# CONTENTS

# 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 Cavan County Council by P&S Civil Works Ltd. It primarily addresses potential air quality related impacts from the proposed quarry extension development at Mullymagowan townland, Stradone, Co. Cavan.

8.2 In summary, the development will consist of:

- Quarry extension development for rock extraction and associated processing over an area of c. 4 hectares within an overall planning application area of c. 4.9 hectares as previously permitted under P. Ref. 12/101 (P. Ref. 17/383) and never commenced;
- A time period of 15 years is being sought to allow the previously permitted extraction be completed plus 2 years to complete restoration works (total duration sought 17 years);
- The development proposed seeks to utilise existing ancillary buildings and facilities including weighbridge, wheelwash, portacabin office/canteen/toilet, waste water treatment system, processing plant, site entrance and all other associated site works, and ancillary activities as currently permitted by P. Ref. 07/827; and
- Final restoration of the worked out quarry to a permanent water body and naturally regenerated wildlife habitat area.

8.3 Further information on the site infrastructure, operations, environmental management systems, and controls at the existing quarry site and proposed extension are provided in Chapters 1 and 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 planning application is to provide for a continued supply of aggregates from the quarry extension site and secure the workforce of the existing quarry in the medium term.

## Scope of Work

8.7 The main focus of this assessment is the potential impact on local amenity from fugitive dust emissions and particulate matter at the site.

8.8 The principal air quality impact associated with the proposed development through deposition on land is fugitive dust emission. Dust emissions are likely to arise in the course of the following activities:

- trafficking by onsite machinery and heavy goods vehicles (HGVs) over paved / unpaved surfaces;
- end-tipping, handling, and processing of materials;
- stockpiling of aggregates;

- continuation of related aggregates processing;
- landscaping and final restoration activities.

8.9 With respect to the potential for air quality impacts, the key objective at the application site is to manage activities to ensure that air emissions are prevented where possible and the effects of any residual releases are minimised.

8.10 This EIAR Chapter describes and assesses the existing air quality baseline characteristics of the area at and around Mullymagowan based on site specific surveys and EPA data. Air emissions arising from the activities at the quarry are then applied to these baseline conditions and the resulting air quality impacts assessed. Mitigation measures are identified to eliminate and reduce these impacts insofar as practical.

8.11 The following sections of this EIAR Chapter describe the potential air quality impacts associated with activities within the 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 proposed development to eliminate or reduce the potential for increased air quality impacts (if appropriate);
- summary of any residual impacts and reinstatement;
- summary of cumulative impacts; and
- monitoring proposals.

## Consultations / Consultees

8.12 No specific external consultations were undertaken in the preparation of this Chapter of the EIAR.

8.13 A formal pre-planning consultation was held between planning staff of Cavan County Council and representatives of SLR Consulting Ireland and P&S Civil Works Ltd. on 10 August 2022. Following a review of published development plans and site surveys, it was considered that there was no requirement for any further formal external consultations to be carried out in respect of climate for the purposes of this assessment. There was however significant consultation with other specialist contributors to this EIA Report.

## Contributors / Author(s)

8.14 SLR Consulting Ireland undertook the impact assessment presented in this chapter on behalf of P&S Civil Works Ltd. The lead consultant for the study was Aldona Binchy MSc. Eng. PIEMA Environmental Engineering and Conor Hughes, MSc Energy Science.

## Limitations / Difficulties Encountered

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

# REGULATORY BACKGROUND

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

## Legislation

### *Air Quality Standards*

8.17 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).

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

8.19 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).

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

- nitrogen oxides;
- sulphur dioxide;
- carbon monoxide;
- ozone;
- particulate matter ($PM_{10}$, $PM_{2.5}$ and black smoke);
- benzene and volatile organic compounds;
- heavy metals; and
- polycyclic aromatic hydrocarbons.

8.21 These pollutants are monitored at 32 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**.

8.22 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<br>Year | 200 µg/m$^3$<br>40 µg/m$^3$ | 18<br>0 | 1 hour alert | 400 µg/m$^3$ Exceeded for 3 consecutive hours | |
| Sulphur Dioxide ($SO_2$) | Hour<br>Day | 350 µg/m$^3$<br>125 µg/m$^3$ | 24<br>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<br>Year | 50 µg/m$^3$<br>40 µg/m$^3$ | 35<br>0 | | | |
| Particulate matter with aerodynamic diameter of less than 2.5µm ($PM_{2.5}$) | Year | 25 µg/m$^3$<br>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 Oxides (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

### *National Planning Framework – Project Ireland 2040*

8.23 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 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 extraction will continue to be enabled where this is compatible with protection of the environments.

8.24 The Project Ireland 2040 National Planning Framework does refer to air quality in general terms under section 9.4 *Creating a Clean Environment for a Healthy Society* in acknowledging that measures which seek a reduction in fossil fuel-based energy sources will reduce air pollution. The Framework seeks to assist in reducing emissions and help prevent people being exposed to unacceptable levels of pollution by supporting public transport, walking and cycling as more favourable modes of transport to the private car and by the promotion of energy efficient buildings and homes and innovative design solutions. National Policy Objective 64 on air quality states:

*"Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions."*

8.25 There are no specific policies in relation to air emissions in the National Planning Framework for extractive industry or related production activities.

### *Local Planning Policy – Cavan County Development Plan*

8.26 The current Cavan County Development Plan 2022 - 2028 (CDP) was adopted in July 2022. The Development Plan Air Quality Policy Objectives are detailed below.

- **CDP 4.10.3** *Promote the preservation of best ambient air quality compatible with sustainable development in accordance with the EU Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/5/0/EC) and ensure that all air emissions associated with new developments are within Environmental Quality Standards as out in the Air Quality Standards Regulations 2011 (SI No. 180 of 201) (or any updated /superseding documents).*
- *It is a strategic aim of the county to reduce polluting emissions and support the implementation of measures to improve indoor and outdoor air quality by:*
  - *Participating in, and facilitating national programmes of air quality monitoring;*
  - *To tackle the problem of particulate matter, clean ways of heating homes and improve energy efficiency of homes can be progressed;*
  - *Support the development and promotion of the Air Quality Index for Health;*
  - *To reduce the impact of nitrogen dioxide, transport options in the Government's Climate Action Plan can be implemented and transport choices can be considered by individuals.*
  - *Support the development of Local Air Quality Management Plans that identify pollution 'hot spots' and aim to reduce pollution through local action on emissions; and*
  - *Assessing radon levels in indoor settings in council properties and support the promotion of radon testing all indoor settings.*

## Guidelines Extractive Industry Emissions Limit Values

8.27 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.

8.28 Section 261 of the Planning and Development Act 2000 (as amended), which regulates a significant proportion of established quarry developments, 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.

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

### *Guidance Relating to Dust*

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

8.31 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]

8.32 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.

8.33 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.

8.34 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 and by vehicles using paved and unpaved haul roads.

8.35 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*

8.36 Most 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:

*"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."*

8.37 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 1,000 mg/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.

[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

### *A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Area*

8.38 Guidance on the assessment of the air quality impacts of development on designated nature conservation sites prepared by the Institute of Air Quality Management (IAQM, 2019). This guidance is also useful to evaluate the effects of air pollution on habitats and species using air quality assessment.

### *Air Quality and Health Effects*

8.39 Two recent EPA reports, *Air Quality in Ireland 2021*[3] and *Ireland's Environment, An Integrated Assessment 2020*[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 several 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.

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

## Site Specific Emission Limits

8.41 Condition No's. 13 and 17 imposed by Cavan County Council (CCC) on the existing quarry operation of Mullymagowan Quarry under P. Ref. 07/827, states that:

*"Measures to mitigate against dust to be implemented to achieve dust standards not exceeding 350 mg/m$^2$/day. Dust deposition shall not exceed 350 mg/m$^2$/day beyond the boundary of the site. This limit to be based on a 30- day composite sample. Measurements to be carried out on a bi-annual basis at locations proposed in the EIS. One of the dust measuring events to be carried out in the summer period."*

8.42 The 350 mg/m$^2$/day limit typically applies to monitoring using the Frisbee type dust monitoring gauges.

8.43 Condition No'. 11 imposed by Cavan County Council (CCC) on the permitted quarry operation of Mullymagowan Quarry under P. Ref. 12/101, states that:

*"The total dust emission arising from the on-site operations when measured at any point along the site boundary (boundary with land not owned or under applicant's control) shall not exceed 350 milligrams per square metre per day averaged over a continuous 30 day period as a deposition of insoluble matter (Bergerhoff method)."*

8.44 As noted previously the DoEHLG (2004), the ICF (2005) and EPA (2006) guidelines recommend adopting the TA Luft Standard and the Bergerhoff Method with its associated ELV of 350 mg/m$^2$/day.

8.45 On site monitoring of dust uses the Bergerhoff Method to align to the nationally recommend approach.

[3] Environmental Protection Agency, Air Quality in Ireland 2021 - Key Indicators of Ambient Air Quality. Available at: Monitoring & Assessment: Air Publications | Environmental Protection Agency (epa.ie)

[4] Environmental Protection Agency. Ireland's Environment, An Integrated Assessment 2020. Available at: State of the Environment | Environmental Protection Agency (epa.ie)

# RECEIVING ENVIRONMENT

## Study Area

8.46 The site is in a rural area in the eastern part of Co. Cavan, c. 1.25km east of the N3 (National Primary Road), which links Dublin and Cavan. The application site itself is located fully within the townland of Mullymagowan, being c. 4.5km south of Stradone village and c. 10km southeast of Cavan town. Access to the site is gained by taking the Regional R165 road off the N3 towards Bailieborough. There is a dedicated private access to the existing quarry.

## Baseline Study Methodology

8.47 The application site and surrounding area fall into Air Quality Zone D, categorised as rural east 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.

8.48 A typical air quality monitoring location to the application site, and in a similar Zone D rural area, is located at Kilkitt, Co. Monaghan. As such, it is considered the most appropriate datasets available for assessment of air quality baseline concentrations in the study area around the Mullymagowan quarry site.

8.49 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 1500 mm 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

8.50 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 (https://www.met.ie/climate-ireland/1981-2010/mullingar.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/).

8.51 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

8.52 Dust deposition surveys were undertaken at and around the application site; refer to **Figure 8-1** for monitoring locations. The dust deposition monitoring results recorded over this period are reviewed

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

8.53 The locations of the baseline dust deposition monitors are shown on **Figure 8-1**:

- D1 dust deposition gauge is located at the north of the application land interest boundary adjacent the site entrance onto the public road;
- D2 dust deposition gauge is located at the centre of the application land interest boundary adjacent to the existing quarry void;
- D3 dust deposition gauge is located at the centre of the application land interest boundary adjacent to the central aggregate processing area,
- D4 dust deposition gauge is located at the south of the application area boundary adjacent to the public road.

## Background Air Quality

8.54 The closest air quality monitoring locations to the quarry, and in a similar Zone D area, is located at Kilkitt, Co. Monaghan.

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

**Table 8-3**
Background Air Quality Concentrations

| $PM_{10}$ | | |
|---|---|---|
| Year | Annual Mean (µg/m$^3$) | Number of Days > 50 µg/m$^3$ |
| 2013 | 11 | 3 |
| 2014 | 9 | 2 |
| 2015 | 9 | 1 |
| 2016 | 8.1 | 0 |
| 2017 | 7.8 | 0 |
| 2018 | 9 | 0 |
| 2019 | 7 | 0 |
| 2020 | 8 | 0 |
| 2021 | 7.8 | 0 |

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

8.57 For rural areas, such as those surrounding the application site, the primary source of $PM_{10}$ 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*

8.58 The results of the dust deposition monitoring are presented in **Table 8-4** below.

**Table 8-4**
Dust Deposition Monitoring Results

| Monitoring Period | | D1 (mg/m$^2$/day) | D2 (mg/m$^2$/day) | D3 (mg/m$^2$/day) | D4 (mg/m$^2$/day) |
|---|---|---|---|---|---|
| 23/09/2022 | 25/10/2022 | 59 | 88 | 153 | 53 |
| 25/10/2022 | 2/11/2022 | 42 | 27 | 3 | Knocked over |

8.59 As it will be noted, the recorded baseline dust deposition rates at Mullymagowan Quarry are all below 350 mg/m$^2$/day for September/October 2022.

## Meteorology: Dispersion of Emissions

8.60 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**: affects ground level emissions by increasing the initial dilution of particles in the emission. It will also affect the potential for dust entrainment.

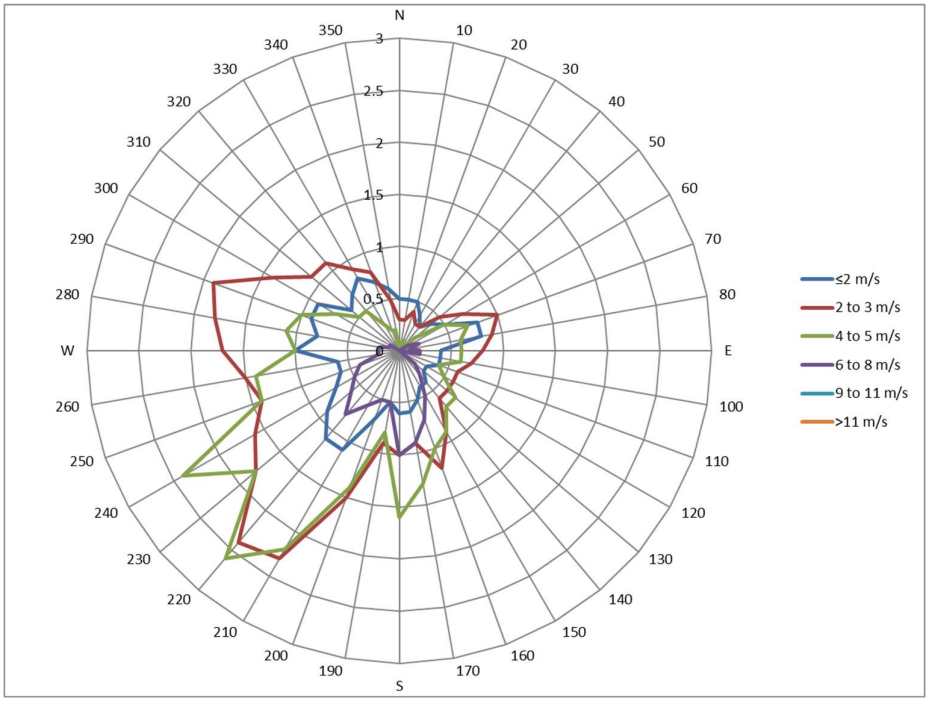
8.61 Rainfall is also an important climatological parameter in the generation of dust; a sufficient amount of rainfall can suppress dust at the source and eliminate the pathway to the receptor. According to Arup (1995) rainfall greater than 0.2mm per day is sufficient to suppress dust emissions.

## Local Wind Speed and Direction Data

8.62 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.

8.63 A windrose for the average conditions recorded at Mullingar over a ten-year period is presented below 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

8.64 Relevant rainfall data applicable to the site has been obtained from the Irish Meteorological Service website for the Mullingar station (1981 – 2010). The annual average days with rainfall greater than 0.2 mm are 209 days per year. Natural dust suppression (from rainfall) is therefore considered to be effective for 57.2% of the year.

## Sensitive Receptors

### *Ecological Receptors*

8.65 The application site is not subject to any statutory nature conservation designation.

8.66 Based on the nature, size and scale of the planned development, it is considered that the maximum distance for which the project should be evaluated in terms of Natura 2000 and designated sites is up to a maximum radius of 2km from the application site unless there are any potential source-pathway-receptor links between the proposed development at Mullymagowan and any Natura 2000 or designated site(s) beyond this distance.

8.67 At a distance greater than 2km, and in the absence of any potential source-pathway-receptor link, it is considered that no Natura 2000 and designated sites would be affected by any direct loss of habitat or impacted upon by the effects of dust.

8.68 There are no Natura 2000 sites (SAC or SPA) or pNHA / NHA within 10 km of the application area.

### *Human Receptors*

8.69 Sensitive locations are those where people may be exposed to dust from 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.

8.70 Receptors have been identified within a 1km distance of the application site boundary at Mullymagowan. The receptors within 1km of the application site are listed in **Table 8-5** and their locations are shown in **Figure 8-1**. As residences are clustered in some areas, receptors have been assessed at the nearest location to the application site boundary.

8.71 There are c. 46 potential receptors identified within 1km of the red line planning application boundary of the site, see **Table 8-5.**

**Table 8-5**
Sensitive Receptors within the 1km of the Application Area

| Receptor Reference | Receptor | Dust Sensitivity | Distance from red line application boundary (m) (approx.) |
|---|---|---|---|
| R1 | Residential (Applicant) | Medium | 26 W |
| R2 | Residential | Medium | 180 NW |
| R3 | Residential | Medium | 235 S |
| R4 | Residential | Medium | 430 S |
| R5 | Residential | Medium | 445 S |
| R6 | Residential | Medium | 440 S |
| R7 | Residential | Medium | 420 SW |
| R8 | Residential | Medium | 425 N |
| R9 | Residential | Medium | 425 N |
| R10 | Residential | Medium | 495 N |
| R11 | Residential | Medium | 415 NE |
| R12 | Residential | Medium | 375 NE |
| R13 | Residential | Medium | 290 NE |
| R14 | Residential | Medium | 315 E |
| R15 | Residential | Medium | 535 SE |
| R16 | Residential | Medium | 700 S |
| R17 | Residential | Medium | 605 S |
| R18 | Residential | Medium | 725 S |
| R19 | Residential | Medium | 700 S |
| R20 | Residential | Medium | 620 SW |
| R21 | Residential | Medium | 530 N |
| R22 | Residential | Medium | 585 N |
| R23 | Residential | Medium | 550 N |
| R24 | Residential | Medium | 510 NE |
| R25 | Residential | Medium | 815 N |

| Receptor Reference | Receptor | Dust Sensitivity | Distance from red line application boundary (m) (approx.) |
|---|---|---|---|
| R26 | Residential | Medium | 830 N |
| R27 | Residential | Medium | 905 N |
| R28 | Residential | Medium | 900 NE |
| R29 | Residential | Medium | 840 NE |
| R30 | Residential | Medium | 815 NE |
| R31 | Residential | Medium | 770 NE |
| R32 | Residential | Medium | 790 NE |
| R33 | Residential | Medium | 790 NE |
| R34 | Residential | Medium | 810 NE |
| R35 | Residential | Medium | 875 NE |
| R36 | Residential | Medium | 980 NE |
| R37 | Residential | Medium | 880 SE |
| R38 | Residential | Medium | 970 SE |
| R39 | Residential | Medium | 860 S |
| R40 | Residential | Medium | 905 SW |
| R41 | Residential | Medium | 910 SW |
| R42 | Residential | Medium | 850 SW |
| R43 | Residential | Medium | 820 SW |
| R44 | Residential | Medium | 840 SW |
| R45 | Residential | Medium | 970 SW |
| R46 | Residential | Medium | 985 SW |

# IMPACT ASSESSMENT - METHODOLOGY

## Evaluation Methodology

8.72 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.

8.73 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.

8.74 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.

8.75 The impact assessment is based upon a comparison of the baseline (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.

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

- emission from soils stripping, placement and restoration (earthworks, trackout);
- emission from rock extraction and ancillary activities;
- $PM_{10}$ contribution from operational activities; and
- traffic exhaust emissions.

8.77 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.

8.78 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

8.79 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.

8.80 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 8-6** below (and IAQM Construction Dust Guidance[6]).

**Table 8-6**
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<br>More than 100 dwellings within 20m<br>Local annual mean $PM_{10}$ concentrations exceed the Objective.<br>Works continuing in one area of the site for more than 1-year | European Designated sites |
| High | Densely populated area.<br>10-100 dwellings within 20m of site.<br>Local annual mean $PM_{10}$ concentrations close to the Objective (36 – 40µg/m$^3$) | Nationally Designated sites |
| Medium | Suburban or edge of town<br>Less than 10 receptors within 20m<br>Local annual mean $PM_{10}$ concentrations below the Objective (30 – 36µg/m$^3$) | Locally designated sites |
| Low | Rural area; industrial area | No designations |

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

| Sensitivity of Area | Examples | |
|---|---|---|
| | Human Receptors | Ecological Receptors[(a)] |
| | No receptors within 20m<br>Local annual mean $PM_{10}$ concentrations well below the Objective (<30µg/$m^3$)<br>Wooded area between site and receptors | |
| Notes: (a)-Only applicable if ecological habitats are present which may be sensitive to dust effects. | | |

8.81 **Table 8-7** illustrates 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 8-7**
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 |

## Soils Stripping, Placement and 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 the following potential activities:

- earthworks;
- trackout.

8.83 Based on the scale and nature of the works including areas, soils stripping 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 8-8** 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 8-8**
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 |

| Distance to Nearest Receptor | | Dust Emission Class | | |
|---|---|---|---|---|
| Human | Ecological | Large | Medium | Small |
| 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 8-9** 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 8-9**
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.

## Material Extraction and Ancillary Activities Deposited Dust - 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.

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 to be 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 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 consider proposed mitigation measures** implemented at the development. These 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 Material Extraction and Ancillary 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, quarry and ancillary operations can potentially contribute up to 5 $\mu g/m^3$ towards annual mean background concentrations of the coarse fraction (2.5 – 10 µm diameters) of particulates in the immediate area.

8.99 Given the nature and scale of proposed activities, the potential $PM_{10}$ impact of increased intake is similar or lower. However, to ensure a robust assessment of potential $PM_{10}$ impacts, the upper limit of $5\mu g/m^3$ 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 (Design Manual for Roads and Bridges).

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

## Soils Stripping, Placement and Restoration - Assessment

8.102 An overview of the sources and processes associated with the extraction activities, and their respective potential for dust deposition (both dust and smaller particles), is presented below in **Table 8-10**.

**Table 8-10**
Site Activities: Sources of Dust Emissions

| Activity | Source | Emission Potential | Comments |
|---|---|---|---|
| Operating plant and machinery, trucks driving along routes | Excavators / Dozers / HGV | 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.<br>Soils placed directly into storage area or in progressive works. |

8.103 During the placement of overburden, restoration activities, earthworks will be limited in extent and given the proximity to receptors the dust risk category is considered to be 'low risk' to 'negligible'.

8.104 During the restoration phases, given the limited number of vehicle movements and the limited length of off-road routes, 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 8-11**.

**Table 8-11**
Site Activities: Risk of Dust Emissions

| Source | Risk of Dust Soiling and $PM_{10}$ Effects | Ecological Effects |
|---|---|---|
| Earthworks | Low Risk to Negligible | Negligible |
| Trackout | Negligible | Negligible |

8.106 While the overall risk category has been assessed as 'negligible', if the soils stripping 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 the proposed activities.

## Material Extraction and Ancillary Activities Deposited Dust - Assessment

8.107 An overview of the sources and processes associated with the extraction activities, and their respective potential for dust deposition, is presented below in **Table 8-12**.

**Table 8-12**
Sources of Particulate Emissions

| Activity | Source | Emission Potential | Comments |
|---|---|---|---|
| Rock 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 of rock | 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. |
| 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 HGV | 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 on-site & traffic off-site | HGV/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. |

### *Human Receptors*

8.108 Approximately 46 potential receptors were identified within the c. 1km study area around the application site.

8.109 Using the tiered assessment methodology, all receptors located within 500m have progressed onto a Tier 2 assessment as they are considered to have a risk of dust impact. Each receptor identified in **Table 8-5** 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**.

8.110 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.

8.111 A wind-rose for the site is presented in **Figure 8-2** for Mullingar Airport 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 3m/s capable of carrying airborne dust[7].

8.112 A wind rose showing the frequency of winds at wind speeds of greater than 2m/s is presented in **Figure 8-2** with the individual frequencies for each 10-degree compass sector used within the assessment. In this assessment, wind speeds over 2m/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.

8.113 A summary of the risk assessment of dust impacts from sources within the proposed development is presented in **Table 8-13** below.

**Table 8-13**
Dust Risk Assessment Screening (**Without Mitigation Measures**)

| Receptor | Distance from Operations (m) | Relevant. Wind Direction [A] | Potential Exposure Duration [B] | Relative Wind / Distance Rank [C] | Risk Evaluation |
|---|---|---|---|---|---|
| R1 | 26 W | Derelict (in ownership of the applicant) | | | |
| R2 | 180 NW | 120-150 | 6.5 | 1/5 | Insignificant |
| R3 | 235 S | 330-0 | 3.2 | 1/4 | Insignificant |
| R4 | 430 S | 320-340 | 3.8 | 1/2 | Insignificant |
| R5 | 445 S | 350-10 | 1.3 | 1/2 | Insignificant |
| R6 | 440 S | 0-20 | 1.1 | 1/2 | Insignificant |
| R7 | 420 SW | 10-30 | 1.1 | 1/2 | Insignificant |
| R8 | 425 N | 150-170 | 8.3 | 2/2 | Insignificant |
| R9 | 425 N | 170-180 | 6.7 | 1/2 | Insignificant |
| R10 | 495 N | 170-180 | 6.7 | 1/2 | Insignificant |

[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.

| Receptor | Distance from Operations (m) | Relevant. Wind Direction (A) | Potential Exposure Duration (B) | Relative Wind / Distance Rank (C) | Risk Evaluation |
|---|---|---|---|---|---|
| R11 | 415 NE | 180-190 | 5.8 | 1/2 | Insignificant |
| R12 | 375 NE | 190-210 | 10.7 | 2/3 | Insignificant |
| R13 | 290 NE | 190-210 | 10.7 | 2/4 | Acceptable |
| R14 | 315 E | 260-280 | 9.1 | 2/3 | 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

8.114 It can be seen from **Table 8-13** that the risk of impact associated with dust deposition at receptors is highest at receptors located closest to the application area. All receptors evaluated in this assessment are expected to have either an acceptable or insignificant risk of deposited dust impacts.

8.115 The assessment does not take into account the mitigating effects of dust control measures implemented during the operations or the effective barrier created by the vegetation along the local hedgerows (which will be retained) and any retained perimeter planting (existing mature forestry). The effectiveness of the vegetation belt as both a windbreak in reducing the momentum of the incident wind and as a surface for the capture of airborne particles is considered to significantly reduce the generation of airborne dust beyond the site development boundary.

8.116 Details of dust mitigation measures to reduce dust deposition impact levels at receptors to levels of 'lower risk' are described in the 'Mitigation' section of this chapter.

### *Ecological Receptors*

8.117 The application site is not subject to any statutory nature conservation designation.

8.118 The nearest ecological receptor are:

- Lough Ramor pNHA (000684) located c. 12.9 km south of the site;
- Lough Sheelin SPA (004043) located c. 14.3 km south of the site;
- Lough Oughter & associated Loughs SAC located c. 14.5 km northwest of the site.

8.119 Fugitive dust from quarry sites 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.

8.120 The EPA environmental management guidelines for the sector recommend a limit of 350 mg/m$^2$/day (averaged over a thirty-day period) for dust deposition at the quarry boundary. A programme of dust deposition monitoring at Mullymagowan Quarry indicates that the levels of dust generated from quarrying operations are below the recommended limit levels 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.

8.121 Based on the above, it is concluded that operations at Mullymagowan Quarry including the application site have had and will have insignificant dust deposition impact on ecological receptors.

## Traffic Emissions - Assessment

8.122 There will be no changes to road alignment or speed on the existing road network.

8.123 Therefore, as none of the roads in the surrounding local road network meet any of the traffic / alignment criteria set out in HA 207/07, then the impact of the scheme can be considered to be 'negligible' in terms of local air quality and no further air quality assessment is deemed necessary.

## $PM_{10}$ Contribution from Material Extraction and Ancillary Activities - Assessment

8.124 In terms of $PM_{10}$, the maximum annual mean measured baseline background concentration ranged from 7.0 µg/m³ to 11 µg/m³ over the period 2013 to 2021 at the Kilkitt, Co. Monaghan monitoring station. Therefore, the potential contribution up of 5 µg/m³ towards annual mean background concentrations of the coarse fraction (2.5 – 10 µm diameters) of particulates (in the immediate area of the site) is insignificant and well below the annual objective of 40µg/m³.

8.125 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 considered to significantly reduce the generation of airborne $PM_{10}$ beyond the site development boundary.

## Unplanned Events (i.e., Accidents)

8.126 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 planned by P&S Civil Works Ltd. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions or unplanned events to occur during extraction and subsequent processing and manufacturing activities.

8.127 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.

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

8.129 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.

8.130 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 $PM_{10}$ 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.

## Cumulative Impacts

8.131 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.

8.132 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 insignificant.

8.133 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.

8.134 There are no other significant sources of emission to air within close proximity to the site, either existing or planned, and therefore no potential for significant cumulative impacts has been identified within c. 1km of the application site.

8.135 Beyond 1km, there is an existing quarry located c. 1.4 km southwest of the application site. The quarry is located at Carricknaveddan (Quarry Ref: QY31). At a distance of c. 1.4 km, the quarry is considered too far removed from the application site at Mullymagowan and the cumulative impact on air quality of the surrounding area by the developments is therefore considered to be insignificant.

## Interaction with Other Impacts

8.136 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

8.137 A range of mitigation measures are recommended for implementation at the proposed site at Mullymagowan.

## Restoration Activities

8.138 Specific mitigation measures are listed in **Table 8–14**.

**Table 8-14**
Restoration Activities – Particulate Emission Mitigation Measures

| Source | Emission Potential | Recommended Mitigation Measures | Effectiveness |
|---|---|---|---|
| Excavator/HGV | High – dry or fine silty material during strong windy weather | Minimise drop heights when handling material. Materials placed directly into storage area or in progressive works. Avoid working in adverse/ windy conditions. | High |
| | Low – soils of high moisture content during conditions of low wind speed | Minimise drop heights when handling material, protection from wind where possible. | High |

## Materials Extraction and Ancillary Activities

8.139 P&S Civil Works Ltd. will implement the mitigation measures outlined in **Table 8-15** to reduce particulate matter emissions during the extraction of rock and processing activities.

**Table 8-15**
Rock Extraction and Ancillary Activities– Particulate Emission Mitigation Measures

| Source | Emission Potential | Recommended Mitigation Measures | Effectiveness |
|---|---|---|---|
| Loader/ Mobile Processing Plant | High – dry material during strong windy weather | Processing of rock carried out on quarry floor and in close proximity to working face to reduce the movement distance. | High |
| | High – dry material during strong windy weather | Minimise drop heights when handling material. Water sprays to moisten handled material. | High |
| | Low – wet material 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 |
| | | | High |
| Screening Mounds | High when dry or fine material being stored or handled during strong windy weather | Seed surfaces of completed mounds / bunds of topsoil. | High |
| | | Limit mechanical disturbance. | High |
| Drilling Rig Dust Emissions | High – during dry and strong windy weather if filters on rig not working | Avoid working in adverse weather conditions and faulty dust filters. | High |
| Ancillary Activities | High- if plant malfunction | Carry out regular checks and maintenance works at the mobile processing plant. | High |
| Acceptable Risk Receptors | High – during dry and strong windy weather | Retention of hedgerows. | High |
| | | Proposed perimeter berms where necessary. | High |
| | | Avoid working in adverse weather conditions | High |
| Slight Adverse Risk Receptors | High – during dry and strong windy weather | Retention of hedgerows | High |
| | | Proposed perimeter berms where necessary. | High |
| | | Avoid working in adverse weather conditions | High |

# RESIDUAL IMPACT ASSESSMENT

## Restoration Activities

8.140 In the absence of mitigation measures, the assessment of risk identified that the risk of impact at receptors during restoration activities would be negligible. With the provision of mitigation measures set out above this risk would reduce even further.

## Material Extraction and Ancillary Activities

8.141 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 evaluated to be at acceptable risk from the proposed activities (without mitigation measures in place) will reduce to insignificant.

8.142 Based on 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 significant deposition impact on assessed receptors.

8.143 Overall, the effects of the proposed development on air quality have been considered to be insignificant.

8.144 A summary of the residual dust risk impact assessment is provided in **Table 8-16**.

**Table 8-16**

Residual Dust Risk Assessment (**With Mitigation Measures**)

| Receptor Reference | Risk Evaluation without Mitigation Measures | Risk Evaluation with Mitigation Measures |
|---|---|---|
| R1 | Derelict (in ownership of the applicant) | |
| R2 | Insignificant | Insignificant |
| R3 | Insignificant | Insignificant |
| R4 | Insignificant | Insignificant |
| R5 | Insignificant | Insignificant |
| R6 | Insignificant | Insignificant |
| R7 | Insignificant | Insignificant |
| R8 | Insignificant | Insignificant |
| R9 | Insignificant | Insignificant |
| R10 | Insignificant | Insignificant |
| R11 | Insignificant | Insignificant |
| R12 | Insignificant | Insignificant |
| R13 | Acceptable | Insignificant |
| R14 | Insignificant | Insignificant |

8.145 Based on 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. To date the operations at Mullymagowan Quarry have not resulted in any complaints from the local sensitive receptors.

## MONITORING

8.146 Dust deposition monitoring will continue to be undertaken at the application site. Four monitoring locations (**D1**, **D2, D3, D4**) were included in the baseline survey and will continue to be monitoring for the duration of the development – refer to **Figure 8-1** for locations.

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

# 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 proposed mitigation being put in place).

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/pit 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 1mm would be provided for each month and calculated over the year to provide an average.

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.

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

**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 30 µm) will largely deposit within 100 m of sources. Smaller particles (less than 10 µm) 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 50 m to 200 m. The 1995 UK DoE Guidance on dust from surface mineral working's, however, recommends a stand-off distance of 100-200 m 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 500 m of the site boundary. Receptors at a distance greater than 500 m 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 500 m for circumstances where although a receptor is beyond 500 m 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 500 m from the dust source |
| 2 | Receptor is between 400 m and 500 m from the dust source |
| 3 | Receptor is between 300 m and 400 m from the dust source |
| 4 | Receptor is between 200 m and 300 m from the dust source |
| 5 | Receptor is between 100 m and 200 m from the dust source |
| 8 | Receptor is less than 100 m 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 is 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.

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

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

| Magnitude of Risk | Score |
|---|---|
| Insignificant | 7 or less |
| Acceptable | 8 to 14 |
| Slight Adverse | 15 to 24 |
| Moderate Adverse | 25 or more |

# FIGURES

## Figure 8-1 Receptor and Dust Monitoring Locations