Spink Quarry, Knockbaun, Abbeyleix, Co. Laois

Spink Quarry

Environmental Impact Assessment Report

Section 9

Air Quality

2021

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9.1 INTRODUCTION

This section of the EIAR deals with the issue of air quality associated with the proposed development at Spink Quarry, Knockbaun, Co. Laois. 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 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".

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 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 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.

Refer to section 8.4.2 for discussion of Climate Change and particularly Kyoto Protocol & Paris Agreements.

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 (SO_2), nitrogen oxides (NOX), volatile organic compounds (VOCs) and ammonia (NH_3). To achieve its initial targets, Ireland was required to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NOX (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (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 SO_2 (65% on 2005 levels), 65 kt for NOX (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels).

European Commission Directive 2001/81/EC, the 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 SO_2, VOCs and NH_3, but failed to comply with the ceiling for NOX.

Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC, will apply the 2010 NEC Directive limits until 2020, and establish new national emission reduction commitments that will be applicable from 2020 and 2030 for SO_2, NOX, NMVOC, NH_3, CH_4, and $PM_{2.5}$. In relation to Ireland, 2020-29 emission targets are for SO_2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH_3 (1% reduction) and for $PM_{2.5}$ (18% reduction). In 2030, Ireland's emission targets are for SO_2 (83% below 2005 levels), for NOX (75% reduction), for VOCs (32% reduction), for NH_3 (7% reduction), for $PM_{2.5}$ (35% reduction) and for CH_4 (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 (EP & CEU 2008) and the Fourth Daughter Directive (EP & CEU 2004). 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 (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; nitrogen dioxide and other oxides of nitrogen; particulate matter (PM_{10} and $PM_{2.5}$); lead; benzene; carbon monoxide; and ozone.

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, SO_2, carbon monoxide (CO), ground level ozone (O_3), particulate matter (PM_{10} 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 O_3. Recently PAHs have also been identified as pollutants of concern.

NO_X refers to the two pollutants nitric oxide (NO) and nitrogen dioxide (NO_2). The main sources of these pollutants are vehicle exhausts and combustion sources. Exposure to NO_2 is harmful to health, while NO_X contributes to the formation of ground-level ozone and acid rain. NO_2 levels across Ireland have remained relatively static since 2005; and although an increasing trend was identified from 2008-2010 with the limit value exceeded in Dublin in 2009, from 2010 to 2015 no exceedances occurred. The 2009 exceedance occurred before the limit value came into force on 1 January 2010. Although NO_2 levels decreased from 2010 to 2012, some locations such as Zone B have indicated an increase in the 2013 and 2014 period. Figure 9.1 shows annual mean nitrogen dioxide concentrations from 2005 to 2015 for monitoring sites across Ireland (EPA 2016).

PM_{10} and $PM_{2.5}$ are particles with diameters less than 10 micrometres and less than 2.5 micrometres, respectively. The health impacts of these small particles relate to their ability to penetrate deep into the respiratory tract. In Ireland, the main sources are domestic use of solid fuel and vehicular traffic.

Having regard to PM_{10} during the 2005 to 2015 period, in cities, traffic emissions were the main source of PM_{10} whilst in areas not connected to the natural gas grid and smaller towns, emissions from residential solid fuel combustion was prevalent. Due to these factors, levels of PM_{10} are similar across all zones and during the ten-year period, no distinguishable trends or decreases were noted (EPA 2016).

Under the CAFE Directive, Ireland is required to achieve reductions in levels of $PM_{2.5}$ of 10% between 2012 and 2020. This reduction is challenging, as it will require an integrated approach across a number of sectors including industrial, transport and residential emissions. Figure 9.2 below shows annual mean PM_{10} concentrations 2005–2015 for monitoring sites across Ireland.

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, Benxo[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.

Table 9.1 below shows VOC emissions exceeding the national 2013 ceiling. This has occurred since 2010 and is primarily due to including a new source category (emissions from manure management in agriculture).

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 SO2, 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 2015).

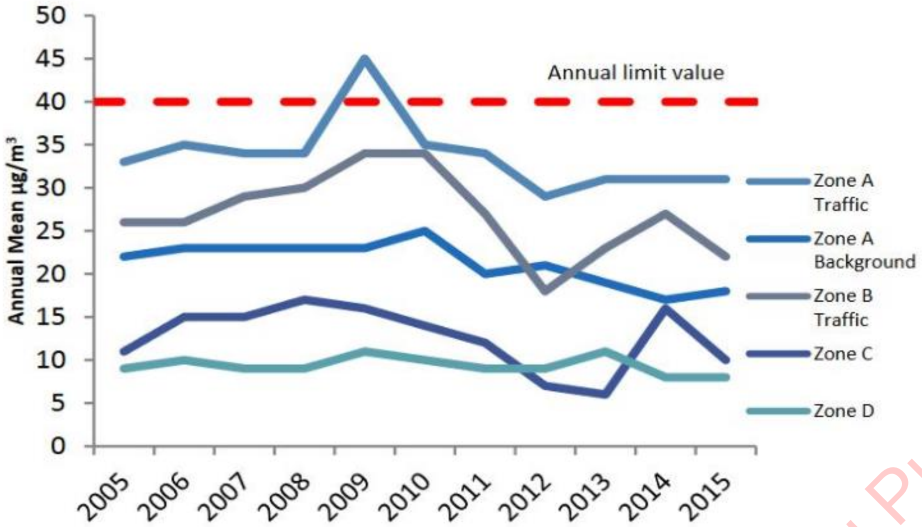

Figure 9.1 Annual Mean Nitrogen Dioxide Concentrations 2005-2015 (Source: EPA)

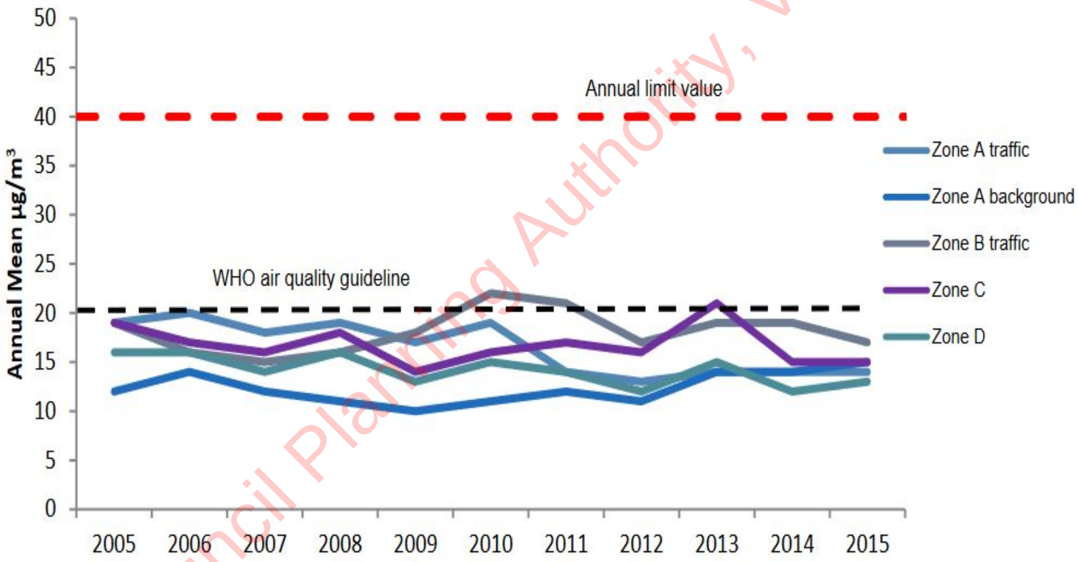

Figure 9.2 Annual Mean PM_{10} Concentrations 2005-2015 (Source: EPA)

Table 9.1 National Total Emissions of the Four NEC Pollutants 2005-2013

	2005 (kt)	2006 (kt)	2007 (kt)	2008 (kt)	2009 (kt)	2010 (kt)	2011 (kt)	2012 (kt)	2013 (kt)	2013 Emission Ceiling (kt)	Ceiling achieved ?
SO_2	71.2	60.7	55.1	45.3	32.7	26	26.7	25.2	25.4	42	Yes
NO_x	116.6	113.4	113.0	106.2	88.8	72.6	73.4	75.9	76.5	65	No
VOCs	59.7	58.4	56.9	55.2	52.2	91.4	88.7	88.2	90	55	No
NH_3	113.3	112.4	107.6	107.4	107.8	106.2	104.9	105.9	107.8	116	Yes

(Source: EPA)

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 NO_2 expected to rise due to increased road emissions.

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 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 $mg/m^2/day$ (when averaged over a 30-day period). This limit is in accordance with condition No. 6 of existing planning permission (P.A. Ref. 10/383) for the quarry development.

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 a forestry plantation abuts the site to the southwest. The R430 Regional Road bounds landholding to the north with c. 700 m of frontage.

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.

There are 36 residences within a 1 km radius of the quarry site (See EIAR Figure 4.1). The closest residence is located c. 175 m west of the site and is one of a cluster of three houses at Larkin's Cross. There are only four residences within 250 m of the site, but all but one of these residences (i.e., No. 4; Refer Figure 4.1) are sheltered, in terms of visual, noise and dust impacts, behind the hill into which the quarry is developed. Indeed, another 12 residences between 500 m and 1 km of the site (i.e., Nos. 11 to 22) are similarly sheltered behind the hill. Of the 13 residences within 1 km of the site that are not sheltered behind the hill, one lies within 250 m (No. 4), four more lie between 250 m and 500 m (i.e., Nos. 7-10), and seven more lie between 500 m and 1 km (i.e., 23-30). There has been a long historical association with quarrying at this location and consideration has been given to screening of the development, phasing and direction of working with respect to receptors so as to reduce visual impact, while impacts due to noise and dust are substantially attenuated.

The Knock National School is located c. 1.75 km to the west, while Headen's Bar in Spink is located c. 850 m to the west along the R430, both of which community facilities are sheltered behind the hill. There are no other industrial and commercial developments within 1 km.

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 $mg/m^2/day$ 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 Knockbaun area, where the Spink 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 Spink Quarry is situated at Portlaoise.

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 three nearest stations of Portlaoise, Carlow and Mountrath (Refer to Figure 9.3).

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
- PM_{10} particles

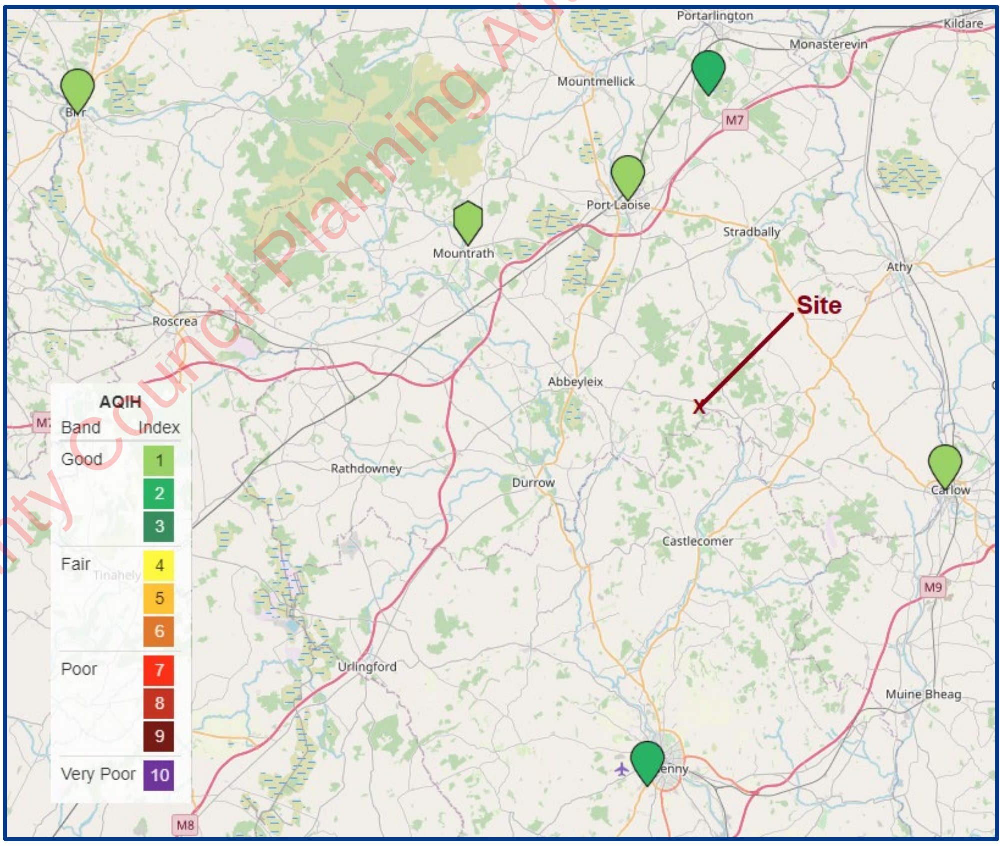

Figure 9.3 Air Quality Index for Health Map (EPA April 2018)

Table 9.2 Air Quality Index for Health (AQIH)

Band	Index	Ozone (µg/m³) 8 HOUR MEAN	Nitrogen Dioxide (µg/m³) 1 HOUR MEAN	Sulphur Dioxide (µg/m³) 1 HOUR MEAN	$PM_{2.5}$ (µg/m³) 24 HOUR MEAN	PM_{10} (µg/m³) 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 (mg/m²/day)

Period	D1	D2	D3	D4
Feb-21	102	150	96	42
Mar-21	144	102	23	11
Apr-21	193	<10	56	29
May-21	154	NR[1]	214	69
Jun-21	188	43	NR[2]	NR[2]

NR[1] denotes None Recorded due to organic contamination from leaf litter, insects, bird droppings, etc.
NR[2] denotes None Recorded due to damage to sample glass collection vessel during transit to Laboratory

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/m^2/day (when averaged over a 30-day period). This limit is in accordance with condition No. 6 of planning permission (P.A. Ref. 10/383) for the quarry development.

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.

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	● (Slight)	● (Moderate)	● (Slight)
Indirect Impacts	**X**	**X**	**X**
Cumulative Impacts	**X**	**X**	**X**
Residual Impacts	**X**	**X**	**X**
`Worst Case' Impacts	**X**	● (Moderate)	**X**

None/imperceptible: X; Slight: ● (green); Moderate: ● (amber); Significant/Very significant: ● (red).

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. 10/383). 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 and operation of a concrete batching plant in the townland of Knockbaun, Spink, County Laois. The scale of the operation under planning permission P.A. Ref. 10/383 was up to a maximum output of 350,000 tonnes per annum. The proposed development will not exceed this level and the average output will be closer to c. 200,000 tonnes per annum.

The proposed development will require the stripping, transport and placement of soils and overburden, as part of the quarry extraction and 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 sandstone/shale 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 (Refer Figure 9.4) showing the main site activities likely to give rise to fugitive dust emissions.

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.

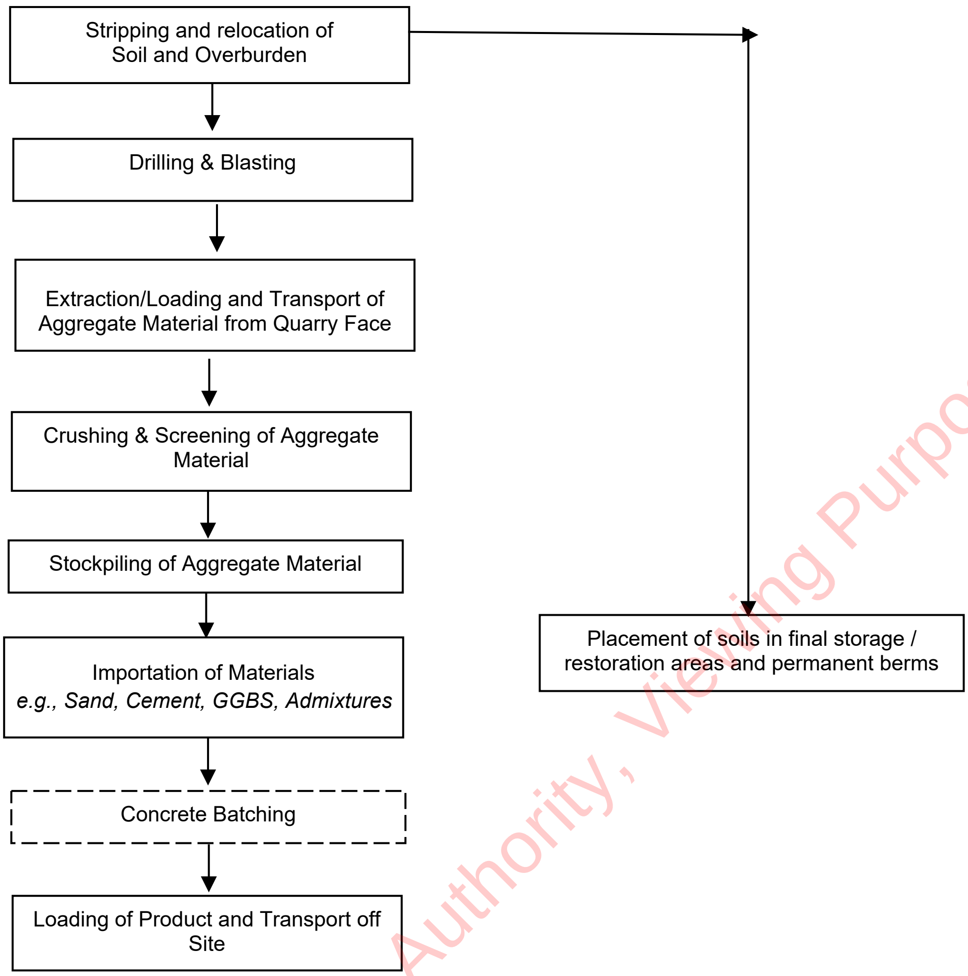

Figure 9.4 Operational Activities

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 continue to use/upgrade the established quarry infrastructure located in the site, including site entrance, internal roads, wheel wash, weighbridge, aggregate storage bays, refueling hard stand, water pond system, and other ancillaries (Refer to Figure 1.3). The development will include provision of new site infrastructure, including portacabin site office/canteen, toilets, concrete batching plant and truck washdown facility, hydrocarbon interceptors, mobile crushing and screening plant, upgrading of the water management system, provision of holding tank for wastewater, and other ancillaries.

Peripheral screening mounds along the northern roadside and western boundary are in place. Any future stripping and use of overburden for restoration will be done in a progressive and phased manner as the quarry is developed to the southeast and as such are considered part of the operational phase.

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

9.5.3.2 Operational Phase

An average annual output of the order of 200,000 tonnes equates to traffic volumes from the development of approximately 38 truckloads including the concrete plant per day leaving the site on a 48 working week per year basis. This would be viewed as a low level of activity from an air emissions / air quality perspective.

The flow diagram shown in Figure 9.5 below shows the sources of fugitive dust emissions arising from the proposed quarry activity and the methods of treatment/ abatement to be employed.

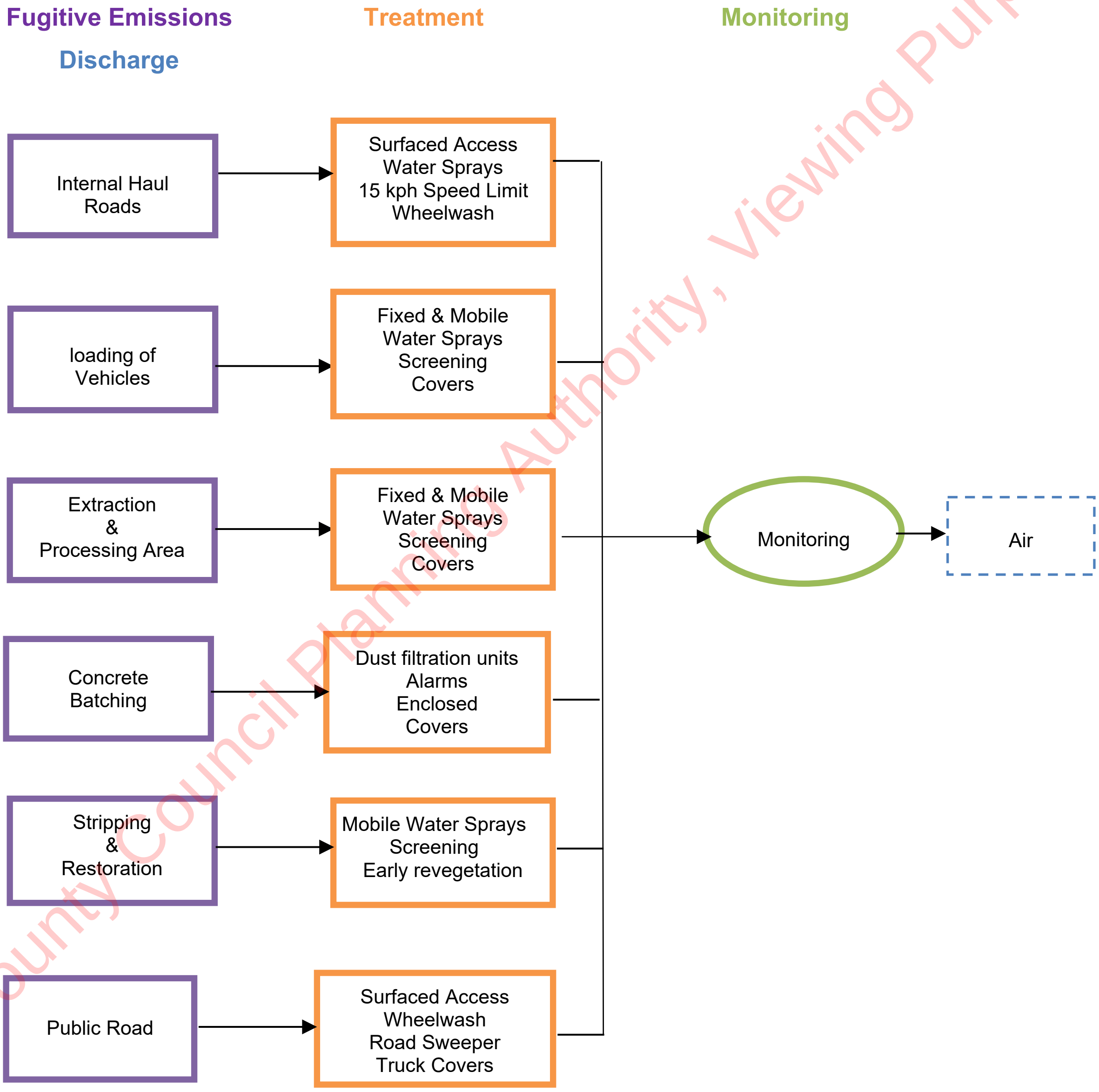

Figure 9.5 Flow Chart for Source of Fugitive Emissions

The impacts of any dust deposition from the operations will be direct, of short duration, temporary and 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 accordance with the within the recognised TA Luft dust deposition limit value of 350 mg/m^2 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*" (DEHLG 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 PM_{10}, 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

Given that the façade of the nearest residences is approximately 260 m from the nearest active quarry area, 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 PM_{10}, 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 PM_{10} emissions from construction activities based on current annual mean PM_{10} concentration, receptor sensitivity and the number of receptors affected. The current PM_{10} concentration in the area as per the EPA's Air Quality Index for Health (AQIH) is approximately 0 - 16 µg/m^3 (Refer to Table 9.2). As shown in Table 9.7 below the risk to human health from PM_{10} emissions at the nearest residence (high sensitivity, distance 260 m 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

Thus, due to the moderate scale of the proposed construction phase and the implementation of the mitigation measures, the impact of dust deposition and ambient levels of PM_{10} / $PM_{2.5}$ 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 site 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) an 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 slight 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 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. 135 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 negligible, such that no residual impacts are predicted.

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 generation of dust from crushing and screening of aggregates and internal haul roads in the absence of dust suppression resulting in a moderate impact 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 for asphalt and 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 existing EMP for Spink Quarry is included as Appendix 10.

A number of mitigation measures 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-scrapers or other devices should be fitted to clean conveyors to prevent build-up of spillage. Spillage should be cleared promptly.

Other Site Measures

- Stripping of overburden will result in screening berms being 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 will be implemented to limit the generation of dust. These measures are described in detail in Section 3.3.3.4;
- 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 from the entrance to the wheelwash;
- 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.

Concrete Batching Plant

- Delivery of cement will be by pressurised bulk tankers. This is a sealed system to prevent dust emissions to atmosphere;
- Dust filters will be installed at the top of the cement silos to control emissions;
- Silo dust filtration units will be installed & commissioned to prevent any dust plumes from the silo;
- The cement silos will be fitted with a high level indicator alarm to prevent over-filling with consequent loss of material causing airborne dust;
- All conveyors will be fitted with covers;
- The concrete products batching units will be enclosed;
- The aggregate storage bins will be fitted with covers;
- During loading of trucks the discharge chute shall be as close as possible to the truck mixer unit to allow direct delivery without any fall through moving air; and
- All concrete trucks will be washed out in the wash-out facility.

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 DEHLG, 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 $mg/m^2/day$ (when averaged over a 30-day period). This limit is in accordance with condition No. 6 of planning permission (P.A. Ref. 10/383) for the quarry development.

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.

Lagan Materials Ltd have in place a group wide Environmental Management System (EMS). A copy of the existing EMP for Spink 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.

9.7 REFERENCES

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