CHAPTER 8

AIR

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INTRODUCTION

Background

8.1 This chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, provides supporting information to accompany a Planning Application to Sligo County Council by Lagan Materials Ltd. It assesses the potential air quality related impacts from the site associated with the planning application area and the wider quarry development at Aghamore Near, Aghamore Far and Carrownamaddoo townlands, Co. Sligo.

8.2 The quarry operations comprise extraction of limestone using conventional blasting techniques; processing (crushing and screening) of the fragmented rock to produce aggregates for road construction, site development works and in the production of asphalt.

8.3 Further information on the site infrastructure, operations, environmental management systems, and controls at the established quarry site is provided in Chapter 2 of this EIAR.

8.4 The proposed development will have the potential to generate additional fugitive dust emissions and particulates (PM_{10}), which may result in impacts on local air quality.

8.5 Combustion emissions (primary PM_{10}, and oxides of nitrogen) from vehicle exhaust emissions associated with the extraction and transportation of aggregates will also have the potential to impact on local air pollution.

8.6 The proposed development provides for extraction in line with previously permitted levels, i.e. up to 300,000 tonnes of rock per year. However, it is expected that extraction rates will vary from 150,000 to 300,000 tonnes per annum, depending on market demand. The quarry will use the existing established access and traffic routes.

8.7 Ancillary manufacturing facilities at the site, located adjacent to the processing area, include an asphalt plant.

8.8 Based on a 50-week year, 5.5 days per week, and 24 tonne loads, all above operations will result in an average of maximum of 164 daily HGV return trips (82 HGVs inward and 82 HGVs outward) generated by the proposed development and existing asphalt plant.

Scope of Work

8.9 The main focus of this assessment is the potential impact on local amenity from increased fugitive dust emissions and particulate matter from the proposed development.

8.10 The chapter describes and assesses the existing air quality baseline characteristics of the local area. The project is then applied to these baseline conditions and the resulting air quality impacts are assessed. Mitigation measures are identified, where required, to insofar as is practical, eliminate and reduce these impacts.

8.11 The following sections of this EIAR Chapter describe the potential air quality impacts associated with activities within the proposed development. The following issues are addressed separately:

- relevant legislation, standards and guidance;

- methodology used to assess the potential impacts of the activities at the proposed development on air quality at sensitive receptors;
- baseline conditions pertaining to the measured (or estimated) existing air quality levels around the site;
- assessment of the impacts;
- description of mitigation measures that are incorporated into the construction, design and operation of the pit to eliminate or reduce the potential for increased air quality impacts (if required);
- summary of any residual impacts and reinstatement;
- summary of cumulative impacts; and
- monitoring proposals.

Consultations / Consultees

8.12 A number of pre-planning consultation meetings have been held between officials of Sligo County Council and representatives of SLR Consulting Ireland and Lagan Materials Limited.

8.13 At the meetings, details of the proposed development were presented and issues likely to be of interest or concern were identified and discussed.

8.14 Following a review of published development plans and the site survey, it was considered that there was no requirement for any further formal consultations to be carried out in respect of air quality for the purposes of this assessment.

Contributors / Author(s)

8.15 SLR Consulting Ireland undertook the impact assessment presented in this chapter on behalf of Lagan Materials Ltd. The lead consultant for the study was Aldona Binchy MSc. Eng PIEMA Environmental Engineering.

Limitations / Difficulties Encountered

8.16 This assessment is compiled on the basis of published regional and local data, guidance documents, and site-specific field surveys. No difficulties were encountered in compiling the required information.

ADDITIONAL INFORMATION

2.1 As outlined in Chapter 1 pf the EIAR a planning application was submitted to Sligo County Council (Plan File Ref. No. 18/345 / ABP Ref. 305821-19) in August 2018 for similar development to that proposed as part of this application. In October 2019 Sligo County Council granted planning permission for the development (subject to 23 no. conditions). 2 no. third party appeals of the

decision by Sligo County Council to grant permission for the proposed quarry development were made to An Bord Pleanala (ABP-305821-19). An Bord Pleanala refused permission for the proposed development on the 30th June 2020 for the 2 no. reasons – refer to Chapter 1 for further details.

2.2 In order to comprehensively address the reasons for refusal, and further comments contained within the An Bord Pleanala Inspectors Report a number of additional surveys / site investigations, field work and assessments have been carried out.

2.3 This Chapter 8 of the EIAR has been updated as follows:

- Additional baseline dust deposition surveys have been undertaken at the application site;
- This assessment takes account of the revised planning application area and considers all activities associated with the revised application area, such as the recommencement of aggregate processing activities;
- The locations of local receptors have been updated to take account of any new sensitive receptors in the vicinity of the application site since the last application;
- The assessment takes account of cumulative impacts associated with the existing asphalt plant on-site.

REGULATORY BACKGROUND

8.17 The following sections describe the main legislative policy requirements in respect of air quality associated with the proposed development.

Legislation

Air Quality Standards

8.18 The Government's policy on air quality within Ireland is set out in the Air Quality Standards (AQS) Regulations 2011. The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). It replaces the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the EPA Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 4th Daughter Directive was transposed by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 (S.I.no. 58 of 2009).

8.19 The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in Ireland.

8.20 The AQS sets standards and objectives for ten priority pollutants. Standards establish concentrations of pollutants in the atmosphere which can broadly be taken to provide a certain level of environmental quality. Objectives are policy targets, often expressed as maximum concentrations, not to be exceeded (either without exception, or with a limited number of exceedances within a specified timescale).

8.21 Under the AQS, the following pollutants are monitored and controlled:

- nitrogen oxides;
- sulphur dioxide;
- carbon monoxide;
- ozone;
- particulate matter (PM10, PM2.5 and black smoke);
- benzene and volatile organic compounds;
- heavy metals; and
- polycyclic aromatic hydrocarbons.

8.22 These pollutants are monitored at stations across the country and together they form the national ambient air quality network. A summary of relevant air quality limit values in relation to human health are presented in **Table 8-1**. Air quality limit values in relation to vegetation protection are presented separately in **Table 8-2**.

8.23 The air quality monitoring network is coordinated and managed by the EPA, as the National Reference Laboratory for air quality. The results of the monitoring are compared to limit values set out in EU and national legislation on ambient air quality. As was recommended in the 2011 Review of the Environmental Protection Agency, map-based assessments are prepared and published by the EPA.

Table 8- 1
Relevant Air Quality Limit Values for Protection of Human Health

Human Health	Limit or Target Value			Information and Alert Thresholds (where applicable)		Long Term Objective
Pollutant	Averaging Period	Value	Maximum Number of Allowed Occurrences	Period	Threshold value	
Nitrogen Dioxide (NO_2)	Hour Year	200 µg/m^3 40 µg/m^3	18 0	1 hour alert	400 µg/m^3 Exceeded for 3 consecutive hours	
Sulphur Dioxide (SO_2)	Hour Day	350 µg/m^3 125 µg/m^3	24 3	1 hour alert	500 µg/m^3 Exceeded for 3 consecutive hours	
Particulate matter with aerodynamic diameter of less than 10µm (PM_{10})	Day Year	50 µg/m^3 40 µg/m^3	35 0			
Particulate matter with aerodynamic diameter of less than 2.5µm ($PM_{2.5}$)	Year	25 µg/m^3 20 µg/m^3 (ECO)				0 8.5 to 18 µg/m^3

Table 8- 2
Summary of Air Quality Limit Values: Protection of Vegetation

Vegetation	Critical Level or Target Value		Long-term Objective	
Pollutant	Averaging Period	Value	Value	Date
Nitrogen dioxide (NOx)	Calendar year	30 µg/m^3		
Sulphur Dioxide (SO_2)	Calendar year and winter (October to March)	20 µg/m^3		

Planning Policy and Development Control

8.24 The National Planning Framework 2040 (published in February 2018) is a national planning framework for Ireland. The framework provides the policies for all regional and local plans. In the framework, the extractive industries are recognised as important for the supply of aggregates and construction materials to a variety of sectors. It emphasises that the planning process will play a key role in realising the potential of the extractive industries and protecting reserves of aggregates and minerals. Aggregates and minerals will continue to be enabled where this is compatible with protection of the environments.

8.25 There are no specific policies in relation to air emissions in NPF for construction aggregates. The general objective is to facilitate the development while at the same time protect the environment.

Local Planning Policy – Sligo County Development Plan

8.26 The current Sligo County Development Plan which was adopted in August 2017 includes a number policies and objectives for the planning and sustainable development of the County from 2017 to 2023. P-AQ-2 and P-AQ-4 state that is it the policy of Sligo County Council to:

"In conjunction with the EPA, ensure that all existing and new developments are operated in a manner that does not contribute to deterioration in air quality"

"Promote the retention of trees, hedgerows and other vegetation, and encourage tree planning as a means of air purification and filtering of suspended particles"

Site Emission Limits

8.27 Condition No. 19 of the previous planning permission relating to the quarry (Planning Ref. PL02/271) stated the following when the quarry is operational:

(a) During (dry) weather conditions which favour the dispersion of dust, the Applicant shall ensure that a procedure for the control of windblown dust and dust from the movement of trucks/machinery shall be operated and maintained.

(b) Dust suppression systems shall be used and maintained on all internal roads, aggregate transfer points, stockpile areas, conveyors and at the crushing plant. Collection systems for runoff water shall be provided with adequately designed settlement traps, to reduce the likely discharge of suspended solids to adjacent water courses. Details of the systems (i.e. dust suppression and run-off collection systems) shall be submitted to the Planning Authority for approval prior to their installation.

(c) The Applicant shall maintain and operate the dust deposit gauges around the site to the satisfaction of the Local Authority.

(d) A new dust deposition gauge shall be installed on the western boundary of the quarry, the location shall be agreed with the Local Authority prior to its installation. Additional dust deposition gauges may be requested by the Local Authority at other locations around the site if the Authority deem necessary.

(e) The dust gauges shall be operated in accordance with BS1747 Part 1 of 1969: Methods for the Measurement of Air Pollution: Deposit Gauges (or such method as may be agreed in advance in writing with the Local Authority).

(f) Dust deposition shall not exceed 130 mg/m²/day. Any excess of this shall be immediately notified to the Local Authority.

(g) Safe and permanent access shall be provided to each of the dust deposition monitoring sites.

(h) The results of monthly measurements from these gauges shall be retained on-site, for inspection by the Local Authority, for a period of 10 years after the measurements are made. A summary of these results shall be submitted to the Local Authority annually as part of the Annual Environmental Report.

8.28 It should be noted that the 130 mg/m^2/day limit is related to an outdated methodology. Current guidelines now recommend a limit of 350 mg/m^2/day, this is widely accepted throughout Ireland.

Guidelines Extractive Industry Emissions Limit Values

8.29 In 1996, the Irish Concrete Federation (ICF), the trade body representing the interests of quarry operators and producers of construction materials, published the ICF Environmental Code which provided guidance for its members on best practice in the environmental management of quarries. The document was subsequently updated in 2005.

8.30 Section 261 of the Planning and Development Act 2000 (as amended), which regulates a significant proportion of established pit development, came into effect in April 2004. The Department of Environment planning guidelines for the extractive industry 'Quarries and Ancillary Activities – Guidelines for Planning Authorities' (DoEHLG 2004) were published around the same time.

8.31 Separately, in 2006, the EPA published its Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals).

Guidance Relating to Dust

8.32 Fractions of dust greater than 10 µm (micrometres) in diameter are not covered within the Air Quality Standards and typically relate to nuisance effects.

8.33 A range of monitoring techniques exist for dust deposition rates (i.e. Bergerhoff and Frisbee gauges). Extractive industry standard criteria levels for the gravimetric assessment of dust deposition which are generally used across extractive industry in Ireland include the DoEHLG (2004) planning guidelines for the extractive industry[1], the ICF Guidelines (2005) and EPA (2006) Environmental Management Guidelines.[2]

8.34 The Guidelines recommend the use of the Bergerhoff method for measuring dust deposition. In line with this approach, the guidelines recommend the TA Luft dust deposition limit value of 350 mg/m^2/day (total dust deposition averaged over a 30 day period), measured at site boundaries.

8.35 When the rate of accumulation of this coarser fraction of dust (referred to as deposited dust) is sufficiently rapid to cause fouling or discolouration, then it is generally considered to introduce a nuisance. The point at which an individual perceives dust deposition as a nuisance and causes a complaint is highly subjective.

8.36 The action of wind over dry ground will carry dust particles into the air. Although large emissions of dust occur naturally, man-made dust events are caused by a range of activities including agriculture, road traffic, construction works (including the handling and storage of soils or C&D wastes) and by vehicles using paved and unpaved haul roads.

[1] http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/DevelopmentandHousing/Planning/FileDownLoad%2C1606%2Cen.pdf

[2] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf

8.37 For operations involving the mechanical break up of solids, the most common concern regarding dust emissions is the potential nuisance effect from the larger fractions of dust.

Dust and Ecological Receptors

8.38 A majority of the research on the effects of particulate matter on vegetation has focussed on the chemical effects of alkaline dusts. A summary of a review of available research on behalf of the UK's Department for the Environment Transport and Regions (DETR) concluded that:

8.39 "The issue of dust on ecological receptors is largely confined to the associated chemical effect of dust, and particularly the effect of acidic or alkaline dust influencing vegetation through soils."

8.40 An Interim Advice Note (IAN) prepared as a supplement for Volume 11, Section 3, part 1 of the UK DMRB (Design Manual for Roads and Bridges) and now incorporated into HA207/07) suggests that only dust deposition levels above 1,000mg/m^2/day are likely to affect sensitive ecological receptors. This level of dust deposition is approximately five times greater than the level at which most dust deposition may start to cause a perceptible nuisance to humans. It states that most species appear to be unaffected until dust deposition rates are at levels considerably higher than this.

Air Quality and Health Effects

8.41 Two recent EPA reports, *Air Quality in Ireland 2015*[3] and *Ireland's Environment, An Assessment 2016* [4]detail the main air quality trends based on monitoring from the national ambient air quality network. There are monitored exceedances of the WHO guideline values for ozone, PM_{10} and $PM_{2.5}$ at a number of sites though there are no current exceedances of the lower (less protective) EU standards at the existing monitoring locations in Ireland. The reports also highlight the main challenges of reducing air pollution from key sources such as particulate matter emissions from solid fuel burning (e.g. peat, coal and wood) in the residential sector and NOx emissions from vehicles in the transport sector.

8.42 A summary of relevant Air Quality limit values in relation to human health was presented previously in **Table 8-1**.

RECEIVING ENVIRONMENT

Study Area

8.43 The application site is located in the townland of Aghamore Near, Aghamore Far and Carrownamaddoo, County Sligo approximately 7km south of Sligo and 5km east of the N4 Road.

8.44 The application site relates to the quarry extraction area on the western side of the local road, as per the previous planning application (Plan File Ref. No. 02/271) and the aggregate processing area located on the eastern side of the local road. Material extracted from the quarry area will be processed within the quarry void using mobile plant and then transported to the processing area

[3] Environmental Protection Agency, 2016. Air Quality in Ireland 2015 - Key Indicators of Ambient Air Quality. Available at:https://www.epa.ie/pubs/reports/air/quality/Air%20Quality%20Report%202015.pdf

[4] Environmental Protection Agency, 2016. Ireland's Environment, An Assessment 2016. Available at: http://www.epa.ie/pubs/reports/indicators/SoE_Report_2016.pdf

located on the opposite side of the local road for further processing using mobile plant, prior to stockpiling and transport off-site.

8.45 Dwellings within the vicinity of the site generally comprise one-off housing along the local road network. The nearest dwellings to the landholding site boundary are identified on **Figure 8-1**.

Baseline Study Methodology

8.46 The application site and surrounding area fall into Air Quality Zone D, categorised as rural Ireland. The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. Upper and lower assessment thresholds are prescribed in legislation for each pollutant. The number of monitoring locations required is dependent on population size and whether ambient air quality concentrations exceed the upper assessment threshold, are between the upper and lower assessment thresholds, or are below the lower assessment threshold.

8.47 The closest air quality monitoring locations to the proposed application site, and in a similar Zone D rural area, is located at Castlebar, Co. Mayo. As such, it is considered the most appropriate datasets available for assessment of air quality baseline concentrations in the study area around the proposed development.

8.48 Dust monitoring was conducted at and around the application site using the 'Bergerhoff method' referred to in the TA Luft Air Quality Standard. The deposition gauge used in the survey was the 'Bergerhoff' dust gauge, which comprises a plastic collection bottle and a post with protective basket, set at 1500mm above ground level. The input of the atmospheric material into the bottle is determined over a planned period measurement (usually one month) by exposing the plastic collection bottle to the environment. The total dust collected in the bottle is expressed as deposition of insoluble particulate matter (mg/m^2/day) arising from fugitive actions in the area surrounding the application site.

Sources of Information

8.49 A desk study was carried out to examine all relevant information relating to air quality conditions around the application site. Met Eireann, the National Meteorological Service, was consulted in relation to the climate / weather data in respect of the study area (http://www.met.ie/climate-ireland.html). The EPA website was examined to note information on baseline air monitoring data around the application site (http://www.epa.ie/air/quality/data/).

8.50 Information published on its website by the National Parks and Wildlife Service (NPWS) (http://webgis.npws.ie/npwsviewer/), (part of the Department of the Environment, Community and Local Government, DoECLG), in respect of designated ecological sites, protected habitats and species was also reviewed, together with Ordnance Survey maps and aerial photography (http://map.geohive.ie/mapviewer.html).

Field Survey / Monitoring / Inspection Works

8.51 A baseline dust deposition survey was undertaken at and around the application site for the period from February to April 2018 and August to September 2020, refer to **Figure 8-1** for monitoring locations. The dust deposition monitoring results recorded over this period were reviewed as part

of this assessment. A survey of the extent of existing residential housing in the area of the quarry was also undertaken.

8.52 The location of the dust deposition monitors are shown on **Figure 8-1**:

- BD1 – at the south-west corner of the quarry extraction area;
- BD2 – at the northern boundary of the quarry extraction area;
- BD3 – at the north-east boundary of the quarry extraction area;
- BD4 – at the processing yard north- east boundary;
- BD5 - at the processing yard southern boundary.

Background Air Quality

8.53 The closest air quality monitoring locations to the proposed development, and in a similar Zone D area, is located at Castlebar, Co. Mayo.

8.54 The monitoring stations continuously monitor concentrations of particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}). Recent annual mean concentrations monitored at Castlebar (published on the EPA website[5]) are presented in **Table 8-3** below.

Table 8- 3
Background PM_{10} Concentrations

Year	Annual Mean (µg/m^3)
2013	15
2014	12
2015	13
2016	11.9
2017	12.2
2018	11
2019	16

8.55 **Table 8-3** illustrates that PM_{10} concentrations monitored at the Castlebar monitoring site are below the annual mean Air Quality Standards (AQS) of 40µg/m^3 and comply with the requirement that a 24-hour mean of 50µg/m^3 should not be exceeded more than 35 times in a calendar year.

8.56 For rural areas, such as those surrounding the application site, the primary source of PM10 would be residential solid fuel emissions and local agricultural or rural based activities for deposited dust.

[5] Secure Archive For Environmental Research Data – http://erc.epa.ie/safer/.

Dust Deposition Monitoring

8.57 Dust deposition monitoring was carried out by BHP Laboratories when quarry was previously operational. Five locations around the original site have been monitored and results are available from 2009 until 2014 (refer to **Figure 8-1** for locations). The results are presented in **Table 8-4**.

Table 8- 4
Dust Deposition Monitoring Results: 2009-2014

Period	D1 (mg/m²/day)	D2 (mg/m²/day)	D3 (mg/m²/day)	D4 (mg/m²/day)	D5 (mg/m²/day)
22/12/08-30/01/09	60	31.1	90	39.4	142.8
30/01/09-26/02/09	123.9	58.9	27.8	53.3	170.5
26/02/09-27/03/09	16.1	28.9	261.7	80.6	80.4
27/03/09-29/04/09	122.7	55.5	108.3	84.4	30
29/04/09-29/05/09	133.9	97.8	91.1	163.9	52.8
29/05/09-29/06/09	243.3	67.2	75.6	318.9	310.6
29/06/09-30/07/09	285.61	88.8	108.3	55	321.1
30/07/09-31/08/09	122.2	9.4	200	210	102.2
31/08/09-25/09/09	405	134.4	100	177.2	195.5
25/09/09-30/10/09	166.7	101.6	6.1	296.6	329.4
30/10/09-01/12/09	20	28.9	15.6	76.6	102.8
01/12/09-13/01/10	-	-	-	282.9	-
13/01/10-29/01/10	43.3	50	1.8	2.4	-
29/01/10-26/02/10	43.9	90.6	3.9	67.8	88.3
26/02/10-31/03/10	16.6	48.3	29.4	72.2	39.4
31/03/10-30/04/10	118.3	9.4	44.4	43.9	484.4
30/04/10-31/05/10	488.9	176.1	131.1	106.7	918.8
31/05/10-30/06/10	201.1	85.6	56.1	65	91.1
30/06/10-30/07/10	332.2	52.2	29.4	25	423.3
30/07/10-27/08/10	103.3	30.6	47.8	84.4	212.2
27/08/10-30/09/10	261.6	88.9	292.7	258.9	333.3
30/09/10-28/10/10	100	66.6	94.4	83.3	61.1
28/10/10-26/11/10	13.3	51.6	26.6	42.3	21.5
14/12/12-16/01/13	90.3	66	66.7	53.3	86.1
16/01/13-14/02/13	162.1	198.6	289.6	120	208.3
14/02/13-13/03/13	23	8.1	200	140	<1
13/03/13-10/04/13	<1	<1	20.8	21.4	109.5
10/04/13-14/05/13	72.5	76.5	340	52.5	106.3
14/05/13-17/06/13	36.8	101	215.9	31.2	172.9
17/06/13-15/07/13	<7.1	58.6	321.4	<7.1	264.3

Period	D1 (mg/m²/day)	D2 (mg/m²/day)	D3 (mg/m²/day)	D4 (mg/m²/day)	D5 (mg/m²/day)
15/07/13-09/08/13	10.7	61.3	802	23.2	171.2
09/08/13-12/09/13	103.7	209.3	212.7	55.4	59.4
12/09/13-08/10/13	113.1	541.5	316.9	126.2	659.2
08/10/13-11/11/13	32.4	120.6	216.5	670.6	45.9
11/11/13-10/12/13	77.9	117.2	215.2	171	183.4
10/12/13-20/01/14	29.8	133.7	191.7	106.8	104.9
20/01/13-13/02/14	250.7	246.5	238.2	263.2	376.4

8.58 The majority of recorded dust deposition rates presented in **Table 8-4** are below the more recently recommended emission limit value (ELV) of 350 mg/m²/day. The following illustrates the percentage of time each monitoring location has been over this limit value during the three years of monitoring; D1: 5%, D2: 2%, D4: 2% and D5: 14%. Reasons for these exceedances could be due to a number of factors such as extraordinarily dry weather or contamination of sample.

8.59 The results of the baseline dust deposition monitoring carried out by SLR Consulting Ireland in 2018 and 2020 are presented in **Table 8-5**.

Table 8- 5
Baseline Dust Deposition Monitoring Results: 2018 and 2020

Period	BD1 (mg/m²/day)	BD2 (mg/m²/day)	BD3 (mg/m²/day)	BD4 (mg/m2/day)	BD5(mg/m2/day)
26/02/2018-26/03/2018	<1	13	<1	-	-
26/03/2018-25/04/2018	25	<1	36	-	-
26/08/2020-29/09/2020	68	2	1	224*	9

*high organic content

8.60 The recorded baseline dust deposition rates at the proposed development over the recent period are below emission limit values (ELV's).

Meteorology: Dispersion of Emissions

8.61 The most important climatological parameters governing the atmospheric dispersion of particles are as follows:

- wind direction determines the broad transport of the emission and the sector of the compass into which the emission is dispersed; and
- wind speed will affect ground level emissions by increasing the initial dilution of particles in the emission. It will also affect the potential for dust entrainment.

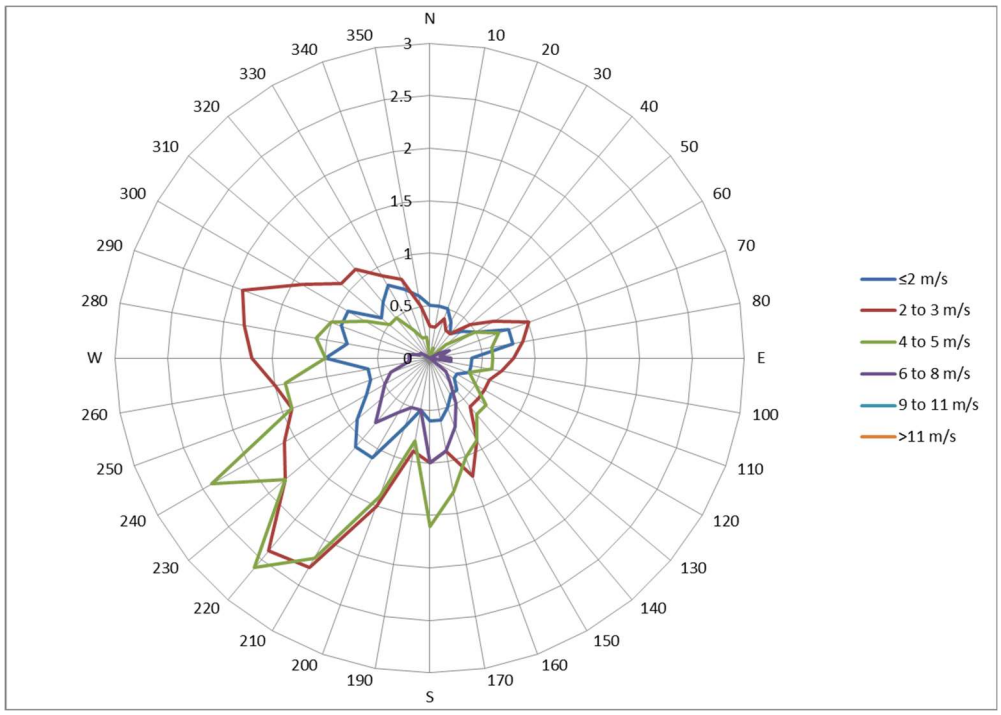
8.62 Rainfall is also an important climatological parameter in the generation of dust; sufficient amounts of rainfall can suppress dust at the source and eliminate the pathway to the receptor. According to Arup (1995) rainfall greater than 0.2mm per day is sufficient to suppress dust emissions.

Local Wind Speed and Direction Data

8.63 The closest weather station with sufficient records of wind direction and wind speed considered representative of conditions experienced at the application site is Mullingar Meteorological Station.

8.64 A windrose for the average conditions recorded at Mullingar over a ten year period is presented in **Figure 8-2**. The predominant wind direction is from the south-western quadrant. Moderate to high-speed winds (>2 m/s) occur for approximately 76.2% of the time.

Figure 8-2
Windrose for Mullingar Meteorology Station



Rainfall Data

8.65 Relevant rainfall data applicable to the overall site has been obtained from the Irish Meteorological Service website for Claremorris meteorological station (1981 – 2010), located approximately 70km south west of the proposed development. The annual average days with rainfall greater than 0.2mm is 176 days per year. Natural dust suppression (from rainfall) is therefore considered to be effective for 48% of the year.

Sensitive Receptors

Ecological Receptors

8.66 The application site is not subject to any statutory nature conservation designation; the nearest designated site is to the north of the application site, Special Area of Conservation – Lough Gill (Sligo) 001976 – refer to EIAR Chapter 5.

Human Receptors

8.67 Sensitive locations are those where people may be exposed to dust from the existing or planned activities. Locations with a high sensitivity to dust include hospitals and clinics, hi-tech industries, painting and furnishing and food processing. Locations classed as being moderately sensitive include schools, residential areas, and food retailers.

8.68 Receptors have been identified within a 500m distance of the application site boundary at the proposed development (refer to **Figure 8-1**). The relevant receptors are listed in **Table 8-6** and their locations are shown in **Figure 8-1**. As residences are clustered in some areas, receptors have been identified at the nearest location to the application site boundary.

8.69 There are 12 sensitive receptors or groups of receptors identified within the 500m study area of the application site.

Table 8- 6
Receptors – Refer to Figure 8.1

Receptor Reference	Receptor	Sensitivity	Distance (m) / Direction from Site Activities (approx.)
R Group 1	Residential	Medium	105(SE)
R Group 2	Residential	Medium	280(NE)
R Group 3	Residential	Medium	174(N)
R Group 4	Residential	Medium	215(W)
R5	Residential	Medium	154(S)
R Group 6	Residential	Medium	378(NW)
R Group 7	Residential	Medium	170(NE)
R Group 8	Residential/ Commercial	Medium	40(E)
R Group 9	Residential	Medium	170(SE)
R10	Residential	Medium	150 (SW)
R11	Residential	Medium	507 (S)
R12	Residential	Medium	483(S)

IMPACT ASSESSMENT - METHODOLOGY

Evaluation Methodology

8.70 Fugitive dust emissions and particulate matter arising from the application site activities has the potential to affect existing sensitive receptors in the area due to a potential increase in airborne dust deposition.

8.71 Given the short-term period of restoration activities, the magnitude for particulate matter release will be low. Given the nature of the rock extraction operation activities, the magnitude for particulate matter release will be low.

8.72 Combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the quarry activities also have the potential to contribute to local air pollution.

8.73 The significance of impacts due to emissions from the application site are dependent upon the magnitude of the emissions, the prevailing meteorological conditions for the location, and the proximity of sensitive locations to the emission sources.

8.74 The impact assessment is based upon a comparison of the baseline situation (both current and projected without the development proposals) situation against the air quality impacts resulting from the 'with development' proposal scenario. The potential for 'in-combination' effects from other planned or proposed sources or air pollutants in the area has also been considered.

8.75 Each of the activities associated with proposed development have been assessed for potential air quality impacts including:

- Impact on human and ecological receptors;
- PM10 contribution from operational activities;
- Traffic exhaust emissions.

8.76 The methodology used in each assessment is presented in the sub-sections below which also provide an explanation of the significance criteria to describe the impacts of the proposed development on air quality.

8.77 For the purposes of environmental assessment of releases of dust from construction and mineral activities, the classifications of PM_{10} and 'deposited dust' are typically applied. The impacts associated with PM_{10} are related to potential health impacts while deposited dust is related to potential nuisance effects. The assessment of the potential impacts of each fraction has, therefore, been undertaken separately.

Significance Criteria

8.78 The following air quality specific significance criteria have been used to assess the significance of air quality impacts in preference to overall descriptors of significance.

8.79 To determine the significance of particulate matter effects associated with the development, an evaluation of the sensitivity of the surrounding area is required. Receptors can demonstrate different sensitivities to changes in environment and are classified as per **Table 8-7** below (and IAQM Construction Dust Guidance[6]).

[6] http://www.iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf

Table 8- 7
Methodology for Defining Sensitivity to Dust and PM_{10} Effects

Sensitivity of Area	Examples	
	Human Receptors	Ecological Receptors[(a)]
Very High	Very densely populated area More than 100 dwellings within 20m Local annual mean PM_{10} concentrations exceed the Objective. Works continuing in one area of the site for more than 1-year	European Designated sites
High	Densely populated area. 10-100 dwellings within 20m of site. Local annual mean PM_{10} concentrations close to the Objective (36 – 40µg/m^3)	Nationally Designated sites
Medium	Suburban or edge of town Less than 10 receptors within 20m Local annual mean PM_{10} concentrations below the Objective (30 – 36µg/m^3)	Locally designated sites
Low	Rural area; industrial area No receptors within 20m Local annual mean PM_{10} concentrations well below the Objective (<30µg/m^3) Wooded area between site and receptors	No designations
Notes: (a)-Only applicable if ecological habitats are present which may be sensitive to dust effects.		

8.80 On the basis on the matric above basis the sensitivity of the area is considered Low.

8.81 **Table 8-8** illustrates how the interaction of magnitude and sensitivity results in the significance of an environmental effect, with the application of mitigation measures as per the IAQM Construction Dust Guidance.

Table 8- 8
Impact Significance Matrix – Dust Effects (With Mitigation)

Sensitivity of Surrounding Area	Risk of Site Giving Rise to Dust or PM_{10} Effects		
	High	Medium	Low
Very High	Slight Adverse	Slight Adverse	Negligible
High	Slight Adverse	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

Restoration- Methodology

8.82 The Institute of Air Quality Management (IAQM) assessment of risk is determined by considering the predicted change in conditions as a result of the proposed development. The risk category for potential effects arising from site works is divided into two potential activities:

- Earthworks;
- Trackout.

8.83 Based on the scale and nature of the works including areas, soils and operations at the site, a dust emission class is defined for each of the activities. These dust emission classes are then used to determine the risk categories presented below. These risk categories determine the potential risk of dust soiling effects assuming no mitigation measures are applied.

8.84 **Table 8-9** illustrates how the interaction of distance to the nearest receptor and the dust emission class results in the determination of risk category from *earthworks activities*.

Table 8- 9
Determination of Risk Category from Earthworks Activities

Distance to Nearest Receptor		Dust Emission Class		
Human	Ecological	Large	Medium	Small
<20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	-	High Risk Site	Medium Risk Site	Low Risk Site
50 – 100	<20	Medium Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 – 40	Medium Risk Site	Low Risk Site	Negligible
200 – 350	40 – 100	Low Risk Site	Low Risk Site	Negligible

8.85 **Table 8-10** illustrates how the interaction of distance to the nearest receptor and the dust emission class results in the determination of risk category from *trackout movements*.

Table 8- 10
Determination of Risk Category from Trackout Movements

Distance to Nearest Receptor		Dust Emission Class		
Human	Ecological	Large	Medium	Small
<20	-	High Risk Site	Medium Risk Site	Medium Risk Site
20 – 50	<20	Medium Risk Site	Medium Risk Site	Low Risk Site
50 – 100	20 – 100	Low Risk Site	Low Risk Site	Negligible

8.86 Mitigation measures are recommended based on the evaluation of risk in accordance with the IAQM Dust and Air Emissions Mitigation Measures Guidance.

Rock Extraction / Processing & Ancillary Manufacturing Activities - Methodology

8.87 A staged approach has been adopted; this ensures that the approach taken for the assessment of risk is proportional to the risk of an unacceptable impact being caused. As such, where a simple review of the situation shows that risk of a health or nuisance impact is negligible, this will be sufficient. In cases where the risk cannot be regarded as insignificant, a more detailed assessment may be required, such as a quantitative screening assessment or an advanced dispersion modelling exercise as appropriate.

8.88 Guidance on the assessment of the impacts of extractive operations on air quality has been prepared by the Institute of Air Quality Management (IAQM). This guidance uses a simple distance-based screening process to identify those operations where the dust impacts are unlikely to be significant and therefore require no further assessment. Where assessment that is more detailed is required, a basic assessment framework is presented which employs the Source-Pathway-Receptor approach to evaluate risk of impacts and effects.

8.89 The predicted scale of dust effects may be classified as either 'significant', or not 'significant'. Where effects are predicted to be 'significant', further mitigation is likely required before the proposals are to be acceptable under planning policy.

8.90 A semi-quantitative assessment of fugitive dust emissions from the proposed development has been undertaken. The assessment has been undertaken by constructing a conceptual model that takes into consideration the potential sources, surrounding receptors, and the pathway between source and receptor in order to assess the magnitude of risk of impact on local amenities.

8.91 The distance from the source to the sensitive receptor is crucial. The initial risk screening stage (Tier 1) focuses upon the potential for dust generation at the site and the distance between source and receptors. In Tier 1 of the assessment, a representative selection of dust sensitive receptors in each direction of the application site is identified within the 1km study area.

8.92 Further assessment is considered to be required for those receptors within 500m of dust generating activities. Receptors within 500m of dust generating processes progress onto a Tier 2 assessment.

8.93 Tier 2 involves identifying source-pathway-receptor linkages and a semi-quantitative assessment of the likelihood and magnitude of any effects that could be associated with each pollutant linkage. This assessment takes account of:

- wind direction and speed data (to estimate frequency of exposure);
- proximity to source (to estimate magnitude of exposure);
- sensitivity of receptor; and
- occurrence of natural dust suppression (rainfall patterns).

8.94 This information is used to inform a semi-quantitative assessment of the likely magnitude of impact and is based upon professional experience of the assessor as the issue of dust nuisance on local receptors is a subjective issue, where public perception on what constitutes 'acceptable' levels varies from one person to the next. Assigning significance to nuisance impacts is qualitative and involves a judgement based on the likely magnitude, frequency, duration and reversibility (or recovery) of the impact. In this context, significant impact is taken to mean what is generally not publicly acceptable and desirable.

8.95 Note that the Tier 2 risk screening assessment does not take into account mitigation measures implemented at the proposed development. These currently include provision of perimeter screening berms, dust suppression measures etc., refer to the section dealing with Mitigation Measures later in this Chapter.

8.96 Following the results of the risk assessment, mitigation measures are detailed, and the residual impact assessed. The detailed methodology used within the assessment is described in **Appendix 8-A**.

PM_{10} Contribution from Site Activities - Methodology

8.97 In terms of whether the PM_{10} concentration in the local area is likely to exceed the AQS, the following information has been reviewed:

- existing PM_{10} concentrations; and
- expected additional contribution of PM_{10} from site operations.

8.98 In terms of estimating the potential magnitude of impact from site operations, a UK edition of the LAQM Technical Guidance (LAQM.TG(03)) stated that fugitive dust from stockpiles, pit operations can potentially contribute up to 5µg/m^3 towards annual mean background concentrations of the coarse fraction (2.5 – 10µm diameters) of particulates in the immediate area.

8.99 Given the nature and scale of existing activities, the potential PM_{10} impact of increased intake is considered to be lower than this. However, to ensure a robust assessment of potential PM_{10} impacts, the upper limit of 5µg/m^3 has been applied to represent the development contribution to annual ambient PM_{10} concentrations. This value has then been added to existing background levels to assess whether the Air Quality Standards objective is likely to be exceeded.

Traffic Emissions - Methodology

8.100 Atmospheric emissions related to site proposals are primarily associated with the exhaust emissions from heavy duty vehicles (HDVs). The decision as to whether an assessment of potential impact is required is based upon the criteria set out in the DMRB.

8.101 The criterion for assessment of air quality contained within the latest DMRB guidance (207/07) focuses on roads with relatively high changes in flows or high proportion of HDV / HGV traffic. Affected roads are defined as those that meet any of the following criteria:

- road alignment will change by 5m or more; or
- daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) movements or more; or
- HDV / HGV flows will change by 200 AADT or more; or
- daily average speed will change by 10 km/hr or more; or
- peak hour speed will change by 20km/hr or more.

ASSESSMENT OF IMPACTS

Restoration - Assessment

8.102 An overview of the sources and processes associated with the above noted activities, and its respective potential for dust deposition (both dust and smaller particles), is presented below in **Table 8-11**.

Table 8- 11
Site Activities: Sources of Dust Emissions

Activity	Source	Emission Potential	Comments
Restoration Works	Excavators/ HDV	High - dry or fine materials during strong windy weather	Temporary, variable from day to day depending on prevailing meteorological conditions, level, and location of activity.
		Low – coarse or wet materials during conditions of low wind speed	

Activity	Source	Emission Potential	Comments
			Soils placed directly into in progressive works.

8.103 During the final restoration activities, earthworks will be confined within the application area. In light of this and the separation distance to receptors, the dust risk category is considered to be 'low risk' to 'negligible'.

8.104 During the final restoration activities, given the limited length of off-road routes (with no hardstanding), the trackout dust risk category is considered to be 'negligible'.

8.105 A summary of the determined risk category for proposed operation identified is presented within **Table 8-12**.

Table 8- 12
Site Activities: Risk of Dust Emissions

Source	Risk of Dust Soiling Effects	Ecological Effects
Earthworks	Negligible	Negligible
Trackout	Negligible	Negligible

8.106 While the overall risk category has been assessed as 'negligible', if the restoration activities were not mitigated, the effects of dust during dry and windy conditions could possibly lead to occasional increases in nuisance dust immediately surrounding the application area. However, these are not considered to be significant given the limited duration of such meteorological conditions and the limited change in the extent and scale of proposed activities.

Rock Extraction / Processing & Ancillary Manufacturing Activities - Assessment

8.107 An overview of the potential sources and processes associated with all site activities, and their respective potential for dust deposition, is presented below in **Table 8-13**.

Table 8- 13
Sources of Particulate Emissions

Activity	Source	Emission Potential	Comments
Material transfer to processing area	Onsite vehicle, Dry loose material.	High when dry material being handled during strong windy weather	Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces.
Processing	Processing plant, Dry loose material	High when dry material being processed during strong windy weather	Emissions due to prevailing meteorological conditions (high winds).
Material transfer to storage area	Onsite vehicle, Dry loose material	High when dry material being handled during strong windy weather	Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces.

Activity	Source	Emission Potential	Comments
Material storage	Dry loose material in stockpiles	High when dry material being stored during strong windy weather	Emissions due to prevailing meteorological conditions (high winds).
Material Loading to HDV	Onsite vehicle, Dry loose material	High when dry material being handled during strong windy weather	Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces.
Transfer off site & traffic off site	HDV/Road vehicles	Low - on paved road surfaces	Dependant on the amount of loose material on road surface available for re-suspension and track out.
Blasting holes	Drilling Rig	Low if dust filters fitted on the drilling rig.	Depends on dust filters effectiveness.
Asphalt Plant	Asphalt Processing plant / Storage area	Low - material being processed in enclosed unit and processed material is stored in the shed	Enclosed unit.

8.108 There were 12 receptors identified within the 500m study area around the application site.

8.109 Using the tiered assessment methodology, receptors located within 500m have progressed onto a Tier 2 assessment as they are considered to have a greater risk of dust impact. Those receptors that are assessed within Tier 2 are detailed below in **Table 8-14**.

Table 8- 14
Receptors Progressing to Tier 2

Receptor Reference	Receptor	Sensitivity	Distance (m) / Direction from Site Activities (approx.)
R Group 1	Residential	Medium	105(SE)
R Group 2	Residential	Medium	280(NE)
R Group 3	Residential	Medium	174(N)
R Group 4	Residential	Medium	215(W)
R5	Residential	Medium	154(S)
R Group 6	Residential	Medium	378(NW)
R Group 7	Residential	Medium	170(NE)
R Group 8	Residential/ Commercial	Medium	40(E)
R Group 9	Residential	Medium	170(SE)
R10	Residential	Medium	150(SW)
R11	Residential	Medium	507 (S)
R12	Residential	Medium	483(S)

8.110 Each receptor identified in **Table 8-14** above is assessed against the frequency of exposure and the distance from the source to the receptor (i.e. the pathway). The methodology is described fully in **Appendix 8-A**.

8.111 The frequency of exposure of each receptor is based upon the frequency of winds capable of carrying dust particles blowing in the direction, from the source to the receptor, on days when rainfall does not inhibit dust from becoming airborne. Representative data on the local wind climate is therefore required for this section of the assessment.

8.112 A wind-rose for the site is presented in **Figure 8-2** for Mullingar Meteorological Station and illustrates the predominant wind directions from the south-west. The potential for the generation of airborne dust will increase with wind speed, with winds greater than 3 m/s capable of carrying airborne dust[7].

8.113 The wind rose also shows the frequency of winds at wind speeds of greater than 2 m/s, with the individual frequencies for each 10 degree compass sector used within the assessment. In this assessment, wind speeds over 2 m/s were used, as this is how the data on percentage occurrence of wind frequency and wind speed is calculated and presented by Met Eireann. For this reason therefore, the impact assessment presented herein is conservative.

8.114 A summary of the risk assessment of dust impacts from sources within the proposed development is presented in **Table 8-15** below.

Table 8- 15
Dust Risk Assessment Screening (Without Mitigation Measures)

Receptor Reference	Distance from Operations (m)	Relevant. Wind Direction (A)	Potential Exposure Duration (B)	Relative Wind / Distance Rank (C)	Risk Evaluation
R Group 1	105(SE)	250-60	14.2	5/5	Moderate Adverse
R Group 2	280(NE)	190-280	19.5	6/4	Slight Adverse
R Group 3	174(N)	150-240	19.3	6/5	Moderate Adverse
R Group 4	215(W)	30-120	5.9	2/4	Acceptable
R5	154(S)	320-50	3.6	2/5	Acceptable
R Group 6	378(NW)	110-190	10	5/3	Slight Adverse
R Group 7	170(NE)	160-250	19.7	6/5	Moderate Adverse
R Group 8	40(E)	210-300	19.3	6/8	Moderate Adverse
R Group 9	170(SE)	300-20	4.9	2/5	Acceptable
R10	150 (SW)	0-60	1.9	1/5	Insignificant
R11	507 (S)	0-50	1.2	1/1	Insignificant
R12	483(S)	340-30	1.6	1/2	Insignificant

Table Note:

(A) – relevant wind direction based on upwind sector which would potentially convey from site towards the receptor.

(B) – Potential duration of exposure based on frequency of moderate to high wind speed (adjusted for dry days only) as described in the methodology in **Appendix 8-A**.

(C) – Ranking as per methodology in **Appendix 8-A**

Refer to **Figure 8-1** for Receptor Locations

8.115 From **Table 8-15**, it is observed that the risk of impact from dust emissions associated with the proposed development (without any mitigation measures in place) generally varies from Insignificant at R10, R11, R12, Acceptable at R Group 9, R Group 4, R5, Slight Adverse at R Group 2, R Group 6 to Moderate Adverse at R Group 1, R Group 3, R Group 7, R Group 8.

[7] Department of the Environment, Transport and the Regions, 1995. *The Environmental Effects of Dust from Surface Mineral Workings* – Volume 2. Technical Report. December 1995.

Ecological Receptors

8.116 The application site is not subject to any statutory nature conservation designation. The nearest protected site is located to the north east of the application site boundary.

8.117 Studies have indicated that fugitive dust is typically deposited within 100 to 200m of the source, the greatest proportion of which, comprising larger particles (greater than 30 microns) is deposited within 100m. Where large amounts of dust are deposited on vegetation over a long time-scale (a full growing season for example) there may be some adverse effects upon plants restricting photosynthesis, respiration, and transpiration.

8.118 Baseline dust deposition monitoring at the site indicates that the levels of dust generated are low and well below the level of 1000 mg/m^2/day, where it is considered that dust could be likely to have a significant effect on sensitive ecosystems.

8.119 Based on the above, it is concluded that the activities within existing development and proposed development site will have no significant impact on ecological receptors from the deposition of fugitive dust.

Human Receptors

8.120 Using a screening assessment tool, the Air Quality Assessment (outlined in **Appendix 8-A**) considers that there is generally an acceptable to moderate adverse risk that dust may cause an impact at sensitive receptors within 500m of the source of the dust generated activities.

8.121 Note that this assessment *does not take into account implementation of mitigation measures* within the proposed development that include provision of perimeter screening berms, dust suppression measures etc. (outlined in the Mitigation Measures section below). This assessment is considered to be conservative on the basis of the moderate wind speeds included in the risk evaluation.

PM_{10} Contribution from Site Activities - Assessment

8.122 In terms of PM_{10}, the maximum annual mean measured baseline background concentration was 16µg/m^3 in 2019 at Castlebar, Co. Mayo monitoring station. Therefore, the potential contribution up of 5µg/m^3 towards annual mean background concentrations of the coarse fraction (2.5 – 10µm diameters) of particulates (in the immediate area of the site) is considered to be insignificant and well below the annual objective of 40µg/m^3.

8.123 Therefore, the potential impacts in relation to increase in ambient PM_{10} concentrations can be classified as 'negligible', when the limited duration of conditions and the magnitude of change in the extent and scale of activities are consider to significantly reduce the generation of airborne PM_{10} beyond the site development boundary.

Traffic Emissions - Assessment

8.124 Atmospheric emissions related to site proposals are primarily associated with the exhaust emissions from heavy duty vehicles (HDVs). The decision as to whether an assessment of potential impact is required is based upon the criteria set out in the DMRB.

8.125 The criterion for assessment of air quality contained within the latest DMRB guidance (207/07) focuses on roads with relatively high changes in flows or high proportion of HDV / HGV traffic. Affected roads are defined as those that meet any of the following criteria:

- road alignment will change by 5m or more; or
- daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) movements or more; or
- HDV / HGV flows will change by 200 AADT or more; or
- daily average speed will change by 10 km/hr or more; or
- peak hour speed will change by 20km/hr or more.

8.126 Based on a 50-week year, 5.5 days per week, and 24 tonne loads, potential cumulative operations will result in an average of maximum of 164 daily HGV return trips (82 HGVs inward and 82 HGVs outward) generated by the proposed and existing (asphalt plant) development.

8.127 The traffic numbers for the proposed development are below the assessment criteria.

Cumulative / Synergistic Impacts

8.128 In essence, cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

8.129 Baseline dust deposition monitoring carried out at the overall site boundaries at the proposed development, and the processing area, typically complies with the recommended dust deposition emission limit value of 350 mg/m^2/day (averaged over 30 days).

8.130 This air quality impact assessment shows that the proposed development air quality impact from the proposed operations at receptors is determined to be ACCEPTABLE to NEGLIGIBLE with mitigation measures.

8.131 The asphalt plant is located adjacent to the eastern part of the application site; asphalt is manufactured at the process yard with imported bitumen with aggregates produced at the quarry.

8.132 The October 2020 asphalt plant monitoring results are provided in **Table 8-16** below:

Table 8- 16
Stack Emission Monitoring Results at Aghamore Asphalt Plant

	Nitrogen Oxides (as NO2)	Sulphur Dioxide (SO2)	Total Particulates
Unit	mg/m^3	mg/m^3	mg/m^3
Emission Limit Values	450	500	20
October 2020	22.5	35.3	0.34

8.133 At present air quality monitoring shows that there are no exceedances of the Air Quality Objectives at any location in the study area, and dust emissions are below the existing limits. The proposed activities will not have the potential to impact the existing ambient air quality in the vicinity of quarry.

8.134 A search of the myplan.ie and An Bord Pleanála online planning portal searches was carried out to determine if there were any other planned developments in the vicinity (c. 1km radius) of the application site that have recently been granted permission or are currently under consideration and which have the potential to have a significant adverse cumulative impacts on the local environment. There is an existing inert waste facility to the south east of the proposed development.

8.135 Considering the baseline monitoring data provided for Aghamore quarry and processing area, coupled with the fact that the adjacent waste facility was in operation at the time the baseline data was carried out, it is considered that the cumulative impacts of the proposed development and soil facility can be considered to be negligible.

8.136 This assessment shows that the proposed development at Aghamore will not have the potential to contribute to local air pollution. The cumulative effects of both developments if not mitigated, in dry and windy conditions could possibly lead to occasional increases in nuisance dust and 24-hour mean PM10 concentration immediately surrounding the area. However, these are not considered to be significant given the limited duration of such meteorological conditions

8.137 The cumulative impact of the proposed development will be insignificant.

Unplanned Events (i.e. Accidents)

8.138 Accidents, malfunctions and unplanned events refers to events or upset conditions that are not part of any activity or normal operation of the proposed extraction as has been planned by Lagan Ltd. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions or unplanned events to occur during rock extraction activities.

8.139 Many accidents, malfunctions and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, emergency response planning, and mitigation.

8.140 Considering the rock extraction activities, there is no need to use any warning sirens or warning sounds in relation to unplanned events.

8.141 In terms of air quality impacts the following unplanned events could have an effect on the local area:

- equipment malfunction;
- vehicle collision;
- dry and windy weather conditions with dust suppression equipment malfunction;
- accidental material spillages during transport.

8.142 If unplanned events were not mitigated, the effects of dust during dry and windy conditions could possibly lead to occasional increases in nuisance dust and 24-hour mean PM10 concentration immediately surrounding the quarry and access road. However, these are not considered to be significant given the limited duration of such meteorological conditions and the limited scale of activities.

Interaction with Other Impacts

8.143 The potential impact on air quality by the project on sensitive receptors including sensitive ecological receptors and people living in the area has been fully assessed in this chapter. The overall impact of the project on these receptors is further considered in Chapter 4 Population and Human Health and Chapter 5 Biodiversity.

MITIGATION MEASURES

8.144 A range of mitigation measures are recommended for the proposed development. Specific mitigation measures are listed in **Table 8–17** below.

Site Specific Mitigation Measures

Table 8- 17
Particulate Emission Mitigation Measures

Source	Emission Potential	Recommended Mitigation Measures	Effectiveness
Excavators/HDV	High – dry or fine material during strong windy weather	Minimise drop heights when handling materials. Soils placed directly into screening berms or in progressive works. Avoid working in adverse/ windy conditions.	High
	Low – material of high moisture content during conditions of low wind speed	Minimise drop heights when handling material, protection from wind where possible.	High
Onsite Vehicles	High when travelling over un-surfaced and dry site roads.	Minimise distances of onsite haul routes.	High
		Use of water sprays / tractor & bowser to moisten surfaces during dry weather.	High
		Restrict vehicle speeds through signage / staff training.	High
		Location of haul routes away from sensitive receptors.	High
Road Vehicles (transfer offsite)	Low / Moderate on paved road surfaces	Use of road sweeper to reduce the amount of available material for re-suspension.	Moderate / High
		Pave the access road.	High
Drilling Rig Dust Emissions	High – during dry and strong windy weather if filets on rig not working	Avoid working in adverse weather conditions and faulty dust filters	High
Stockpiles	High when dry or fine material being stored or handled during strong windy weather	Seed surfaces of completed mounds / bunds of top soil.	High
		Limit mechanical disturbance.	High
Processing Plant	High – during dry and strong windy weather	Retention of hedgerows	High
		Proposed perimeter berms	High

Source	Emission Potential	Recommended Mitigation Measures	Effectiveness
		Avoid working in adverse weather conditions	High
		Locate plant within quarry void	High
Asphalt Plant	High- if plant malfunction	Carry out regular checks and maintenance works at the plant	High
Acceptable Risk Receptors	High – during dry and strong windy weather	Retention of hedgerows	High
		Proposed perimeter berms	High
		Avoid working in adverse weather conditions	High High
Slight Adverse Risk Receptors	High – during dry and strong windy weather	Retention of hedgerows	High
		Proposed perimeter berms	High
		Avoid working in adverse weather conditions	High

RESIDUAL IMPACT ASSESSMENT

8.145 With the range of mitigation measures to be implemented and design measures to be incorporated into the working scheme, it is considered that the risk of dust impact at receptors from the proposed development reduces further.

8.146 After an assessment of potential adverse effects produced by the development it was concluded that there would be no significant adverse air quality effects for both human and ecological receptors which cumulatively would not hinder the site or the surrounding area. Overall, the effects of the proposed development on air quality have been considered to be negligible to acceptable.

8.147 A summary of the residual dust risk impact assessment is provided in **Table 8-18**.

Table 8- 18
Residual Dust Risk Assessment (With Mitigation Measures)

Receptor Reference	Risk Evaluation
R Group 1	Acceptable
R Group 2	Acceptable
R Group 3	Acceptable
R Group 4	Insignificant
R5	Insignificant
R Group 6	Acceptable
R Group 7	Acceptable
R Group 8	Acceptable
R Group 9	Insignificant
R10	Insignificant
R11	Insignificant
R12	Insignificant

8.148 On the basis of the assessment presented above, it is concluded that the proposed development, with the range of mitigation measures to be implemented and design measures incorporated into the working scheme, will not have a dust deposition impact on any assessed receptors.

MONITORING

8.149 Dust monitoring locations shall be reviewed and revised where and as/when necessary. The results of the dust monitoring shall be submitted to Sligo County Council on a regular basis for review and record purposes.

AIR QUALITY: APPENDIX 8

APPENDIX 8- A

DUST RISK SCREENING ASSESSMENT METHODOLOGY

The methodology applied in the assessment is a semi-quantitative risk assessment methodology, in which the probability of an impact occurring and the magnitude of the impact, if it were to occur, are considered. This methodology is the Tier 2 assessment of the dust assessment methodology. In the event that identified dust sensitive receptors are not screened out within Tier 1, this approach provides a mechanism for identifying the areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the development, (i.e. the assessment does not take account of existing mitigation in place at the quarry).

The magnitude of the potential risk at each receptor is classified depending on the frequency of exposure and the distance from the site to the receptor. Frequency of exposure is represented by the percentage of moderate to high winds (over 3m/s) from the direction of the site.

The screening assessment tool assesses the significance of the distance from site and the frequency of exposure of each receptor by assigning a ranked number. Receptors with a higher potential for dust impacts would therefore result in a higher value whilst receptors with lower potential would expect to carry a lower value. The value corresponding to an evaluation of risk is a product of the significance of the distance and frequency of exposure, each is assigned a value representing its significance. The multiplication of the two values assigned gives a total, which is then corresponded to a qualitative term of risk magnitude.

Frequency of Exposure Criterion

The potential for any site to emit dust is greatly influenced by weather. Increased wind speed increases the potential for the generation of airborne dust due to the suspension and entrainment of particles in airflow. A worst-case situation would be strong, warm, drying winds which increase the rate at which dust is lifted from an untreated surface and emitted into the air. Wind can also have the effect of spreading dust over a large area. Conversely, rainfall decreases dust emissions, due to both surface wetting and increasing the rate at which airborne dust is removed from air. An article on dust generation from quarry operations[8] suggests that rainfall of greater than 0.2mm per day is considered sufficient to effectively suppress windblown dust emissions.

The frequency of exposure to dust emissions represents the percentage of time that wind speeds capable of carrying airborne dust (greater than 3m/s) are blowing from the site to the direction of the receptor. Frequencies are calculated based on meteorological data. For screening assessment wind speeds greater than 2m/s were considered as this is how data on percentage occurrence of wind frequency and wind speed is calculated and presented by Met Eireann. For this reason, the assessment is considered to be conservative.

For the screening assessment, a value of 1mm would be used for the criteria to classify days as ‘dry’ or ‘wet’; five times the recommended value, using annual average rainfall data. The average number of days when rainfall exceeds 1.0mm would be provided for each month, and calculated over the year to provide an average.

[8] Leeds University. Good Quarry. http://www.goodquarry.com/article.aspx?id=55&navid=2

The resulting frequency of moderate to high wind speeds with the potential of carrying airborne dust towards receptors would then be classified into the criteria in Table 8 A-1 with the respective rank value assigned.

Table 8 A- 1
Frequency of Exposure – Risk Classification

Risk Category	Criteria
1	Frequency of winds (>2 m/s) from the direction of the dust source on dry days are less than 3%
2	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are between 3% and 6%
3	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are between 6% and 9%
4	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are between 9% and 12%
5	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are between 12% and 15%
6	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are greater than 15%

Distance to Source Criterion

In assessing dust impacts, the distance from the source to the sensitive location is crucial, as airborne and deposited dust tend to settle out close to the emission source. Smaller dust particles remain airborne for longer, dispersing widely and depositing more slowly over a wider area.

Guidance indicates that larger dust particles (greater than 30µm) will largely deposit within 100m of sources. Smaller particles (less than 10µm) are only deposited slowly. Concentrations decrease rapidly on moving away from the source, due to dispersion and dilution.

To allow for this effect of distance, buffer zones are often defined by mineral planning authorities around potentially dusty activities to ensure that sufficient protection is provided. They have not been established in any rigorous scientific way, but usually range from 50m to 200m. The 1995 UK DoE Guidance on dust from surface mineral working's, however, recommends a stand-off distance of 100-200m from significant dust sources (excluding short-term sources), although it is recognised that these distances can be reduced if effective mitigation measures are identified and implemented. In terms of identifying sensitive locations therefore, and to represent an extreme worst case scenario, consideration only needs to be given to sensitive receptors within 500m of the site boundary. Receptors at a distance greater than 500m have therefore been screened out in Tier 1 of the assessment.

The criteria for classifying the distance from receptor to source and thus assigning a rank value has therefore been based on the various references to dust behaviour described above. The rank classifications are presented below in Table 8 A-2. A risk category is maintained for receptors in excess of 500m for circumstances where although a receptor is beyond 500m from the dust source, its sensitivity for example is sufficient for it to be taken onto a Tier 2 assessment.

Table 8 A- 2
Distance to Source – Risk Classification

Risk Category	Criteria
1	Receptor is more than 500m from the dust source
2	Receptor is between 400m and 500m from the dust source
3	Receptor is between 300m and 400m from the dust source
4	Receptor is between 200m and 300m from the dust source
5	Receptor is between 100m and 200m from the dust source
8	Receptor is less than 100m from the dust source

Sensitivity of Receptors

Sensitive locations are those where the public may be exposed to dust from the site. Locations with a high sensitivity to dust include hospitals and clinics, hi-tech industries, painting and furnishing and food processing. Locations classed as being moderately sensitive include schools, residential areas and food retailers. Table 8 A-3 below[9] shows examples of dust sensitive facilities.

Table 8 A- 3
Examples of Dust Sensitive Facilities

High Sensitivity	Medium Sensitivity	Low Sensitivity
Hospitals and clinics	Schools and residential areas	Farms
Retirement homes	Food retailers	Light and heavy industry
Hi-tech industries	Greenhouses and nurseries	Outdoor storage
Painting and furnishing	Horticultural land	
Food processing	Offices	

Evaluation of Risk

Once a rank value has been assigned to the frequency of exposure and distance to source, an overall risk can be evaluated by combining the two risk categories, along with consideration of the sensitivity of the receptor. For low sensitivity receptors the risk of dust impact are considered to be significantly lower than for medium and high sensitive receptors. Therefore, a factor of 0.5 would be applied to the final risk evaluation ranking.

For each receptor, the relative magnitude of risk is given by identifying which of the score categories in Table 8 A-4 it falls into. This final evaluation represents the risk of dust impacts prior to control and mitigation measures being employed on site.

Table 8 A- 4
Risk Evaluation Ranking (Without Mitigation)

Magnitude of Risk	Score
Insignificant	7 or less

[9] **Ireland M. (1992)** "Dust: Does the EPA go far enough?", Quarry Management, pp23-24.

Magnitude of Risk	Score
Acceptable	8 to 14
Slight Adverse	15 to 24
Moderate Adverse	24 or more

FIGURES

NOTES

1. ORDNANCE SURVEY IRELAND LICENCE NO. CYAL50167032 (C) ORDNANCE SURVEY IRELAND / GOVERNMENT OF IRELAND
2. AERIAL PHOTOGRAPHY CARRIED OUT BY SLR CONSULTING SEPTEMBER 2020

LEGEND

- APPLICATION AREA
- RESIDENCE
- COMMERCIAL
- 1 KM OFFSET
- 500 M OFFSET
- GROUPS OF RECEPTORS
- BASELINE DUST MONITORING LOCATION (SLR)
- BASELINE DUST MONITORING LOCATION (BHP)
- LOUGH GILL SAC

Metres 1:10,000

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LOCAL RECEPTORS AND MONITORING LOCATIONS

FIGURE 8.1

Scale: 1:10,000 @ A3

Date: MAY 2021

501.00584.00019.Sligo EIAR Figure 8.1.Rev.1.dwg

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