# CONTENTS

**INTRODUCTION ..... 8-1**
Background ..... 8-1
Scope of Work ..... 8-2
Consultations / Consultees ..... 8-2
Contributors / Author(s) ..... 8-3
Limitations / Difficulties Encountered ..... 8-3

**REGULATORY BACKGROUND ..... 8-4**
Legislation ..... 8-4
Planning Policy and Development Control ..... 8-6
Guidelines Extractive Industry Emissions Limit Values ..... 8-7
Site Specific Dust Deposition Emission Limit Values ..... 8-7
Guidance Relating to Air Quality / Dust Nuisance ..... 8-7
Guidance on Assessment of Mineral Dust Impacts for Planning ..... 8-8
Air Quality and Ecological Receptors ..... 8-8
Air Quality and Health Effects ..... 8-8

**RECEIVING ENVIRONMENT ..... 8-9**
Study Area ..... 8-9
Baseline Study Methodology ..... 8-9
Sources of Information ..... 8-10
Field Survey / Monitoring / Inspection Works ..... 8-10
Background Air Quality ..... 8-10
Meteorology: Dispersion of Emissions ..... 8-11
Local Wind Speed and Direction Data ..... 8-11
Rainfall Data ..... 8-12
Sensitive Receptors ..... 8-13

**IMPACT ASSESSMENT METHODOLOGY ..... 8-15**
Evaluation Methodology ..... 8-15
Significance Criteria ..... 8-16
Construction Stage Dust Impacts - Methodology ..... 8-17
Operation Stage Dust Impacts - Methodology ..... 8-18
$PM_{10}$ Contribution from Site-Based Activities: Methodology ..... 8-19
Traffic Emissions - Methodology ..... 8-19

**ASSESSMENT OF IMPACTS ..... 8-20**
Construction Stage, Soil Stripping & Restoration Activities Stages Impacts – Assessment . 8-20
Operational Stage (Extraction & Processing) Dust Impact – Assessment ..... 8-20
Traffic Emissions - Assessment ..... 8-24
$PM_{10}$ Contribution from Extraction / Production Activities - Assessment ..... 8-25
Unplanned Events (i.e., Accidents) ..... 8-25
Cumulative / Synergistic Impacts ..... 8-26
Interaction with Other Impacts ..... 8-26
**MITIGATION MEASURES ..... 8-26**
Trackout Measures ..... 8-27
Good Practice Measures ..... 8-27
**RESIDUAL IMPACT ASSESSMENT ..... 8-28**
Human Receptors ..... 8-28
**MONITORING ..... 8-29**
**FIGURES .....**
**APPENDICES .....**
Appendix 8-A: Dust Risk Screening Assessment Methodology .....

## TABLES

Table 8-1: Relevant Air Quality Limit Values for Protection of Human Health ..... 8-5
Table 8-2: Summary of Air Quality Limit Values: Protection of Vegetation ..... 8-5
Table 8-3: Background $PM_{10}$ Concentrations Birr, Co. Offaly (Source: EPA) ..... 8-10
Table 8-4: Dust Deposition Monitoring Results ..... 8-11
Table 8-5: Natura 2000 or Designated Site(s) within a 2 km of Application Site ..... 8-13
Table 8-6: Sensitive Receptors within c. 1km of the Application Area (Red Line Boundary) 8-13
Table 8-7: Methodology for Defining Sensitivity to Dust and $PM_{10}$ Effects ..... 8-16
Table 8-8: Impact Significance Matrix – Dust Effects (With Mitigation) ..... 8-16
Table 8-9: Determination of Risk Category from Earthworks Activities ..... 8-17
Table 8-10: Determination of Risk Category from Trackout Movements ..... 8-17
Table 8-11: Site Activities: Sources of Dust Emissions ..... 8-20
Table 8-12: Site Activities: Risk of Dust Emissions ..... 8-20
Table 8-13: Sources of Particulate Emissions ..... 8-21
Table 8-14: Dust Risk Assessment Screening (Without Mitigation Measures) ..... 8-22
Table 8-15: Particulate Emission Mitigation Measures ..... 8-26
Table 8-16: Residual Dust Risk Assessment (With Mitigation Measures) ..... 8-28

## FIGURES

Figure 8-1 Baseline Dust Monitoring Locations (And Receptors within 1km)

# Introduction

## Background

8.1 This Chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential effects of the proposed continued use and extension of the sand and gravel pit on air quality. The existing pit is located at Mounthall and Cummer townlands, Camross, Co. Laois.

8.2 The proposed development being applied for under this planning application will consist of:

- Continued use and extension to existing permitted sand and gravel pit registered under Section 261 of the Planning & Development Act 2000, as amended (site ref. QY05/10) within an overall application area of c. 12.2 hectares;
- Extraction of sand and gravel (dry working) over an area of c. 8 hectares with processing and washing of material on site (closed loop water recycling system with associated silt storage lagoons 1,952.25m$^2$), and all ancillary works and structures;
- Site facilities consisting of mobile processing plant, portacabin site office (6.25m$^2$), portacabin welfare facility (18.9m$^2$), serviced portaloo toilet, bunded fuel storage and refuelling pad with hydrocarbon interceptor, weighbridge, wheelwash, water supply borehole, perimeter berms, vegetation planting and fencing;
- Access to the site will be via the existing sand & gravel pit entrance;
- Restoration of the site to agricultural lands; and
- The proposed extraction operational period is for 10 years plus 1 year to complete restoration (total duration sought 11 years).

8.3 Further details on the proposed development, site activities, environmental management systems and controls at the application sites are provided in the Chapter 2 of this EIAR.

8.4 The UK Institute of Air Quality Management (IAQM) 2016 Guidance on the Assessment of Mineral Dust Impacts for Planning notes that *"Dust arising from the quarry can reduce amenity in the local community due to visible dust plumes and dust soiling. The generally coarser dust that leads to these effects may, therefore, be referred to as 'disamenity dust'. The smaller dust particles can remain airborne longer, potentially increasing local ambient concentrations of suspended particulate matter (e.g. $PM_{10}$ and to a lesser extent $PM_{2.5}$), which is associated with a range of health effects. This guidance uses $PM_{10}$ as the health indicator of airborne particles to be consistent with national Planning Practice Guidance (nPPG5) for mineral sites. Mineral site impacts are more likely to be associated with coarse particulate matter (i.e. $PM_{10}$)."*

8.5 The guidance further notes *"As noted earlier, the $PM_{10}$ fraction is relevant to health outcomes. For quarries most of this suspended dust will be in the coarse sub-fraction ($PM_{2.5-10}$), rather than in the fine ($PM_{2.5}$) fraction."* It is on this basis that only $PM_{10}$ is considered further in this assessment.

8.6 The proposed development at Mounthall and Cummer townlands will have the potential to generate fugitive dust emissions and particulates ($PM_{10}$), which may result in impacts on local air quality. Combustion emissions (primary $PM_{10}$, and oxides of nitrogen) from vehicle exhaust emissions associated with the extraction and transportation of aggregates may also have the potential to impact on local air pollution.

8.7 The proposed development will have an average annual extraction rate of c. 80,000 tonnes per year. Based on this output level the proposed development will generate an average of

c. 24 HGV trips per day (i.e. 12 loads per day). The development will also generate some light vehicular traffic, principally by employees and visitors travelling to and from the site. This equates to an average of 12 staff and visitor light vehicle trips daily.



## Scope of Work

8.8 The focus of this assessment is the potential impact on local residential amenity of fugitive dust emissions and particulate matter generated by the proposed development.

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

- soil stripping, earthworks, and topsoil stockpiling (site preparation and restoration works);
- handling and processing of excavated sand and gravel;
- transfer, end-tipping and stockpiling of aggregates;
- trafficking by heavy goods vehicles (HGVs) over paved / unpaved surfaces; and
- landscaping and final restoration activities.

8.10 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.

8.11 This EIAR chapter describes and assesses the existing air quality baseline characteristics of the area at and around the application site based on site specific surveys and EPA data. Impacts on air quality arising from the proposed development are assessed. Mitigation measures are identified where required, to eliminate and reduce these impacts insofar as practical.

8.12 The following sections of this chapter describe the potential air quality impacts associated with the planned development activities. The following issues are addressed separately:

- relevant legislation, standards, and guidance;
- methodology used to assess the potential impacts of planned activities on air quality at local properties (sensitive receptors);
- baseline conditions pertaining to measured (or estimated) existing air quality levels around the existing sand and gravel pit footprint;
- 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 required);
- summary of any residual impacts;
- summary of cumulative impacts; and
- monitoring proposals.

## Consultations / Consultees

8.13 A formal pre-planning consultation meeting was held online between officials of Laois County Council, SLR and the Applicant on the 1st May 2024.

8.14 A pre-planning consultation document was issued to 13 no. statutory consultees which included the EPA, An Taisce, the HSE and the Heritage Council. The full list of statutory consultees and summaries of their responses is provided in Chapter 1, sections 1.33 to 1.40 and **Table 1-1**.

8.15 Feedback of most relevance to the assessment of air quality was received from the Health Service Executive (HSE) Environmental Health Department who made the following comments in their consultation response:

*"Due to the nature of the proposed works, generation of airborne dust has the potential to have significant impacts on sensitive receptors.*

*Dust control and mitigation measures should be included in the EIAR and measures should include:*

- *Sweeping of hard road surfaces*
- *Provision of a water bowser on site, regular spraying of haul roads*
- *Wheel washing facilities at site exit*
- *Restrict speed on site*
- *Provide covers to all delivery trucks to minimise dust generation*
- *Inspect and clean public roads in the vicinity if necessary*
- *Material stockpiling provided with adequate protection from the wind*
- *Dust monitoring at the site boundary*
- *Truck inspection and maintenance plan*
- *Details of a road maintenance agreement between the operator and the Local Roads Authority to clarify responsibility for the upkeep and repair of access roads during the construction phase of the project.*

8.16 Details of the range of mitigation measures to be implemented at the site are provided later in the chapter. In addition, it is standard practice for Local Planning Authorities to impose a condition in relation to a financial payment to the Local Authority for the upkeep and maintenance of local public roads.

8.17 In addition, consultation has been undertaken directly with EIA specialist contributors such as ecology in the preparation of the air quality assessment.

8.18 Following this, and a review of published development plans / site surveys, it was considered that there was no requirement for any further formal external consultations to be carried out in respect of air quality for the purposes of this assessment. There was however significant consultation with other specialist contributors to this EIA Report.

## Contributors / Author(s)

8.19 The air quality impact assessment presented in this Chapter was prepared by SLR Consulting Ireland. The lead consultant for the study was Hannah McGurran BSc. Environmental Science and Conor Hughes MSc. Energy Science. A review was carried out by Shane McDermott BSc (Hons) MSCSI MRICS.

## Limitations / Difficulties Encountered

8.20 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



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

## Legislation

### Air Quality Standards

8.22 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).

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

8.24 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).

8.25 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.

8.26 A summary of relevant air quality limit values typically associated with aggregate extraction and associated HGV traffic in relation to human health are presented in **Table 8-1**[1]. Air quality limit values in relation to vegetation protection are presented separately in **Table 8-2**: Summary of Air Quality Limit Values: Protection of Vegetation.

8.27 The air quality monitoring network is coordinated and managed by the EPA, as the National Reference Laboratory for air quality. The EPA co-ordinates and manages a nationwide network of over 110 monitoring stations which measures the levels of air pollutants and delivers this information to the public. The EPA is finalising the National Ambient Air Quality Monitoring Programme, which involves a greatly expanded national monitoring network

[1] Of the five key pollutants with emission ceilings (limits) for which Ireland has compliance commitments under the National Emissions Ceiling Directive (Directive (EU) 2016/22843.[Sulphur Dioxide ($SO_2$), Nitrogen Oxides ($NO_X$), Ammonia ($NH_3$), Non-Methane Volatile Organic Compounds(NMVOCs) and Fine Particulate Matter ($PM_{2.5}$), those listed in Table 8-1 are likely to be closely associated with the extractive industry.

providing enhanced real-time information to the public, as well as an increased local authority capacity to conduct indicative air monitoring. The results of the monitoring are compared to limit values set out in EU and national legislation on ambient air quality. Map-based assessments of air quality are prepared and published by the EPA.



**Table 8-1:** Relevant Air Quality Limit Values for Protection of Human Health[2]

| 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 | 200 µg/m$^3$ | 18 | 1 hour alert | 400 µg/m$^3$ Exceeded for 3 consecutive hours | |
| | Year | 40 µg/m$^3$ | 0 | | | |
| Sulphur Dioxide ($SO_2$) | Hour | 350 µg/m$^3$ | 24 | 1 hour alert | 500 µg/m$^3$ Exceeded for 3 consecutive hours | |
| | Day | 125 µg/m$^3$ | 3 | | | |
| Particulate matter with aerodynamic diameter of less than 10 µm ($PM_{10}$) | Day | 50 µg/m$^3$ | 35 | | | |
| | Year | 40 µg/m$^3$ | 0 | | | |
| | | 20 µg/m$^3$ (ECO) | | | | |

**Table 8-2:** Summary of Air Quality Limit Values: Protection of Vegetation[3]

| 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$^3$ | | |

[2] World Health Organisation (WHO) Air Quality Guidelines & 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 HA 207/07)
[3] Institute of Air Quality Management (IAQM) 2019 A guide to the assessment of air quality impacts on designated nature conservation sites

## Planning Policy and Development Control



### National Spatial Strategy (NSS) / National Planning Framework – Project Ireland 2040

8.28 The National Planning Framework 2040[4] (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 will continue to be enabled where this is compatible with protection of the environments.

8.29 There are no specific policies in relation to air emissions in the NPF for extractive or production of construction aggregates and materials. The general objective is to facilitate development and to protect the environment at the same time. The air quality objectives assessed according to industry accepted methodology for EIA in extractive development are identified in **Table 8-1**.

### Local Planning Policy – Laois County Development Plan 2021 – 2027

8.30 The current Laois County Development Plan (CDP) sets out policy in relation to management of air pollution:

*"The Council has adopted policies in relation to air quality having regard to its importance to a good quality of life, public health and environmental sustainability. Air pollution can negatively affect human health and eco-systems with the main threat to air quality being emissions from road traffic and solid fuel burning. The policy approach of the Council to integrate land use planning and transportation will reduce emissions from vehicles."*

8.31 The CDP contains the following policy objectives in relation to air quality:

*"To seek to preserve and maintain air and noise quality in the county in accordance with good practice and relevant legislation."*

- **ES38** *"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 (2008/50/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 2011) (or any updated/superseding documents)."*
- **ES39** *"Encourage more sustainable modes of transport and a more balanced modal spilt to reduce carbon emissions."*
- **ES40** *"Encourage the use of appropriate mitigation measures, such as dust dampeners, chimney stack scrubbers, etc. to minimise the potential impacts of developments on air quality."*
- **ES41** *"Require developments of a certain nature to carry out assessments of the impact of the development on air quality."*
- **ES42** *"Ensure the implementation of the radon prevention measures for new homes as contained within the Building Regulations."*

[4] Draft First Revision to the National Planning Framework (issued July 2024)

## Guidelines Extractive Industry Emissions Limit Values



8.32 Section 261 of the Planning and Development Act 2000 (as amended), which regulated a significant proportion of established extractive development, came into effect in April 2004. The planning guidelines[5] for the extractive industries ***'Quarries and Ancillary Activities – Guidelines for Planning Authorities'*** were published by the Department of the Environment, Heritage, and Local Government at around the same time.

8.33 Separately, in 2006, the EPA published complementary guidance aimed at quarry operators, planning authorities and the general public ***Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals)***[6].

8.34 The Irish Concrete Federation (ICF), the trade body representing the interests of quarry operators and producers of construction materials, has also published the ICF Environmental Code to provide guidance for its members on best practice in the environmental management of quarries. The document was last updated in 2005.

## Site Specific Dust Deposition Emission Limit Values

8.35 Condition 5 attached to the Section 261A conditions imposed on the site (Ref. Q05/10) states:

*"Activities at the site shall not give rise to total dust deposition of greater than 350mg/m² per day monthly mean in accordance with TA Luft VDI Method 2119 (Bergerhoff Gauge), measured at dust sensitive locations details of which shall be submitted to the Planning Authority for agreement and approval within 6 months of the date of this order. A map showing the location of the dust monitors shall be submitted to the Planning Authority for approval."*

***Reason**: To protect the amenities of the properties in the vicinity of the area.*

## Guidance Relating to Air Quality / Dust Nuisance

8.36 A range of monitoring techniques exists for dust deposition rates (i.e., Bergerhoff and Frisbee gauges). There is currently no Irish, European Union (EU) or World Health Organisation (WHO) statutory standards or limits appropriate for the assessment of deposited dust and its propensity to generate annoyance.

8.37 Industry standard criteria levels for the gravimetric assessment of dust deposition from extractive industry in Ireland are set out in the DoEHLG (2004) planning guidelines for the extractive industry, the ICF Guidelines (2005) and EPA (2006) Environmental Management Guidelines. Each of these 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.

8.38 When the rate of accumulation of the 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.

8.39 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 and particulate matter) and by vehicles using paved and unpaved haul roads.

[5] Quarries and Ancillary Activities – Guidelines for Planning Authorities (DoEHLG, 2004)

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

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

## Guidance on Assessment of Mineral Dust Impacts for Planning

8.41 Guidance on the assessment of the impacts of extractive operations on air quality has been prepared by the Institute of Air Quality Management (IAQM, 2016)[7]. 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 more detailed assessment is required, a basic assessment framework is presented which employs the Source-Pathway-Receptor approach to evaluate risk of impacts and effects.

## Air Quality and Ecological Receptors

8.42 Much 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."*

8.43 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 HA 207/07) 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.

8.44 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.

8.45 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.

## Air Quality and Health Effects

8.46 The main health effects of air pollution can include stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma. These conditions can lead to sickness and ill health as well as premature mortality.

8.47 Two recent EPA reports, *Air Quality in Ireland 2022*[8] and *Ireland's Environment, An Assessment 2020*[9] 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, $NO_2$, $SO_2$, $PM_{10}$ 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

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

[8] Environmental Protection Agency, Air Quality in Ireland 2022. Available at: https://www.epa.ie/publications/monitoring assessment/air/Air_Quality_Report_22_v8v2.pdf

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

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.

8.48 Europe as part of the Green Deal and the EU's Zero pollution visions for 2050 is revising its air quality standards to align them closely with the lower WHO recommendations.

8.49 A summary of relevant Air Quality limit values normally associated with aggregate extraction and associated HGV traffic in relation to human health was presented previously in **Table 8-1.**



# Receiving Environment

## Study Area

8.50 The lands surrounding and within the application site predominantly comprise agricultural fields with the exception of the existing sand and gravel pit. There are isolated private residential property and agriculture farms located throughout the surrounding rural landscape, predominantly along the local road network.

8.51 Two local roads bound the application site. The L1031 local road borders its southeastern boundary and the L10317 local road to the east and northeast. Access to the existing pit is via the L10317 local road. A drainage channel bounds the southern application site, flowing east for c. 150m alongside the L1031 local road before it enters the Killeen stream.

8.52 The application site is not subject to any statutory or non-statutory nature conservation designations. The Slieve Bloom SPA (site code 004160) bounds the northern boundary of the existing sand and gravel pit with the proposed extension area to develop away from this SPA. The Slieve Bloom SAC (site code 000412) is located c. 1.5km to the north at its closest point and the River Barrow & River Nore SAC is c. 2km to the east.

8.53 Dwellings in the vicinity of application site are generally located along the local road network comprise farmsteads or isolated on-off residences, with occasional small clusters. The nearest dwellings to the application site boundary are shown in **Figure 8-1**. There are c. 20 residences located within 500m of the application boundary, with a further c. 30 residences between 500m and 1km.

## Baseline Study Methodology

### Baseline Dust Monitoring

8.54 Baseline dust monitoring has been undertaken by SLR Consulting Ireland. Two rounds of monitoring were undertaken at four monitoring points within the planning application boundary as shown on **Figure 8-1** (see below). The monitoring method utilised was the 'Bergerhoff method' referred to in the TA Luft Air Quality Standard. The 'Bergerhoff' dust deposition gauge used in the survey comprises a plastic collection bottle with protective basket, mounted on a post and set at 1500 mm above ground level. The input of atmospheric borne particulate material into the collection bottle takes place over a pre-determined measurement period (usually one month) by exposing it to the environment. The total dust collected in the bottle is expressed as deposition of total particulate matter ($mg/m^2/day$) arising from human activity in the area surrounding the application site.

### $PM_{10}$ Monitoring

8.55 The application site and surrounding area fall into Air Quality Zone D, categorised as rural Ireland by the EPA. An active $PM_{10}$ air quality monitoring location within a similar Zone D area is located at Birr, Co. Offaly, c. 20km west of the application site, since 2020. As such,

it is considered an appropriate dataset available for assessment of air quality baseline concentrations within the study area.

## Sources of Information

8.56 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 (Birr synoptic weather station 1979–2008 averages (met.ie)[10]. The EPA website was examined to note information on baseline air monitoring data around the application site (http://www.epa.ie/air/quality/data/).

8.57 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

8.58 Baseline dust deposition surveys were undertaken at and around the application site by SLR Consulting Ireland, at 4 no. monitoring locations. The dust deposition monitoring results recorded over this period are presented and reviewed as part of this assessment. A survey of the extent of existing residential housing around the application site was also undertaken.

8.59 The locations of baseline dust deposition monitors are shown on **Figure 8-1** are as follows:

- **D1** – located at the northern application site boundary;
- **D2** – located at the north-eastern application site boundary adjacent to residence R1;
- **D3** –located at the south-eastern application site boundary adjacent to residence R3;
- **D4** –located at the south-western application site boundary.

## Background Air Quality

8.60 As previously noted, the closest air quality monitoring location to the application site in a similar Zone D area is located at Birr, Co. Offaly, c. 20km west. 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 Birr (published on the EPA website[11]) are presented in **Table 8-3** below.

**Table 8-3:** Background $PM_{10}$ Concentrations Birr, Co. Offaly (Source: EPA)

| Year | Annual Mean (µg/m$^3$) | Number of Days >50 µg/m$^3$ |
|---|---|---|
| 2022 | 14.5 | 3 |
| 2021 | 12.2 | 2 |
| 2020 | 10.0 | 0 |

8.61 **Table 8-3** above indicates that $PM_{10}$ concentrations monitored at the Birr monitoring site are below the annual mean Air Quality Standards (AQS) of 40 µg/m$^3$ and comply with the

[10] Birr Synoptic station closed in January 2009 and was replaced with Gurteen Automatic Weather Station (AWS)
[11] https://www.epa.ie/environment-and-you/air/

requirement that a 24-hour mean of 50 µg/m$^3$ should not be exceeded more than 35 times in a calendar year.

8.62 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.



### Dust Deposition Monitoring

8.63 The results of the baseline dust deposition monitoring undertaken at the 4 no. locations around the application site between December 2023 and February 2024 are presented in **Table 8-4** below.

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

| Sample Date | D1 (mg/m$^2$/day) | D2 (mg/m$^2$/day) | D3 (mg/m$^2$/day) | D4 (mg/m$^2$/day) |
|---|---|---|---|---|
| 27/11/2023 – 09/01/2024 | 5 | 263 * | 7 | 7 |
| 09/01/2024 – 12/02/2024 | 23 | 23 | 2 | 1 |
| * Survey field notes indicate a high organic matter content | | | | |

8.64 As may be noted, baseline dust deposition rates around the application site at Mounthall are low and below the emission limit values (ELV's) recommended in the EPA (2006) *Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* of 350 mg/m$^2$/day.

## Meteorology: Dispersion of Emissions

8.65 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.

8.66 Rainfall is also an important climatological parameter in the generation of dust; enough rainfall can suppress dust at the source and eliminate the pathway to the receptor. According to Arup (1995)[12], rainfall greater than 0.2 mm per day is sufficient to suppress dust emissions.

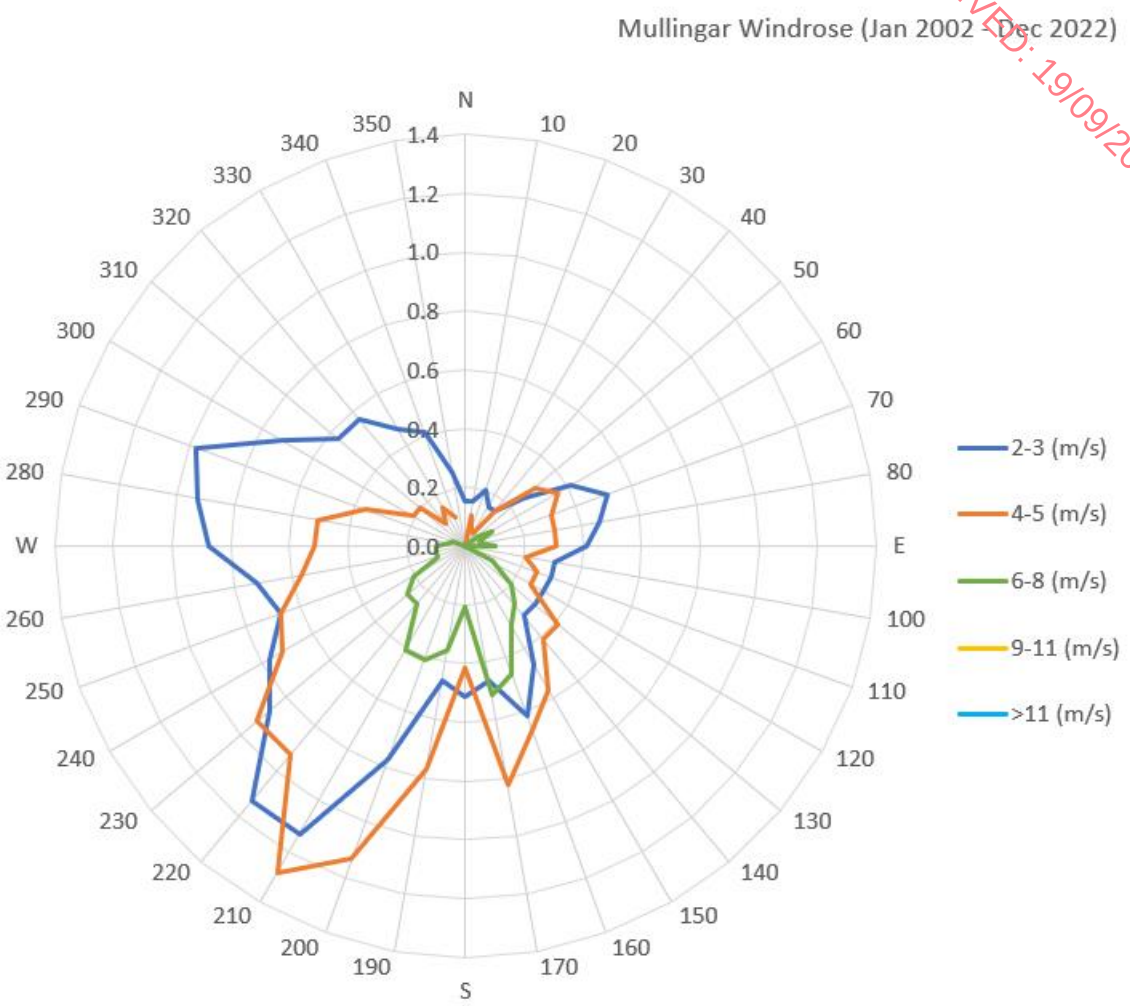
## Local Wind Speed and Direction Data

8.67 An appropriate weather station with sufficient records of wind direction and wind speed considered representative of typical conditions experienced at the application site is Mullingar Meteorological Station (c. 55km north). A windrose for the average conditions recorded at Mullingar over a 20-year period (2002-2022) is presented in **Plate 8-1**. The predominant wind direction is from the south-western quadrant. Moderate to high-speed winds (>2 m/s) occur for approximately 77% of the time.

[12] Arup Environmental, Ove Arup and Partners (1995) The Environmental Effects of Dust from Surface Mineral Workings, HMSO, London (ISBM 11 75 3186 3)

**Plate 8-1:** Windrose for Mullingar Meteorology Station






## Rainfall Data

8.68 Relevant rainfall data applicable to the site has been obtained from the Irish Meteorological Service website for the Birr station (1979 – 2008)[13] c. 20km west of the application site and is considered representative of typical conditions experienced at the application site. The annual average days with rainfall greater than 0.2 mm are 206 days per year. Natural dust suppression (from rainfall) is therefore considered to be effective for 56% of the year.

8.69 In addition, a rain gauge station was installed at the site on 24th April 2024 at the entrance to the existing pit, see EIAR Chapter 7 **Plate 7-1**, with the average monthly rainfall for the on-site rain gauge is presented in EIAR Chapter 7 **Table 7-2**, and the daily rainfall measurements shown in EIAR Chapter 7 **Appendix 7-B**.

[13] Last period for 30-year average data at Birr Synoptic station before closure in January 2009 and was replaced with Gurteen Automatic Weather Station (AWS)

## Sensitive Receptors



### Ecological Receptors

8.70 The application site is not subject to any statutory or non-statutory nature conservation designations. The closest Natura 2000 (SAC & SPA sites) and other designated sites are identified in **Table 8-5** and include three Natura sites: the Slieve Bloom SPA (site code 004160) adjacent to the northern application boundary/existing pit area; the Slieve Bloom SAC (site code 000412) located c. 1.5km to the north; and the River Barrow & River Nore SAC c. 2km to the east.

**Table 8-5:** Natura 2000 or Designated Site(s) within a 2 km of Application Site

| Natura 2000 / Designated Site | Site Code | Location (closest point to Application Site) |
|---|---|---|
| Slieve Bloom Mountains SPA | 004160 | 0 km (north) – bounds existing pit |
| Slieve Bloom Mountains SAC | 000412 | 1.5 km (north) |
| River Barrow and River Nore SAC | 002162 | 2 km (east) |
| Slieve Bloom Mountains pNHA | 000412 | 1.5 km (north) |
| Delour river near Lacca Manor pNHA | 000864 | 2 km (east) |

8.64 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 or designated nature sites is up to a maximum radius of 2km unless there are any potential source-pathway-receptor links between the proposed development at Mounthall and Cummer townlands, and any Natura 2000 or designated site(s) beyond this distance. At a distance greater than 2 km, and in the absence of any potential source-pathway-receptor link, it is generally considered that no Natura 2000 or designated sites would be affected by any direct loss of habitat or otherwise be impacted upon.

### Human Receptors

8.65 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.

8.66 Receptors have been identified within a 1 km distance of the application site boundary at Mounthall and Cummer townlands, as listed in **Table 8-6** below and their locations shown in **Figure 8-1**. There are 50 sensitive receptors identified within the 1km of the application area of the application site.

**Table 8-6:** Sensitive Receptors within c. 1km of the Application Area (Red Line Boundary)

| Receptor reference | Receptor | Sensitivity | Approx. Distance (m) to Planning Red Line Boundary / Direction from site boundary |
|---|---|---|---|
| R1 | Residential | Medium | 25 (E) |
| R2 | Residential/Commercial | Medium | 25 (E) |
| R3 | Residential | Medium | 5 (E) |
| R4 | Residential | Medium | 205 (E) |

| | | | |
|---|---|---|---|
| R5 | Residential | Medium | 235 (S) |
| R6 | Residential/Commercial | Medium | 245 (SW) |
| R7 | Residential | Medium | 300 (S) |
| R8 | Residential/Commercial | Medium | 385 (SW) |
| R9 | Residential | Medium | 475 (SW) |
| R10 | Residential | Medium | 345 (W) |
| R11 | Residential | Medium | 275 (NE) |
| R12 | Residential/Commercial | Medium | 305 (NE) |
| R13 | Residential | Medium | 350 (NE) |
| R14 | Residential | Medium | 395 (NE) |
| R15 | Residential | Medium | 305 (E) |
| R16 | Residential | Medium | 330 (E) |
| R17 | Residential | Medium | 350 (E) |
| R18 | Residential | Medium | 400 (E) |
| R19 | Residential | Medium | 415 (E) |
| R20 | Residential | Medium | 450 (E) |
| R21 | Residential | Medium | 505 (E) |
| R22 | Residential/Commercial | Medium | 540 (E) |
| R23 | Residential/Commercial | Medium | 625 (E) |
| R24 | Residential | Medium | 685 (E) |
| R25 | Residential/Commercial | Medium | 685 (SE) |
| R26 | Residential | Medium | 585 (SE) |
| R27 | Residential | Medium | 710 (S) |
| R28 | Residential | Medium | 550 (SW) |
| R29 | Residential | Medium | 750 (SW) |
| R30 | Residential | Medium | 645 (N) |
| R31 | Residential | Medium | 740 (N) |
| R32 | Residential | Medium | 540 (NE) |
| R33 | Residential | Medium | 545 (NE) |
| R34 | Residential | Medium | 600 (NE) |
| R35 | Residential | Medium | 650 (NE) |
| R36 | Residential | Medium | 795 (E) |
| R37 | Residential | Medium | 940 (E) |
| R38 | Residential | Medium | 955 (E) |
| R39 | Residential | Medium | 770 (SE) |
| R40 | Residential/Commercial | Medium | 870 (SE) |
| R41 | Residential/Commercial | Medium | 845 (SE) |

| | | | |
|---|---|---|---|
| R42 | Residential/Commercial | Medium | 785 (SE) |
| R43 | Residential | Medium | 975 (S) |
| R44 | Residential | Medium | 870 (SW) |
| R45 | Residential | Medium | 805 (SW) |
| R46 | Residential/Commercial | Medium | 815 (SW) |
| R47 | Residential | Medium | 820 (SW) |
| R48 | Residential | Medium | 825 (SW) |
| R49 | Residential/Commercial | Medium | 870 (SW) |
| R50 | Residential/Commercial | Medium | 915 (N) |



# Impact Assessment Methodology

## Evaluation Methodology

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

8.68 Increased combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the proposed development also have the potential to contribute to local air pollution.

8.69 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.

8.70 This impact assessment is based upon a comparison of the baseline (both current and projected without the new 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.

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

- emission from preparatory works, stripping, placement and stockpiling of soil (earthworks / trackout);
- emissions from sand and gravel extraction and processing;
- emissions from the transfer, end-tipping and stockpiling of aggregates;
- $PM_{10}$ contribution from operational activities; and
- traffic exhaust emissions.

8.72 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.

8.73 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

8.74 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.

8.75 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).

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

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

8.76 **Table 8-8** below 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 |

| Sensitivity of Surrounding Area | Risk of Site Giving Rise to Dust or $PM_{10}$ Effects | | |
|---|---|---|---|
| | High | Medium | Low |
| Low | Negligible | Negligible | Negligible |



## Construction Stage Dust Impacts - Methodology

8.77 The Institute of Air Quality Management (IAQM) assessment of risk at construction stage is determined by considering the predicted change in conditions because of the proposed development. The risk category for potential effects arising from preparatory site works is divided into two potential activities:

- earthworks;
- trackout.

8.78 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.

8.79 **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 (m) | Ecological (m) | 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 |

8.80 **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 (m) | Ecological (m) | 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 |

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

## Operational Stage Dust Impacts - Methodology



8.82 A staged approach has been adopted to the assessment of operations stage impacts generated by the proposed development (i.e. sand & gravel extraction and processing). 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.

8.83 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.

8.84 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.

8.85 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 to assess the magnitude of risk of impact on local amenities.

8.86 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 1 km study area.

8.87 Further assessment is required for those nearest receptors within 500m (shaded green on **Table 8-6**) of dust generating activities. Receptors within 500m[14] of dust generating processes progress onto a Tier 2 assessment. Other receptors beyond 500m are considered too far away to be impacted by potential dust from the site and not considered any further in this assessment.

8.88 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).

8.89 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

[14] Residence R21 which lies just outside the 500m radius is included in the assessment

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.



8.90 Note that the Tier 2 risk screening assessment **does not consider proposed mitigation measures** to be implemented at the proposed development. These will include provision of perimeter screening berms, dust suppression measures etc., identified in the section dealing with Mitigation Measures later in this Chapter.

8.91 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 more detail in **Appendix 8-A**.

## $PM_{10}$ Contribution from Site-Based Activities: Methodology

8.92 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.

8.93 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 and quarry operations can potentially contribute up to 5 µg/m$^3$ towards annual mean background concentrations of the coarse fraction of particulates (2.5-10 µm diameters) in the surrounding area.

8.94 Given that the nature and scale of proposed future activities around the proposed development will be comparable to pre-existing / prior activities, the potential $PM_{10}$ impact is likely to be lower than that indicated by the LAQM guidance. However, to ensure a robust assessment of potential $PM_{10}$ impacts, the upper limit of 5 µg/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

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

8.96 The criterion for assessment of air quality contained within the latest DMRB guidance (LA 105) focuses on roads with relatively high changes in flows or high proportion of HDV / HGV traffic.

8.97 The following traffic scoping criteria shall be used to determine whether the air quality impacts of a project can be scoped out or require an assessment based on the changes between the do something traffic (with the project) compared to the do minimum traffic (without the project) in the opening year:

- annual average daily traffic (AADT) ≥ 1,000; or
- heavy duty vehicle (HDV) AADT ≥ 200; or
- a change in speed band; or
- a change in carriageway alignment by ≥ 5 m.

# Assessment of Impacts



## Construction Stage, Soil Stripping & Restoration Activities Stages Impacts – Assessment

8.98 An overview of the sources and processes associated with the preparatory site works (topsoil and overburden removal), the construction / infrastructure activities and restoration activities, and their 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 |
|---|---|---|---|
| Earthworks, Construction and Trackout Activities | Excavators / Dozers / HGVs | **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 | Soils immediately used to construct berms, used in restoration works or placed in stockpiles. |

8.99 During the site preparatory works, activities at the site will be confined to within the application site. In light of this and the separation distance to sensitive receptors, the IAQM Construction Dust Guidelines indicates that the dust risk category would be considered to be 'low risk' to 'negligible'. A summary of the determined risk category for proposed operation identified is presented in **Table 8-12**.

**Table 8-12:** Site Activities: Risk of Dust Emissions

| Source | Risk of Dust Soiling Effects | Ecological Effects |
|---|---|---|
| Earthworks | Low risk | Negligible |
| Construction | Low risk | Negligible |
| Trackout | Low risk | Negligible |

8.100 While the overall risk category has been assessed as 'low risk' to 'negligible', if the soils stripping, construction and trackout 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.

## Operational Stage (Extraction & Processing) Dust Impact – Assessment

8.101 When commenced and operational, the principal air quality impacts generated by the proposed development will be dust and traffic related emissions. An overview of the sources and processes associated with the extraction and processing activities, and their respective potential for dust deposition, is presented **Table 8-13** below.

**Table 8-13:** Sources of Particulate Emissions



| Activity | Source | Emission potential | Comments |
|---|---|---|---|
| Material transfer to processing area | On-site 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 sand and gravel | 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 | On-site 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 | On-site 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 | HGV / Road vehicles | **Low** - on paved road surfaces | Dependent on the amount of loose material on road surface available for re-suspension and track out. |

## Human Receptors

8.102 A total of 50 representative residence receptors were identified within the c. 1km study area around the application site. Using the tiered assessment methodology, 21 of these receptors located within c. 500m have progressed onto a Tier 2 assessment as they are considered to have a greater risk of dust impact. Each receptor is assessed against the frequency of exposure and the distance from the source to the receptor (i.e., the pathway) in accordance with the methodology described in **Appendix 8-A.**

8.103 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.

8.104 The wind-rose presented in **Figure 8-1** for Mullingar Meteorological Station (and which is considered indicative of the application site conditions) 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[15].

8.105 The wind rose shows the frequency of winds at wind speeds of greater than 2 m/sec 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

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

occurrence of wind frequency and wind speed is calculated and presented by Met Eireann. For this reason, the impact assessment presented herein is conservative.



8.106 A summary of the risk assessment of dust impacts at the selected Tier 2 receptors / locations arising from the proposed development activities (**in the absence of any mitigation measures**) is presented in **Table 8-14** below.

**Table 8-14:** Dust Risk Assessment Screening (Without Mitigation Measures)

| Receptor Reference | Distance From Operations (m) | Relevant Wind Direction (A) | Potential Exposure Duration (B) | Rank (C) Relative Rank: Windy/Distance | Risk Evaluation |
|---|---|---|---|---|---|
| R1 | 25 (E) | 130-360 | 32.0 | 5/8 | Moderate Adverse |
| R2 | 25 (E) | 250-320 | 10.4 | 2/8 | Slight Adverse |
| R3 | 5 (E) | 260-330 | 9.4 | 2/8 | Slight Adverse |
| R4 | 205 (E) | 260-310 | 8.0 | 2/4 | Acceptable |
| R5 | 235 (S) | 340-30 | 1.7 | 1/4 | Insignificant |
| R6 | 245 (SW) | 30-70 | 2.6 | 1/4 | Insignificant |
| R7 | 300 (S) | 0-40 | 1.0 | 1/3 | Insignificant |
| R8 | 385 (SW) | 20-50 | 1.1 | 1/3 | Insignificant |
| R9 | 475 (SW) | 30-60 | 1.6 | 1/2 | Insignificant |
| R10 | 345 (W) | 90-140 | 4.2 | 1/3 | Insignificant |
| R11 | 275 (NE) | 190-250 | 14.1 | 3/4 | Acceptable |
| R12 | 305 (NE) | 200-260 | 14.5 | 3/3 | Acceptable |
| R13 | 350 (NE) | 220-270 | 11.5 | 2/3 | Insignificant |
| R14 | 395 (NE) | 230-280 | 10.2 | 2/3 | Insignificant |
| R15 | 305 (E) | 270-300 | 5.8 | 1/3 | Insignificant |
| R16 | 330 (E) | 270-300 | 5.8 | 1/3 | Insignificant |
| R17 | 350 (E) | 270-300 | 5.8 | 1/3 | Insignificant |
| R18 | 400 (E) | 260-290 | 6.1 | 1/2 | Insignificant |
| R19 | 415 (E) | 260-290 | 6.1 | 1/2 | Insignificant |
| R20 | 450 (E) | 260-290 | 6.1 | 1/2 | Insignificant |
| R21 | 505 (E) | 260-290 | 6.1 | 1/1 | Insignificant |
| (**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**.<br>Refer to **Figure 8-1** for Receptor Locations | | | | | |

8.107 From **Table 8-14** above, it is observed that the risk of impact from dust emissions associated with the proposed development at Mounthall (**without any mitigation measures in place**) varies from:

- Insignificant at R5 - R10 and R13 – R21;
- Acceptable at R4, R11 & R12;
- Slight Adverse at R2 & R3; and
- Moderate Adverse at R1 (Landowner residence).

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

8.109 Note that this assessment ***does not consider*** implementation of mitigation measures within the proposed development that include provision of perimeter screening berms and strengthened boundary vegetation / screen planting, dust suppression measures etc. (as outlined in the section of Mitigation Measures section below).

8.110 Furthermore, the assessment is considered conservative on the basis that the reference wind speed for the risk evaluation was less than that required to carry airborne dust.

### Restoration Phase

8.111 The restoration phase will entail decommissioning and removal of plant and equipment following cessation of sand and gravel extraction activities and the final restoration of the application site to agricultural lands thereafter. Potential air quality impacts associated with this phase of development will be negligible.

## Ecological Receptors

8.112 The existing sand and gravel pit and extension application site are not subject to any statutory nature conservation designation.

8.113 The Slieve Bloom Mountains SAC & pNHA (both 1.5km north), the River Barrow and River Nore SAC (2km east) and the Delour river near Lacca Manor pNHA (3km east), due to the small-scale operations proposed at the site and their distance from the site are considered too far distant to be significantly impacted by dust.

8.114 However, as noted previously, the nearest protected site (the Slieve Bloom Mountains SPA) is located directly north of the application site boundary at its nearest point.

8.115 The distance where sand and gravel extraction will be carried out will mostly be in excess of 100m from the edge of the SPA boundary. Therefore, most of the dust created through the proposed works will deposit within 100m and will not reach the SPA. Large dust particles (greater than 30 µm), which make up the greatest proportion of dust emitted from minerals workings, will largely deposit within 100m of sources. Intermediate-sized particles (10-30 µm) are likely to travel up to 200-500m (IAQM, 2016). Therefore, the potential area of habitat within the SPA likely to be impacted by dust is relatively small, as identified in the Natura Impact Statement (NIS).

8.116 As noted in the 2016 IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning, an ecological receptor refers to any sensitive habitat affected by dust deposition and can include the direct impacts on vegetation or aquatic ecosystems and the indirect impacts on fauna (e.g. on foraging habitats). For locations with a statutory designation such as the Slieve Bloom Mountains SPA, consideration should be given as to whether the particular site is sensitive to dust, and this will depend on why it has been designated.

8.117 The conservation objective for Slieve Bloom Mountains SPA aims to maintain the extent and condition of hedgerows, heath, bog, low intensity managed grasslands, and associated habitats within the SPA. These can provide important foraging resources for breeding hen harriers, and in the case of heath and bog, can also provide important nesting resources. The level of dust deposition likely to lead to a change in vegetation is very high (over 1g/m2/day) and the likelihood of a significant effect is therefore very low except on the site with the highest dust release close to sensitive habitats.

8.118 The NIS determines that emissions to air will not directly impact the qualifying interests (QI) species hen harrier but there is a risk that dust created from the project could impact important habitats within the SPA for this species, albeit at a very small fraction of the overall habitat within the wider SPA. Without appropriate mitigation measure, this would have potential to impact the integrity of the site.

8.119 It is proposed that the direction of sand and gravel extraction (refer to EIAR Chapter 2 **Figure 2-2**) will be carried out in a northerly direction towards the SPA boundary with the intervening face and site topography acting as a wind break. It is anticipated that this, along with the proposed perimeter screening berms and vegetation planting and the range of mitigation measures outlined in **Table 8-15** will screen fugitive dust and prevent it from being carried any significant distance into the forested area.

8.120 It should also be noted that the prevailing winds are from the southwest and the SPA boundary is located to the north of the existing pit over a short length of boundary (c. 150m) in a localised area with the majority of the application site boundary being in excess of 250m from the SPA.

8.121 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 timescale (a full growing season for example) there may be some adverse effects upon plants restricting photosynthesis, respiration, and transpiration.

8.122 Dust deposition monitoring at the site indicates that the levels of dust generated are well below the level of 1,000 mg/m$^2$/day, where it is considered that dust could be likely to have a significant effect on sensitive ecosystems, refer to guidance section above.

8.123 Based on the above, with the proposed mitigation measures to be implemented and given the low baseline dust levels observed along with the fact that the vast majority of sand and gravel extraction will be carried out well in excess of 100m from the Slieve Bloom Mountain SPA boundary, it is considered that the proposed development will have an insignificant dust deposition impact on ecological receptors, including the adjoining Slieve Bloom Mountains SPA and the other Natura sites identified in **Table 8-5** above.

8.124 Furthermore, the Natura Impact Statement, based on the best available scientific information, concludes that, considering the proposed mitigation measures which are designed to prevent likely significant effects from emissions to air (dust) from the Project will not undermine the conservation objectives of the River Barrow and River Nore SAC, Slieve Bloom Mountains SPA and River Nore SPA, either alone or in-combination with other projects or plans.

## Traffic Emissions - Assessment

8.125 For the purposes of assessment, the projected traffic movements associated with the proposed development will generate an average of 24 HGV trips per day[16].

8.126 In view of:

[16] Based on an average annual extraction rate of 80,000 tonnes

- the low levels of predicted HGV traffic associated with the development; and
- the fact that none of the roads in the surrounding local road network meet any of the traffic / alignment criteria set out in LA 105.

it is considered that the extent of any traffic related change arising from future extraction and restoration activities can be deemed 'negligible' in terms of its resultant impact on local air quality and that no further air quality assessment is necessary.

8.127 On this basis, the impact of the proposed development can be screened out and combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the transportation of materials will not have the potential to contribute to local air pollution.

## $PM_{10}$ Contribution from Extraction / Production Activities - Assessment

8.128 In terms of $PM_{10}$, the maximum recent annual mean measured baseline background concentration was 14.5µg/m$^3$ in 2022 at Birr, Co. Offaly monitoring station. 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 and quarry operations can potentially contribute up to 5 µg/m$^3$ towards annual mean background concentrations of the coarse fraction of particulates (2.5 – 10 µm diameters) in the surrounding area. Given that the nature and scale of proposed future activities around the site will be comparable to pre-existing/prior activities, the potential $PM_{10}$ impact is likely to be lower than that indicated by the LAQM guidance. To ensure a robust assessment of potential $PM_{10}$ impacts, one approach might be to apply the upper limit of 5 µg/m$^3$ to represent potential future development contribution to annual background/ambient $PM_{10}$ concentrations to assess whether the Air Quality Standards objective is likely to be exceeded. The potential contribution of up to 5 µg/m$^3$ 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 40 µg/m$^3$.

8.129 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.

8.130 Given the limited magnitude of change in the extent and scale of planned activities at the site, the available monitoring data are taken to be representative of ambient $PM_{10}$ concentrations likely to arise over the life of the proposed pit extension. As such, any potential future impact in relation to increased ambient $PM_{10}$ concentrations is classified as 'negligible'.

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

8.131 Accidents, malfunctions, and unplanned events refer to events or upset conditions that are not part of any activity or normal operation of the proposed development planned by the Applicant. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions, or unplanned events to occur during the proposed development operations.

8.132 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. In terms of air quality impact, the following unplanned events could influence the local area:

- equipment malfunction;
- vehicle collision;
- dry and windy weather conditions with dust suppression equipment malfunction; and

- accidental material spillages during transport.



8.133 In relation to air quality, the impacts of any unplanned events are considered to be negligible. 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 application site. However, these are not considered to be significant given the limited duration of such meteorological conditions and the likely limited scale of any incident.

## Cumulative / Synergistic Impacts

8.134 In essence, cumulative impacts are those which result from incremental changes caused by other past, present, or reasonably foreseeable actions or developments together with those generated by 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.

8.135 This air quality impact assessment herein indicates that the proposed development will not contribute to a significant increase in local air pollution by way of excessive air / dust emissions. There are no other significant sources of air emissions approved or planned within 2 km of the application site and no potential for significant cumulative impacts has been identified. The cumulative impact of the proposed development is therefore classified as 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 wide range of dust mitigation and management measures are recommended for implementation at the application site. These include the measures listed in **Table 8-15** below:

**Table 8-15:** Particulate Emission Mitigation Measures

| Source / Receptor | Emission Potential | Recommended Mitigation Measures | Effectiveness |
|---|---|---|---|
| Excavators / HGV Loading | **High** – dry or fine material during strong windy weather | Minimise drop heights when handling materials. Maximise use of excavated soil in construction of vegetated screening berms or in pit restoration works. Dampen materials using mist cannon, sprinklers, or water bowser | High |
| | **Low** – material of high moisture content during conditions of low wind speed | Minimise drop heights when handling material. Protect from wind where possible. | High |
| | | Minimise length of on-site haul routes. | High |

| Source / Receptor | Emission Potential | Recommended Mitigation Measures | Effectiveness |
|---|---|---|---|
| On-site Vehicles | **High** when travelling over un-surfaced and dry site roads. | Use of mist cannon / sprinklers / water bowser to dampen haul routes during dry weather periods. | High |
| | | Restrict vehicle speeds to less than 20kph. Install signage and undertake staff training. | High |
| | | Routing of traffic and away from any surrounding sensitive receptors. | High |
| Road Vehicles (transfer off-site) | **Low** / **Moderate** on paved road surfaces | Use of road sweeper to reduce the amount of material available for re-suspension. | Moderate / High |
| | | Travel over paved surfaces / access road. | High |
| | | Direct all HGVs through wheelwash facility | High |
| Stockpiles | **High** when dry or fine material being stored or handled during strong windy weather | Seed / vegetate surfaces of completed perimeter mounds and stockpiles of restoration soils. | High |
| | | Locate stockpiles to take advantage of any available shelter from wind. | High |
| | | Use of mist cannon / sprinklers / bowser to moisten materials during periods of dry and windy weather | High |
| | | Limit mechanical disturbance of materials more likely to become airborne and/or time operations having regard to expected weather conditions | High |
| Moderate and Slight Adverse Risk Receptors | **High** – during dry and strong windy weather | Hardstanding areas/site roads, stockpiles with the potential to give rise to dust will be regularly watered as appropriate during dry and/or windy conditions by dust cannon, sprinklers, or water bowser. | High |
| | | Retention of perimeter hedgerows | High |
| | | Provision of screening berms | High |



## Trackout Measures

8.138 When required, for example during adverse weather conditions (dry, windy weather), water from a bowser will be sprayed on dry unpaved road surfaces to minimize dust rise. Any paved surfaces around the site and/or along the access road leading in and out of the site will also be sprayed as required.

8.139 All heavy goods vehicles leaving the application site will be routed through the proposed new wheelwash facility to remove and / or dampen any particulate materials attaching to the undercarriage and to prevent transport of fine particulates off-site, onto the local public road network.

## Good Practice Measures

8.140 Effective site management practices are critical to demonstrate the willingness of the operator to control dust emissions. Monitoring of dust deposition and recording of any complaints shall be carried out to take appropriate measures to reduce emissions in a timely manner.

8.141 Breedon Ireland have in place a group wide Environmental Management System (EMS) which is accredited to ISO 14001 standard. The EMS contains procedures and work instructions which include specific measures in relation to the protection of air quality and control of dust at operational sites. All personnel within Breedon Ireland undergo EMS training regularly.

8.142 Training on dust mitigation measures shall be provided to site-based staff. Training will also cover an 'emergency preparedness plan' to react quickly in case of any failure of dust mitigation measures.

8.143 A water bowser will be made available at required times to dampen down stockpiled / particulate materials and/or unpaved surfaces when adverse (dry, windy) conditions apply.

# Residual Impact Assessment

## Human Receptors

8.144 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 related impacts at receptors generated by the proposed site activities will be further reduced.

8.145 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 human receptors which could cumulatively impact the site or the surrounding area. Overall, the effects of the proposed development on air quality have been considered to be insignificant to acceptable because of the high effectiveness and range of possible mitigation measures at source locations as indicated in **Table 8-15**.

8.146 A summary of the residual dust risk impact assessment at the closest sensitive receptors is provided in **Table 8-16** below.

**Table 8-16:** Residual Dust Risk Assessment (With Mitigation Measures)

| Receptor Reference | Risk Evaluation |
|---|---|
| R1 | Acceptable |
| R2 | Acceptable |
| R3 | Acceptable |
| R4 | Insignificant |
| R5 | Insignificant |
| R6 | Insignificant |
| R7 | Insignificant |
| R8 | Insignificant |
| R9 | Insignificant |
| R10 | Insignificant |
| R11 | Insignificant |
| R12 | Insignificant |
| R13 | Insignificant |
| R14 | Insignificant |

| Receptor Reference | Risk Evaluation |
|---|---|
| R15 | Insignificant |
| R16 | Insignificant |
| R17 | Insignificant |
| R18 | Insignificant |
| R19 | Insignificant |
| R20 | Insignificant |
| R21 | Insignificant |

8.147 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 any adverse or unacceptable dust deposition impact on any nearby sensitive receptors.

## Monitoring

8.148 Dust deposition monitoring will be undertaken at the site for the duration of extraction and restoration activities at the proposed development site (in accordance with conditions attached to any future planning permission and in line with the EPA and DoEHLG guidelines). Dust monitoring will be undertaken at the existing baseline monitoring locations D1 to D4 on a quarterly basis (or other agreed time schedule with the Planning Authority) using the Bergerhoff Method.

8.149 Dust monitoring locations shall be reviewed and revised where and as / when necessary, as the proposed development progresses. The results of the dust monitoring will be submitted to Laois County Council as required for review and record purpose.

# Figures

**Figure 8-1 Baseline Dust Monitoring Locations (And Receptors within 1km)**

**Notes:**

1. Extract from Ordnance Survey 5,000 scale mapping - sheet numbers 3880, 3881, 3937, 3938 and 6" Raster Mapping - sheet numbers LS010, LS011, OY040

**Legend:**

- Landowner Boundary (c.32.1 Hectares)
  *Third party landowner's land interest*
- Planning Application Area (c.12.2 Hectares)
- Applicants Land Interest Area (c.12.4 Hectares)
  *under lease agreement from landowner*
- Proposed S&G Extraction Area (c.8 Hectares)
- Special Protection Area (SPA)
  *Slieve Bloom SPA*
- Distance Off-Sets from Planning Application Boundary
  *250m, 750m and 1km*
- 500m Distance Off-Sets from Planning Application Boundary used for dust impact screening assessment
- R2 Residential Property Locations
  *Residences numbered within 1km of Application Boundary*
- D3 Baseline Dust Monitoring Locations
  *D1 - D4*

RECEIVED: 19/09/2024

| Rev | Amendments | Date | By | Chk | Auth |
|---|---|---|---|---|---|
| | | | | | |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Project
Sand and Gravel Pit Development at Mounthall, Camross, Co. Laois

Figure Title
Baseline Dust Monitoring Locations (and Receptors within 1km)

| Scale | | SLR Project No. |
|---|---|---|
| 1:2,500 | @ A3 | 00584.065036 |

| Designed | Drawn | Checked | Authorised |
|---|---|---|---|
| SMcD | SMcD | LH | LH |
| Date | Date | Date | Date |
| 01/24 | 01/24 | 09/24 | 09/24 |

Figure Number **Figure 8-1** Rev. **0**

Scale 1:2,500



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S:\SLR Projects\00584 Lagan Materials Ltd\065036 Mounthall S&G Pit Development\EIAR\Volume-2 EIAR Report Figs Appends\08 AirDwgs\CAD\Wking\00584_065036 EIAR Fig 8-1 Dust Monitoring R1.dwg
30/08/2024

# Appendices

## Appendix 8-A: Dust Risk Screening Assessment Methodology

# 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. If 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 3 m/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.

### A.1.1 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[17] suggests that rainfall of greater than 0.2 mm 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 3 m/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 2 m/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 conservative.

For the screening assessment, a value of 1 mm 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 mm 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.

[17] 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% |

### A.1.2 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 more than 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 |

### A.1.3 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[18] 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 | |

### A.1.4 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.

**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 |

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