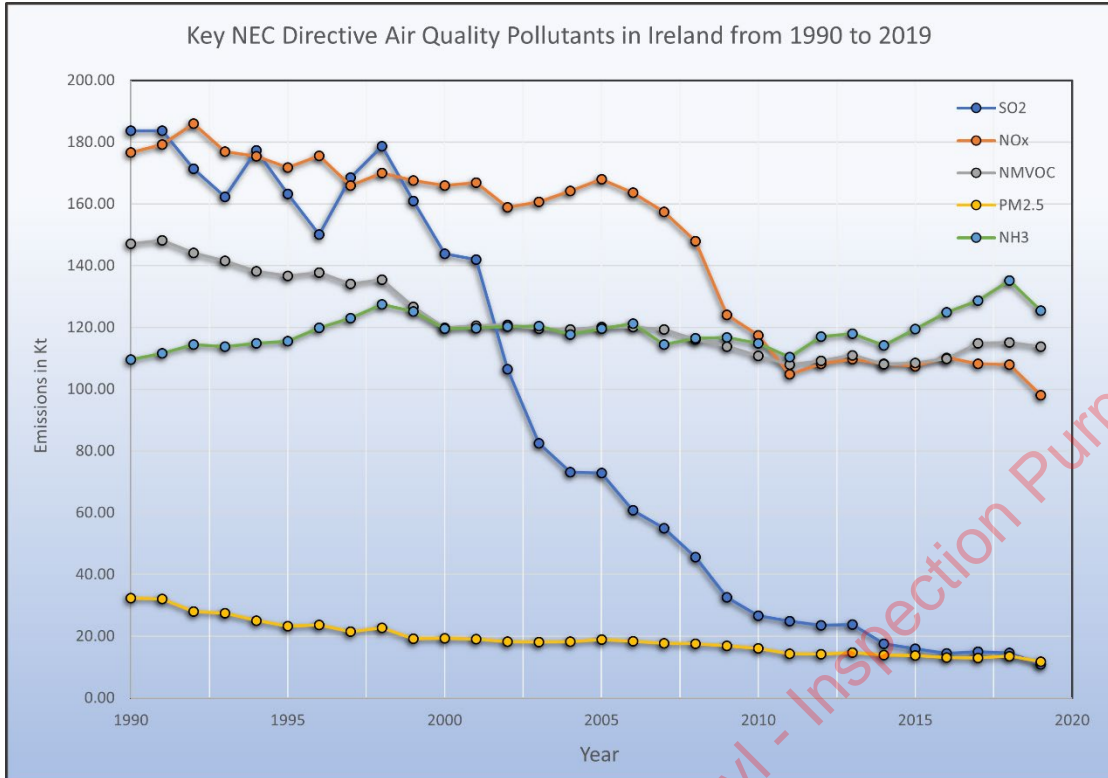


Figure 9.2 Variation in Total Emissions of Key NEC Air Pollutants 1990-2019

(Source: EPA 2021b).

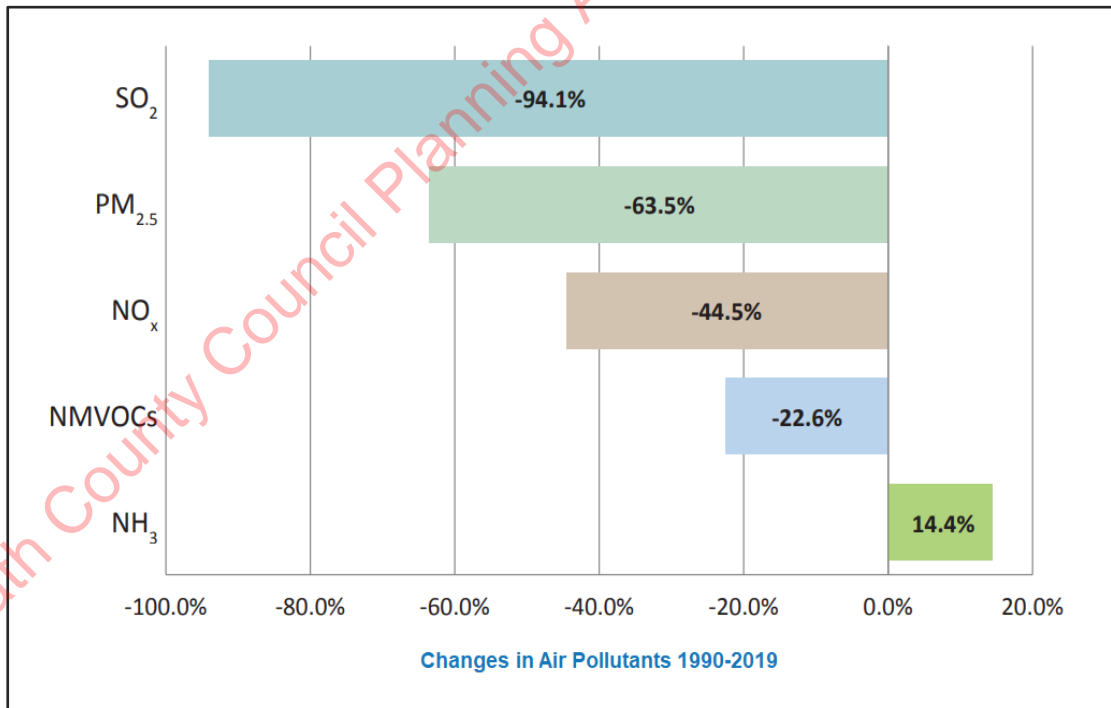


Figure 9.3 Percentage Changes in Key NEC Air Pollutants 1990-2019.

(Redrawn from EPA 2021b).

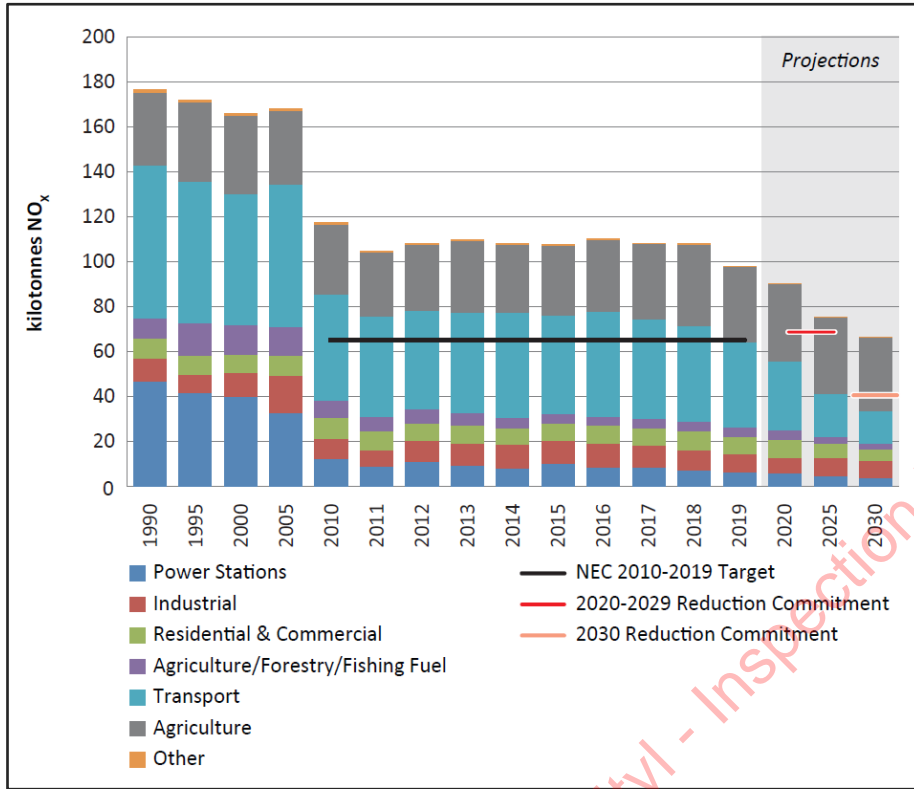


Figure 9.4 Trend in NO_x Emissions 1990-2030, Current and Future Emissions Ceilings.

(Redrawn from EPA 2021b).

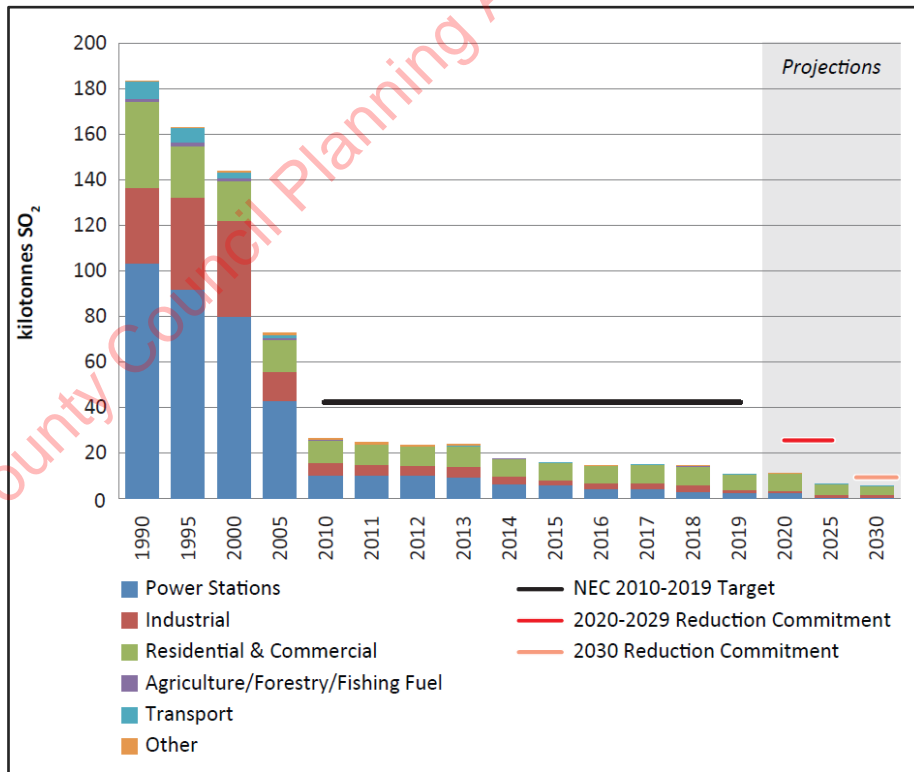


Figure 9.5 Trend in SO₂ Emissions 1990-2030, Current and Future Emissions Ceilings.

(Redrawn from EPA 2021b).

Air Quality in Ireland is generally of an acceptable standard, not exceeding any EU legislative or target values. However, when compared with WHO guideline values and EEA reference level values, ozone, particulate matter, and PAHs emerge as pollutants of concern in the short term with NO₂ expected to rise due to increased vehicular emissions. However, the modal shift away from internal combustion engine powered vehicles to electric cars, public transport, cycling and walking that is envisaged in the Climate Action Plan 2021 (DoECC 2021) will substantially reduce emissions of NO_x and ground-level ozone.

With regard to air emissions, the strategies implemented to achieve compliance with the EU NEC Directive have successfully controlled emissions of sulphur dioxide, ammonia, and volatile organic compounds. Emissions of all three are expected to remain below the prescribed ceilings.

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, which accounts for 40% of national energy consumption. Government departments, national agencies and local authorities must make air quality an integral part of their traffic management and planning processes. The introduction of the nationwide ban on smokey coal in 2018 is to be welcomed and should help shift the use of solid fuel to cleaner alternatives including gas.

9.2.2 EMISSION LIMIT VALUES

The existing planning condition No. 6 states that dust deposition levels measured at the site boundaries shall not exceed 130 mg/ m²/day at any time. This limit often is considered to refer to insoluble particulate matter and an old monitoring method using British Standard deposit gauges (BS 1747: Part 1: 1969).

The impact of dust is usually monitored by measuring rates of dust deposition (DoE 1995). There are currently no Irish statutory standards relating specifically to dust deposition thresholds for inert dust. There are a number of methods to measure dust deposition but only the German TA Luft Air Quality Standards specify a method of measuring dust deposition – The Bergerhoff Method (German Standard VDI 2119, 1972). It is the only enforceable method available.

On the above basis, both the DoEHLG (2004) and EPA (2006) recommended that the following TA Luft dust deposition limit value be adopted at site boundaries associated with quarry developments – total dust deposition (soluble and insoluble): 350 mg/m²/day (when averaged over a 30-day period).

9.2.3 EXTRACTIVE INDUSTRY GUIDELINES

The EPA's Draft Advice Notes for Preparing an Environmental Impact Statement (EPA 2015) provides guidance on Air Quality in respect of preparation of EIARs. Some of the guidance available that have a bearing on Air Quality is given below.

- DoEHLG (2004). *National Guidelines on Quarries and Ancillary Activities for Planning Authorities*. Department of Environment, Heritage and Local Government (DoEHLG), Dublin, Ireland.
- EPA (2006). *Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)*. Environmental Protection Agency (EPA), Johnstown Castle, Wexford, Ireland.
- EPA (2015). *Advice Notes on Current Practice for preparing Environmental Impact Statements*, Draft. Environmental Protection Agency (EPA), Johnstown Castle, Co. Wexford, Ireland.
- ICF (2005). *Environmental Code*, 2nd Edition. Irish Concrete Federation (ICF), Dublin, Ireland.
- IAQM (2014). *Assessment of dust from demolition and construction*. Institute of Air Quality Management (IAQM), London, UK.
- IAQM (2016). *Guidance on the Assessment of Mineral Dust Impacts for Planning*. Institute of Air Quality Management (IAQM), London, UK.
- NRA (2011). *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes*. National Roads Authority (NRA), Dublin, Ireland.
- WHO (2005). *Air Quality Guidelines Global Update 2005: Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide*. World Health Organisation (WHO), Copenhagen, Denmark.

9.3 METHODOLOGY

9.3.1 STUDY

The baseline study comprised a desktop review of:

- Relevant policy, legislation and guidance with respect to air quality and emissions;
- Existing dust monitoring results were analysed to evaluate the current air quality conditions; and
- Impact of the development on the existing air quality of the area.

9.3.2 SOURCES OF INFORMATION

Refer to Section 9.7 for details on sources of information.

9.4 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

9.4.1 SENSITIVE RECEPTORS

The principal concern in respect of emissions from the facility is the effect on residential amenity.

The surrounding lands are largely agricultural and held in pasture, although there is significant afforestation nearby to the west and a copse of trees partly covers the flanks of the hill into which the quarry has been excavated. The minor access road (i.e., c. 130 m in length) to the quarry has a c. 10 m frontage onto R395 Regional Road.

Residential property in the area typically comprises one-off single residences and farmsteads along public roads and to a minor extent, along and at the end of lanes off the public roads.

Residential development in the area consists of dispersed farmsteads and diffuse or sporadic ribbon development along roadsides and around towns and villages. The closest large residential settlement to the site is Castlepollard, which is located c. 2 km to the northwest. There are 10 residences within 250 m, 16 within 500 m and 42 within 1 km of the site (Refer Figure 4.1). There are several clusters of residential dwellings located near the site. A cluster of 6 residences are located within 250 m on the east side of the R395 across from the site entrance and north along the L5743 (i.e., nos. 5-10), while another cluster of 4 residences are located within 250 m west of the site adjacent to the drainage ditch into which it is proposed to discharge surface waters (i.e., nos. 1-4). However, residences nos. 1-4 lie on the west side of an intervening minor topographic ridge, which obscures any views of the site.

There are no occupied residences within the application site or landholding, and the closest is located c. 270 m northeast of the quarry extraction area. There has been a long historical association with quarrying at this location and consideration has been given to screening of the development and phasing with respect to receptors.

There are no community facilities within 1 km of the site, the nearest being the Maple Court Nursing Home and Little Friends Montessori on the outskirts of Castlepollard c. 1.1 km from the site. There are no industrial or commercial developments within 1 km of the site, the nearest being a petrol station on the outskirts of Castlepollard c. 1.1 km from the site. Thus, the number of sensitive receptors primarily relates to residences 5-10 (Refer to Figure 4.1), which lie within 250 m of the site.

The relatively high rainfall of the area, and experience of similar environments elsewhere in Ireland, suggests that baseline dust levels of approximately 40 to 60 mg/m²/day would be expected for an open pastoral landscape during drier periods of the year (May to September).

9.4.2 METEOROLOGY

Please refer to EIAR Section 8.4.1 Climate for a full discussion of wind (8.4.1.3) and rainfall (8.4.1.1).

9.4.3 AIR QUALITY

The Environmental Protection Agency (EPA) manages the National Ambient Air Quality Network. For monitoring purposes, the country is divided into four air quality zones as follows: 'A' (Dublin); 'B' (Cork); 'C' (Large Towns), and; 'D' (Rural). The Deerpark area, where Castlepollard quarry is located, falls into zone 'D' (Rural).

As stated previously (Refer to Section 9.2.1.3 above) under the EU Directives, Ireland is required to monitor a number of air pollutants that have an impact on health and vegetation. The nearest Air Quality monitoring station to Castlepollard Quarry is situated at Mullingar.

The EPA's Air Quality Index for Health (AQIH) is a scale from one to 10 that ranks air quality and is applied to characterise the current air quality in each zone. A reading of 10 means the air quality is very poor and a reading of one to three inclusive means that the air quality is good.

The current air quality index for the area is "1-good" as shown by the light green flags at the four nearest stations of Mullingar, Longford, Navan and Cavan (Refer to Figure 9.6).

The AQIH is based on measurements of five air pollutants, all of which can harm health. The five pollutants are:

- Ozone gas
- Nitrogen dioxide gas
- Sulphur dioxide gas
- PM_{2.5} particles and
- PM₁₀ particles

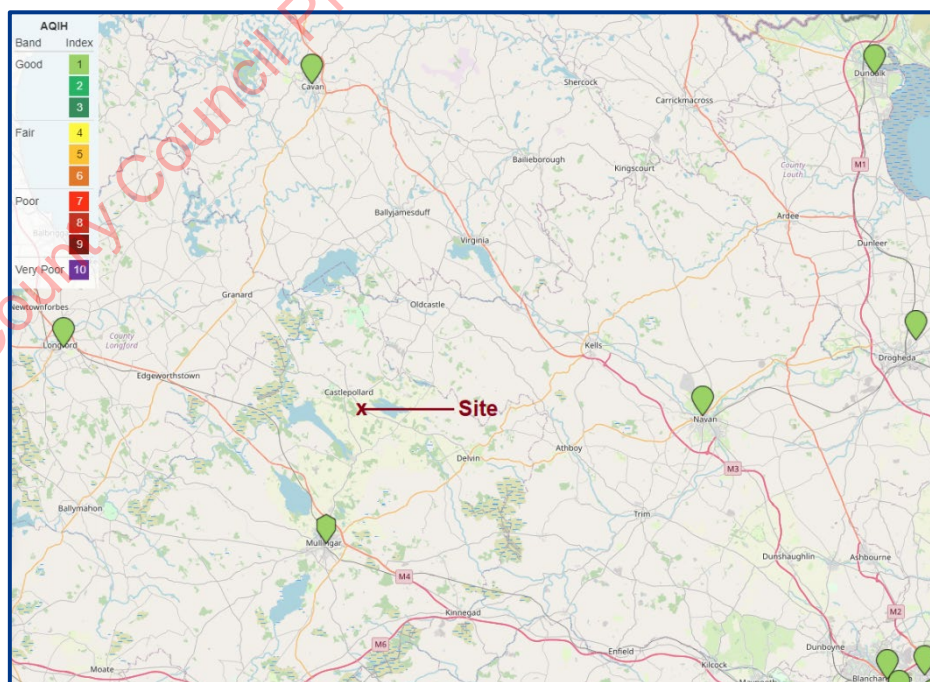


Figure 9.6 Air Quality Index for Health Map (EPA 2021)

Table 9.2 Air Quality Index for Health (AQIH)

Band	Index	Ozone ($\mu\text{g}/\text{m}^3$) 8 HOUR MEAN	Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$) 1 HOUR MEAN	Sulphur Dioxide ($\mu\text{g}/\text{m}^3$) 1 HOUR MEAN	PM _{2.5} ($\mu\text{g}/\text{m}^3$) 24 HOUR MEAN	PM ₁₀ ($\mu\text{g}/\text{m}^3$) 24 HOUR MEAN
Good	1	0 - 33	0 - 67	0 - 29	0 - 11	0 - 16
	2	34 - 66	68 - 134	30 - 59	12 - 23	17 - 33
	3	67 - 100	135 - 200	60 - 89	24 - 35	34 - 50

Band	Index	Health Advice for General Population	Health Advice for At-Risk Groups
Good	1	Enjoy your usual outdoor activities.	Enjoy your usual outdoor activities.
	2		
	3		

9.4.4 ENVIRONMENTAL MONITORING

Baseline dust monitoring was carried out at the site using a Bergerhoff dust deposition gauge. The method of measurement is the German Standard VDI 2119 specified in the “Technical Instructions on Air Quality Control – TA Luft) 1986.

Dust monitoring is carried out at four monitoring locations (D1 to D4) (Refer to EIAR Figures 1.3 and 3.1).

Table 9.3 Dust Deposition Results ($\text{mg}/\text{m}^2/\text{day}$)

Period	D1	D2	D3	D4
Q1 2020	11	24	64	NR ¹
Q2 2020	113	NR ¹	NR ¹	NR ¹
Q3 2020	NR ¹	NR ²	87	39
Q4 2020	15	23	16	9
Q1 2021	61	89	69	73
Q2 2021	41	9	N/A	64
Q3 2021	NR ¹	NR ¹	NR ¹	NR ¹

NR¹ denotes None Recorded due to organic contamination from leaf litter, insects, bird droppings, etc.

NR² denotes None Recorded due to sample glass broken on collection / damage to sample glass collection vessel during transit to Laboratory

It is noted that there are no dust deposition results for Q3 2021 due to large amounts of organic contamination in all four vessels. The applicant has implemented procedures to ensure that all Bergerhoff Dust gauge apparatus is maintained to ensure results are obtained, especially during the autumn seasons when leaves are falling and may create inorganic contamination in the dust gauges. The existing dust monitoring programme will allow on-going monitoring of fugitive dust emissions from the site, thereby assisting in ensuring compliance with the accepted TA Luft dust deposition limit value to be adopted at site boundaries associated with quarry developments – total dust deposition (soluble and insoluble): 350 mg/m²/day (when averaged over a 30-day period).

This condition is also in accordance with guidance issued by both the Department of the Environment and the EPA in relation to dust deposition monitoring for these types of developments and will continue to be applied. Recent monitoring results are provided in Table 9.3 above.

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9.5 ASSESSMENT OF IMPACTS

9.5.1 ASPECTS OF DUST DEPOSITION

For the purpose of this assessment, dust is defined as particulate matter that emanates from the site, or from the vehicles that serve it, which is borne by air and carried downwind from the point of origin or source. The amount of dust that may be emitted from any operation, activity or wind action is a function of two main factors:

- The susceptibility of the material involved to produce dust (i.e., 'erodibility'); and
- The erosive actions to which the material is subjected that could produce dust.

9.5.1.1 Susceptibility of Materials to Erosion

The nature and particle size of the materials being handled at a site have a fundamental influence on their tendency to be broken down and to generate fugitive dust emissions. Particles that may become suspended in air are generally a maximum of 75µm in diameter (i.e., silt size or smaller). It is also dependent on material density and to some extent particle shape. Materials erodibility is therefore directly related to the proportion of particles smaller than this size. Erodibility is also affected by the cohesion within the material. Cohesion increases with clay and moisture content but decreases with sand content. The presence of larger particles such as coarse sand, gravel or stone also reduces the tendency to erosion and by implication dust generation.

9.5.1.2 Erosive Actions

Experience of quarry workings and associated ancillary activities indicates that mechanical activity is the most significant factor in material erosion and dust generation. Dust emanates from a number of site activities as detailed in section 9.5.3 below. However, the effect of wind and high ambient temperatures are also important factors in dust generation and migration. Problems may arise at sites when all these factors arise simultaneously.

Dust generation occurs from three main sources:

- **Point Source** – where dust is generated by activities such as loading, conveyor transfer points;
- **Line Source** – where dust is generated by activities identified above along well-defined haul roads and open conveyors; and
- **Dispersed Source** – where dust is generated by activities such as general site activity. Stockpiles are also considered to be a dispersed dust source.

9.5.1.3 Dust Dispersal

The amount of dust capable of being dispersed to a particular location during windy conditions is related to several factors including:

- Distance from source to receptor;
- Prevailing weather conditions; and
- Intervening topography between source and receptor.

As dust travels downwind from the source it initially disperses outwards and upwards and then progressively falls to the ground surface. Larger particles will fall first and therefore will not migrate as far as the smaller particles. The concentration of dust therefore reduces very quickly from the emission source. Most emitted dust is in fact deposited close to its source, generally within a distance of a few tens of metres.

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 9.4 Air - Impact Matrix			
'Do Nothing' Impacts	X		
Factors	Construction	Operation	Decommissioning
Direct Impacts	●	●	●
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
'Worst Case' Impacts	X	●	X
None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.			
Refer to Appendix 3 for definition of Significance			

9.5.2 'DO NOTHING' IMPACTS

If the development is not permitted 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.

Under the 'Do Nothing' scenario, all quarrying and ancillary activities would cease. The site would be restored as per the requirements of the existing planning permission (P.A. Ref. 01/525). Restoration of the quarry would have a positive slight impact with respect to Air due to revegetation of exposed surfaces within the quarry over time.

9.5.3 DIRECT IMPACTS

The proposal is for the continued use of a quarry for the production of aggregates in the townland of Deepark, Castlepollard, County Westmeath. The scale of the operation under planning permission P.A. Ref. 01/525 was approximately 100,000 tonnes per annum. An average extraction capacity of 100,000 tonnes is anticipated as part of the proposed development.

The proposed development will not require the stripping, transport and placement of soils and overburden as part of the quarry extraction, as this has already been done. However, it will be part of the restoration scheme. An excavator and dump trucks will be mobilised to site as and when required to carry out these operations. The topsoil and overburden will have a greater propensity for erosion and subsequent generation of dust than the underlying limestone rock material. Although these operations will be of a relatively short-term duration, a variety of mitigation measures will be employed as part of on-going operational procedures to limit erosion/dust generation as much as possible.

This is an established well developed quarry and as such the working face has already been developed/exposed within the central portion of the site. The mobile crushing and screening plant will be located centrally within the existing excavation, relocating periodically as the working face is developed to the southeast.

Fugitive dust emissions are generated wherever there is movement of dust relative to the air. The emission of fugitive dust is very dependent on weather conditions. Where nuisance complaints from activities arise, they are generally as a result of a combination of specific site activities and particular weather conditions (e.g., hot, windy).

Experience of quarry operations indicates that mechanical activity is the most significant factor in material erosion and dust generation. The following figure is a generalised flow chart showing the main site activities likely to give rise to fugitive dust emissions (Refer Figure 9.7). The first step of "Stripping and relocation of Soil and Overburden" has been completed at Castlepollard.

The main potential impacts of dust would be visual impact, coating/soiling of property, coating of vegetation, contamination/alteration of soils, water pollution, changes in plant species composition, and loss of plant species.

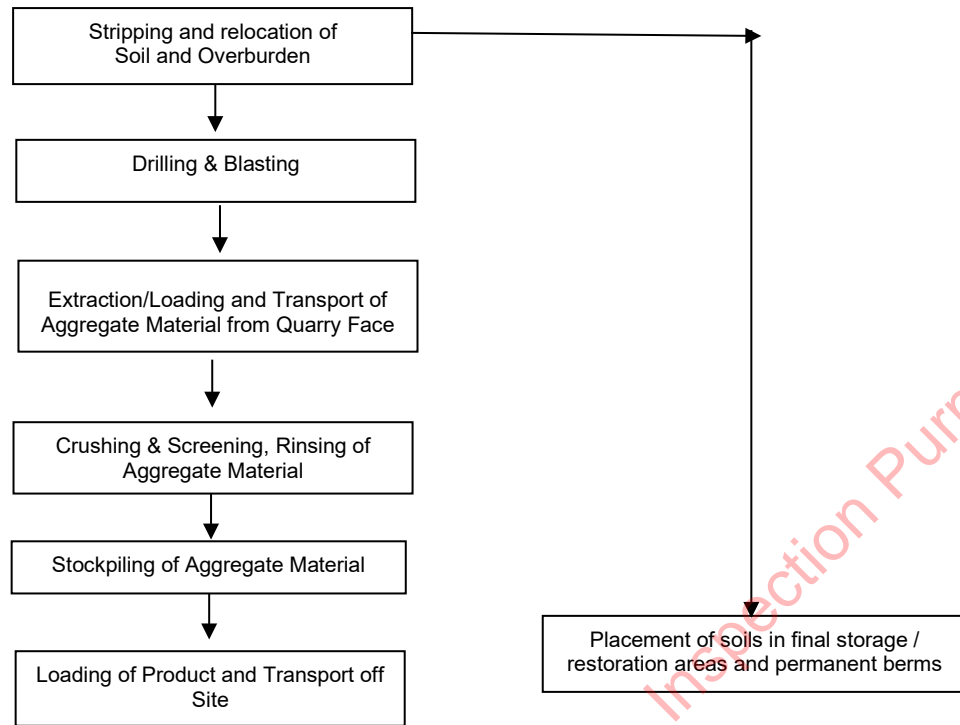


Figure 9.7 Operational Activities

9.5.3.1 Construction Phase

As an existing quarry with much of its infrastructure in-situ, only a brief construction phase is envisaged.

The proposed development will consist of the continued use and operation of the existing quarry (permitted under P.A. Ref. 01/525), including deepening of the quarry, along with minor amendments to the permitted quarry layout comprising an extraction area of c. 4 ha within an overall application area of c. 11.4 ha. The development will include provision of new site infrastructure, including water management system, wheelwash and other ancillaries.

Peripheral screening mounds along the extraction area boundaries are already in place.

It is considered that any direct impact with respect to emissions to air will be slight, occasional, negative due to construction works.

9.5.3.2 Operational Phase

An average extraction capacity of 100,000 tonnes per annum is anticipated as part of the proposed development, which is equivalent to a small quarry operation. The daily traffic volumes associated with the development will average 16 loads per day arriving to, and departing from, the site.

The flow diagram shown in Figure 9.8 below shows the sources of fugitive dust emissions arising from the proposed quarry activity and the methods of treatment/abatement to be employed.

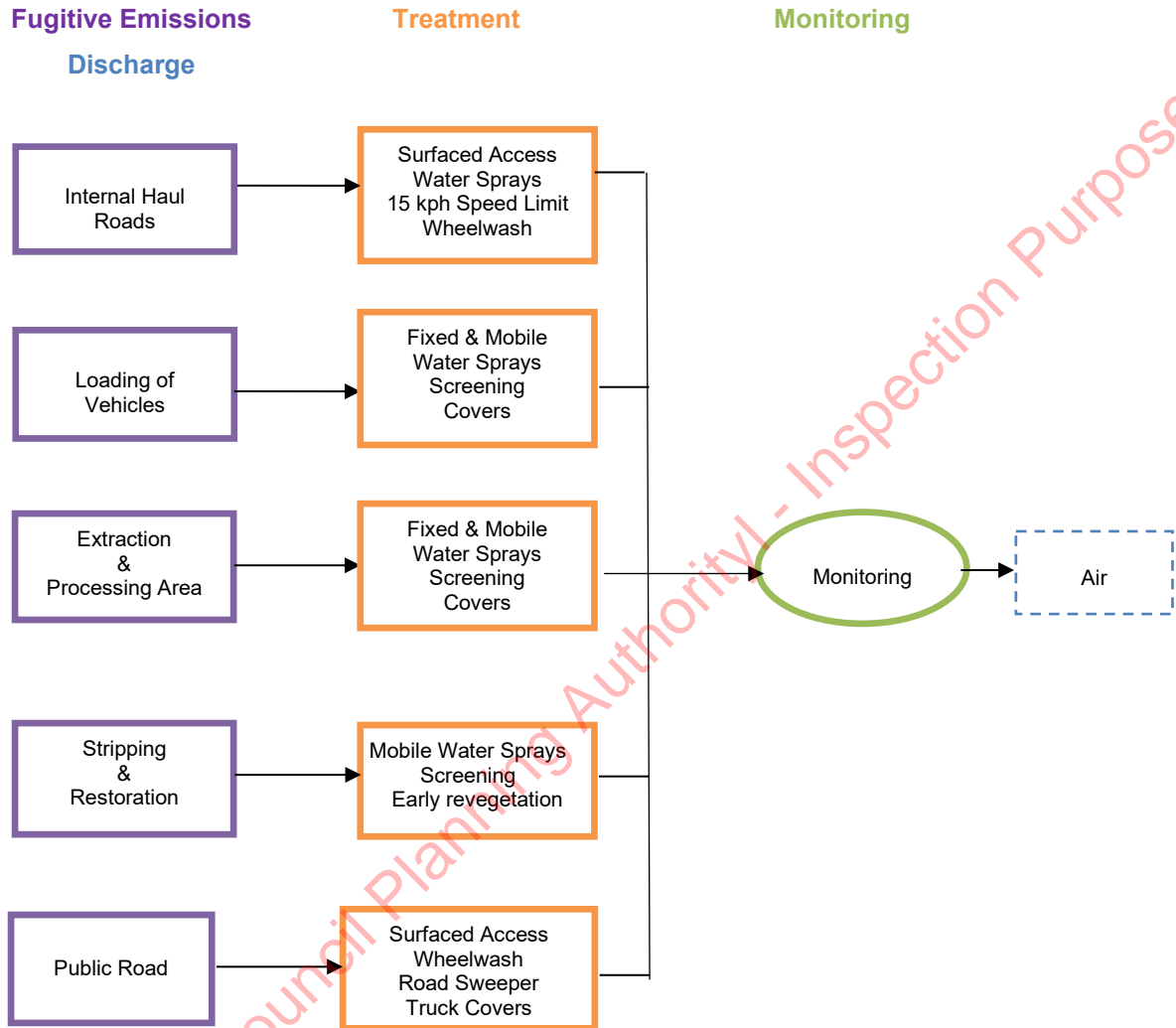


Figure 9.8 Flow Chart for Source of Fugitive Emissions

The impacts of any dust deposition from the operations will be direct, slight, occasional, negative largely confined to the site area. Various mitigation measures will be implemented to minimise any impacts as much as practical to ensure the operation of the quarry will not result in any significant impact on residences or local amenities (Refer to Section 9.6.1 below).

Dust monitoring will be carried out in exceedance of the recognised TA Luft dust deposition limit value of 350 mg/m² per day. Despite the low level of activity, the quarry is proposing a very robust mitigation regime which is fully compliant with best practice in Ireland including the Department of the Environment, Heritage and Local Government publication "Quarries and Ancillary Activities – Guidelines for Planning Authorities" (DoEHLG 2004).

The Institute of Air Quality Management “Guidance on the Assessment of Dust from Demolition and Construction” (IAQM 2014) outlines an assessment criteria for assessing the impact of dust emissions from construction activities with standard mitigation in place. As shown in Table 9.5 below, the risk from soiling ranges from 25–100 m and in relation to PM₁₀, the risk ranges from 10–25 m depending on the scale of the construction activity. Given the site activities expected, the scale of the development would be considered moderate.

Table 9.5 Assessment Criteria for the Impact of Dust Emissions from Construction Activities with Standard Mitigation in Place

Source		Potential Distance for Significant Effects (Distance from source)		
Scale	Description	Soiling	PM ₁₀	Vegetation Effects
Major	Large construction sites with high use of haul routes	100 m	25 m	25 m
Moderate	Moderate sized construction sites with moderate use of haul routes	50 m	15 m	15 m
Minor	Minor construction sites with limited use of haul routes	25 m	10 m	10 m

The guidance above would indicate that there is no potential for soiling when the scale of construction is defined as moderate. No significant impacts are expected when the mitigation measures outlined in Section 9.6.1 below are taken into account. In relation to PM₁₀, which is the particulate fraction with the potential harmful health effects, and vegetation effects, the nearest façades falls outside of the distance for potential significant effects.

The IAQM guidelines also outline the assessment criteria for assessing the impact of dust emissions from construction activities based on both receptor sensitivity and the number of receptors affected. As shown in Table 9.6 below the risk from dust soiling at the nearest residences (a high sensitivity environment, distance 100–350 m and with receptor numbers between 10–100) is considered low under this guidance.

Table 9.6 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

In addition, the IAQM guidelines also outline the assessment criteria for assessing the impact of PM₁₀ emissions from construction activities based on current annual mean PM₁₀ concentration, receptor sensitivity and the number of receptors affected. The current PM₁₀ concentration in the area as per the EPA's Air Quality Index for Health (AQIH) is approximately 0 - 16 µg/m³ (Refer to Table 9.2). As shown in Table 9.7 below the risk to human health from PM₁₀ emissions at the nearest residence (high sensitivity, and with receptor numbers between 1 - 100) is considered low under this guidance:

Table 9.7 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from source (m)			
			<20	<50	<100	<200
High	< 24 µg/m ³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low

Due to the implementation of the mitigation measures, the impact of dust deposition and ambient levels of PM₁₀ / PM_{2.5} at nearby residential receptors is deemed not to be significant during this phase.

The Air Quality Standards Regulations (S.I. 271 of 2002) sets limit values for sulphur dioxide, nitrogen dioxide, particulate matter, and lead in ambient air. The regulations apply to ambient air quality in the vicinity of land use/development types including quarries. The development requires movement of finished products by road, and transport by other methods is not practical in this situation. Given the proximity of the site to the National Road network fuel consumption and therefore exhaust emissions will be reduced relative to more removed locations. The current air quality in the region is known to be "good" (Refer to Section 9.4.3 above) and the impact on air quality with respect to the proposed quarry is considered to be negligible.

Mitigation measures are already in place at the site and included in the existing Environmental Management Plan (EMP – Refer to Appendix 10). Continual monitoring and measurement will ensure the effective application of these mitigation measures (Refer to 9.6 below) and ensure that activity at the quarry will not result in any significant environmental impact.

9.5.4 INDIRECT IMPACTS

Apart from the direct impact of the deposition of particulate material, there may be an associated occasional slight negative visual impact with fugitive dust generation. This impact will be minimised by both the mitigation measures described to minimise dust in Section 9.6 below, and those described to minimise visual impacts in Section 11.

9.5.5 CUMULATIVE IMPACTS

There are no other projects, quarries, commercial or industrial facilities in close proximity to the site. As such it is considered there is no significant cumulative impact with respect to the operation of the quarry.

9.5.6 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. Given the location (c. 50 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 have imperceptible transboundary effects on air quality.

9.5.7 RESIDUAL IMPACTS

Given the low inherent potential for dust and dispersion from the proposed development, the remote rural location, and the mitigation measures incorporated in the design, it is anticipated that the impact on the existing air quality during the operational phase will be occasional, negative and not significant.

The restored quarry will involve a change in land-use from the original agricultural use to mineral extraction and ultimately to the future beneficial use as a wildlife amenity. It is considered that following full restoration and closure of the site that there will be no significant, long-term, adverse impacts in terms of Air Quality.

9.5.8 'WORST CASE' IMPACT

The worst case impact would be occasional generation of dust from crushing and screening of aggregates and from internal haul roads in the absence of dust suppression resulting in occasional slight negative effects on the immediate surrounds.

Various mitigation measures will be implemented to minimise any impacts as much as practical to ensure the operation of the quarry will not result in any significant impact on residences or local amenities (Refer to Section 9.6.1 below).

9.6 MITIGATION & MONITORING

9.6.1 MITIGATION

Lagan Materials Ltd have in place a group wide Environmental Management System (EMS). They have established an integrated management system (IMS) designed to comply with the Environmental requirements of the ISO 14001:2015 standard and the Quality Management requirements of ISO 9001:2015. The IMS is a two-tier system with this top-level Environmental Manual based on ISO EN 14001:2015 being applicable to all activities. The top-level Quality manual then feeds down to the Factory Production Control (FPC) Quality Plans and the depot specific Environmental Management Plans.

The FPC Quality Plans incorporate the procedures and controls in place to reflect the quality system aggregate production. The Environmental Management Plans (EMP's) are depot specific and have been designed to comply with the requirements of ISO EN 14001:2015. The EMP's record the procedures and controls in place to reflect the Quality System and the specific environmental aspects and impacts and the legislative requirements applicable at each depot.

The Company has implemented a quality assurance system and an environmental management system and has certification to the ISO 9001 and ISO 14001 standards. The Company's experience and implementation of the systems has identified the advantages of a structured and systematic approach in achieving managerial objectives.

A copy of the EMP for Castlepollard Quarry is included as Appendix 10.

A number of mitigation measures are/will be put in place with respect to the proposed quarry in order to promote fugitive dust reduction and ensure that the operation is within any specified thresholds, and in line with good industry practice. These are:

EMP (Refer to Appendix 10)

- A wheel wash facility shall be used at the entrance to the site;
- Fixed and mobile water sprays shall be used to control dust emission from material stockpiles, road and yard surface as necessary in dry and/or windy weather. Records shall be maintained on the water spraying schedule;
- Trucks entering and leaving the site with dusty materials shall be covered and they shall pass through a wheel wash before exiting the site;
- A daily inspection programme shall be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management. Findings shall be recorded on the Daily Site Inspection Sheet;
- Dust deposition monitoring shall be carried out in accordance with the requirements of the authorisation permits in order to verify the continued compliance with relevant standards and limits;
- Plant and conveyers should be operated to minimise dust generation by ensuring all dust mitigation functions such as dust covers, wind boards, netting, extraction

and collection systems are all functioning correctly. Regular visual inspections shall be carried out on all such plant and equipment;

- Under-trays and chutes should be provided to collect material dropping from conveyors. The height of free-fall of material from the under-tray should be minimised; and
- Blowers, belt-scrappers or other devices should be fitted to clean conveyors to prevent build-up of spillage. Spillage should be cleared promptly.

Other Site Measures

- Screening berms have been strategically located to shield the site and provide topographical attenuation. This is discussed in more detail in Section 11;
- Haulage routes within the workings will be carefully designed to avoid steep inclines and will be consolidated to avoid excessive dust generation;
- A number of operational measures for the transport and placement of topsoil and overburden during restoration works will be implemented to limit the generation of dust. These measures are described in detail in Section 3.3.3.6;
- Mitigation measures described in Land, Soils and Geology (Refer to Section 6) to limit erosion are also of direct benefit in terms of dust mitigation;
- Consideration will be given to location of mobile plant so as to ensure that any principal dust sources did not adversely affect sensitive off-site locations;
- Good housekeeping is an essential part of overall dust control. The provision of good surfaces that can be maintained with regular cleaning in areas that experience heavy traffic helps to minimise fugitive dust;
- Maintenance of internal haul and access routes;
- Regular maintenance of all plant and machinery will be carried out particularly in relation to exhaust emissions;
- Re-vegetated earth embankments around the quarry perimeter will aid in the visual screening of any dust generated within the workings;
- Perimeter screening berms will both limit dust from blowing beyond the site and lessen the effect of wind blowing within the site;
- In the event of material being spilled on the public road the operator will ensure that spilled material will be removed from the road surface in a safe and timely manner, as soon as they notice or are notified that a spillage has arisen;
- The quarry access road has been provided with an asphalt surface.
- Site speed restrictions (<15 kph) in order to limit the generation of fugitive dust emissions; and
- Suitable vegetation is to be provided on restored areas at the earliest opportunity.

Based on best practice publications from the DoEHLG (2014) and IAQM (2014; 2016), it is considered that the proposed quarry operations will not impinge significantly on the nearby residential receptors. The quarry operator has committed to implementing

all of the best practice mitigation measures outlined in DoEHLG, and as such the operation of the quarry will not lead to either dust nuisance nor lead to an exceedance of the PM_{10} / $PM_{2.5}$ ambient air quality standards. Thus, in terms of air quality and dust deposition, the operation of the proposed quarry will not lead to a significant negative impact on air quality.

It is considered given the nature of the activity, control and abatement measures to the atmosphere are not likely to degrade the environment (i.e., be injurious to public health, or have a deleterious effect on flora or fauna or damage property or impair or interfere with amenities or with the environment).

The active working area of the site will be inspected frequently during dry, windy weather to assess the potential for dust blows, and when necessary, appropriate dust suppression and control measures will be implemented in response.

These measures are considered sufficient to ensure that dust emissions will be below recognised thresholds for this type of development.

9.6.1.1 Monitoring

The existing dust monitoring programme will allow on-going monitoring of fugitive dust emissions from the site, thereby assisting in ensuring compliance with the accepted TA Luft dust deposition limit value to be adopted at site boundaries associated with quarry developments – total dust deposition (soluble and insoluble): $350 \text{ mg/m}^2/\text{day}$ (when averaged over a 30-day period).

This condition is also in accordance with guidance issued by both the Department of the Environment and the EPA in relation to dust deposition monitoring for these types of developments. Recent monitoring results are provided in Table 9.3 above.

Lagan Materials Ltd have in place a group wide Environmental Management System (EMS). A copy of the existing EMP for Castlepollard Quarry is included as Appendix 10. The EMP for the quarry includes for regular dust monitoring to demonstrate that the development is not having an adverse impact on the surrounding environment. The locations of the proposed dust monitoring stations are shown in Figure 3.1.

This programme will allow on-going monitoring of fugitive dust emissions from the site thereby assisting in ensuring compliance with any future requirements or regulations. The results of this monitoring will be made available to the Local Authority on a regular basis, where members of the public may examine it.

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