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# INTRODUCTION

## Background

8.1 This chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential effects on air quality of the planned development at Clonard Co. Kildare.

8.2 The development, within an overall application site area comprises:

- Quarry development and associated processing previously permitted under P. Reg. Ref. No. 99/2042 and ABP Ref. PL09.123207) to include drilling, blasting, crushing, and screening of rock; and lateral extension to same, with an overall extraction area of c. 6.2 hectares with no vertical deepening below the existing quarry floor. The appropriate period of planning register reference 99/2042 was extended by order dated 03/02/2017 by P. Reg. Ref. No. 16/1246;
- Importation of up to 35,000 tonnes per annum of processed fine aggregate, principally sand for use in readymix concrete production on site;
- Use of buildings and structures associated with the sand and gravel pit previously granted planning permission under P. Reg. Ref. No. 03/2754 comprising of the crushing, washing, and screening plant with associated silt disposal lagoons; readymix concrete batching plant including powerhouse; prefabricated office; weighbridge; workshop building with concrete laboratory and bunded fuel tanks; aggregate storage bays; and one liquid effluent treatment system unit;
- Closure of the existing site entrance with provision of a new site entrance located to the north of the existing entrance; realignment of the main internal site access road from the new site entrance to the central processing area with provision of a new wheelwash system; acoustic fence screening (c.2 m in height x 170 m in length); and new screening berms along the western and northern site boundaries;
- Restoration of the site lands will be to a combination of beneficial agricultural and ecological after-uses;
- All associated site works within an overall planning application area of c. 51.7 hectares, including the proposed road works. The proposed operational period is for 10 years plus 2 years to complete restoration (total duration sought 12 years); and
- Provision is also made for 3 no. sections of road improvements (widening) along the haul route between the site entrance and the R148 regional road, covering a total site area of c. 960m$^2$. The proposals at the identified locations include for works in the public road and verge that aim to achieve a consistent carriageway width of 6.0m along with provision of verge widening on the inside of the three bends to improve forward visibility and intervisibility for all opposed traffic including traffic generated by the proposed development.

8.3 Further information on the proposed development, existing site activities, environmental management systems and controls at the application sites are provided in the Chapter 2 'Project Description' of this EIA Report.

8.4 The proposed development 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 exhaust emissions associated with the rock extraction and the production and transportation of aggregates may also have the potential to impact on local air pollution.

8.5 The existing site consists of an existing sand and gravel pit development and an existing hard rock quarry development. The 99/2042 hard rock quarry permission has expired, but when operational, the combined processing volume from the quarry and sand/gravel pit totalled 360,000 tonnes per annum (110,000 tonnes per annum at the quarry and 250,000 tonnes at the sand and gravel pit).

8.6 This planning application seeks to lower the overall volume of aggregates handled to 285,000 tonnes per annum, with a split consisting of 250,000 tonnes per annum extracted from the onsite hard rock quarry, and up to 35,000 tonnes per annum of imported fine aggregate to the site.

8.7 For the purposes of assessment, it is assumed that the total volume of traffic generated in the future by all extraction and production activities at the site (including production of aggregates and concrete, all extraction and importation activities) will be on average 60 trips per day, compared to a rate of 74 for previously permitted activities. The volume of product transported from a quarry site is commercially driven and accordingly the rate of production and extraction can fluctuate throughout the year resulting in a variance of approximately ± 15 trips per day to address certain demands when required.

## Scope of Work

8.8 The main focus of this assessment is the potential impact on local residential amenity of fugitive dust emissions and particulate matter generated by the proposed development. Dust emissions are likely to arise in the course of the following activities:

- soil stripping, earthworks, and topsoil stockpiling (site preparation and restoration works, new road construction);
- trafficking by onsite machinery and heavy goods vehicles (HGVs) over paved / unpaved surfaces;
- handling and processing of excavated rock;
- transfer, end-tipping and stockpiling of aggregates;
- construction and operation of concrete production plant;
- trafficking by heavy goods vehicles (HGVs) over paved / unpaved surfaces;
- landscaping and final restoration activities.

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

8.10 This EIA Report chapter describes and assesses the existing air quality baseline characteristics of the area at and around the site based on site specific surveys and EPA data. Air emissions arising from the proposed extraction operations and processing / concrete production activities at the application site are then applied to these baseline conditions and the resulting air quality impacts assessed. Mitigation measures are identified where required, to eliminate and reduce these impacts insofar as practical.

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

- relevant legislation, standards and guidance;
- baseline conditions pertaining to measured (or estimated) existing air quality levels around the existing extraction footprints and processing areas;
- methodology used to assess the potential impacts of planned activities on air quality at local properties;

- assessment of the impacts;
- description of mitigation measures that are incorporated into the construction, design and operation of the quarry, processing area and concrete batching plant to eliminate or reduce the potential for increased air quality impacts (if required);
- summary of any residual impacts and reinstatement;
- summary of cumulative impacts;
- monitoring proposals.

## Consultations / Consultees

8.12 In preparing the Environmental Impact Assessment Report for the previous planning application (P. Ref. 22/83), a pre-planning consultation meeting was held between officials of Kildare County Council and representatives of SLR Consulting Ireland and Kilsaran Concrete on 9-Dec-2021 via the Microsoft Teams platform (ref. **PP5260**). Staff from the planning, roads, environment, and water departments of Kildare County Council were also in attendance.

8.13 As this planning application is for development broadly covering the same development as applied for previously under P. Ref. 22/83, there was no formal pre-planning meeting held with Kildare County Council.

8.14 Following a review of published development plans and a site survey, 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)

8.15 The air quality impact assessment presented in this Chapter was prepared by SLR Consulting Ireland. The lead consultant for the study was Aldona Binchy MSc. Eng PIEMA Environmental Engineering and Conor Hughes MSc Energy Science.

## Limitations / Difficulties Encountered

8.16 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

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

## Legislation

### *Air Quality Standards*

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

1999). The 4th Daughter Directive was transposed by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 (S.I.no. 58 of 2009).

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

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

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

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

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

8.23 The air quality monitoring network is coordinated and managed by the EPA, as the National Reference Laboratory for air quality. The results of the monitoring are compared to limit values set out in EU and national legislation on ambient air quality. 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**

| Human Health | Limit or Target Value | | | Information and Alert Thresholds (Where Applicable) | | Long Term Objective |
|---|---|---|---|---|---|---|
| Pollutant | Averaging Period | Value | Maximum Number of Allowed Occurrences | Period | Threshold Value | |
| Nitrogen Dioxide ($NO_2$) | Hour<br>Year | 200 µg/m³<br>40 µg/m³ | 18<br>0 | 1 hour alert | 400 µg/m³ Exceeded for 3 consecutive hours | |
| Sulphur Dioxide ($SO_2$) | Hour<br>Day | 350 µg/m³<br>125 µg/m³ | 24<br>3 | 1 hour alert | 500 µg/m³ Exceeded for 3 consecutive hours | |
| Particulate matter with aerodynamic | Day<br>Year | 50 µg/m³<br>40 µg/m³ | 35<br>0 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| diameter of less than 10 µm ($PM_{10}$) | | | | | | |
| Particulate matter with aerodynamic diameter of less than 2.5 µm ($PM_{2.5}$) | Year | 25 µg/m³<br>20 µg/m³ (ECO) | | | | 0 8.5 to 18 µg/m³ |



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

| Vegetation | Critical Level or Target Value | | Long-Term Objective | |
|---|---|---|---|---|
| Pollutant | Averaging Period | Value | Value | Date |
| Nitrogen dioxide (NOx) | Calendar year | 30 µg/m³ | | |
| Sulphur Dioxide ($SO_2$) | Calendar year and winter (October to March) | 20 µg/m³ | | |

## Planning Policy and Development Control

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

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

8.25 There are no specific policies in relation to air emissions in 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.

### *Local Planning Policy – Kildare County Development Plan 2023-2029*

8.26 The current Kildare County Development Plan includes several policies and objectives for the planning and sustainable development of the County from 2023 to 2029.

8.27 Section 6.8.2 relates to air quality.

*'Clean Air is essential in ensuring a high-quality environment for the wellbeing of the population. Air pollution can negatively affect human health and eco-systems. EU Directives set out air quality standards in Ireland and other member states for a wide variety of pollutants. The EPA is responsible for monitoring air quality in Ireland. An air quality station was commissioned in Naas in April 2021 and is currently noted as having 'good' air status.'*

- **Policy IN P8**

*"Implement the provisions of EU and National legislation on air, noise, and light pollution and other relevant legislative requirements, as appropriate."*

- **Objective IN O59**

*"Ensure that all future development is in accordance with the EU Ambient Air Quality and Cleaner Air for Europe (CAFÉ) Directive (2008/50/EC)."*

- **Objective IN O60**

*"Continue to monitor air quality at selected locations throughout the county in co-operation with the Health Service Executive and the Environmental Protection Agency."*

- **Objective IN O61**

*"Support the use of air quality monitors at schools throughout Kildare."*

## Guidelines Extractive Industry Emissions Limit Values

8.28 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[1] for the extractive industries '*Quarries and Ancillary Activities – Guidelines for Planning Authorities'* were published by the Department of the Environment, Heritage, and Local Government around the same time.

8.29 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)*[2].

8.30 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.

### *Specific Guidance Relating to Air Quality / Dust Nuisance*

8.31 A range of monitoring techniques exist 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.

8.32 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) be applied when measured at site boundaries.

8.33 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.

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

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

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

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

### *Guidance on Assessment of Mineral Dust Impacts for Planning*

8.36 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)[3]. 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

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

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

8.38 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 LA 105 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.

### *Assessment of Air Quality Impacts on Designated Nature Conservation Areas*

8.39 Guidance on the assessment of the air quality impacts of a development on designated nature conservation sites was 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.

8.40 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

8.41 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.

8.42 Two recent EPA reports, *Air Quality in Ireland 2021*[4] and *Ireland's Environment, An Assessment 2020*[5] detail the main air quality trends based on monitoring from the national ambient air quality network. There are monitored exceedances of the WHO guideline values for ozone, $PM_{10}$ and $PM_{2.5}$ at several sites though there are no current exceedances of the lower (less protective) EU standards at the existing monitoring locations in Ireland. The reports also highlight the main challenges of reducing

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

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

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

air pollution from key sources such as particulate matter emissions from solid fuel burning (e.g., peat, coal and wood) in the residential sector and NOx emissions from vehicles in the transport sector.

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



## Site Specific Emission Limits

8.44 Condition No. 10 of P. Ref 03/2754 for the sand and gravel site imposes the following condition:

*"Dust levels from the site shall not exceed 350 milligrams per square metre per day averaged over 30 days when measured at the boundary of the site. The developer shall submit to the planning authority for agreement details of ongoing dust monitoring programmes within three months from the date of this order. The details to be submitted shall include monitoring locations, commencement date and the frequency of monitoring results. Details of all dust suppression measures shall likewise be agreed with the planning authority within three months from the date of this order."*

# RECEIVING ENVIRONMENT

## Study Area

8.45 The proposed development is located at Kilrainy and Kilrathmurry townlands, Co. Kildare. The overall land interest is located on the eastern side, and with access onto the L5002 local road. The site entrance is approximately 380 m southeast of the River Boyne which delineates the boundary between counties Kildare and Meath. The R401 regional road connecting Edenderry (Co. Offaly) to Kinnegad (Co. Westmeath) is approximately 1.5 km southwest of the site entrance, whilst the M4 motorway and R148 regional road (former N4 national route) are c. 2.5 km and c. 3 km to the northeast respectively.

8.46 The existing sand and gravel pit and the site entrance are located within the townland of Kilrathmurry, while the existing quarry site is located within the townland of Kilrainy.

8.47 The lands surrounding the application site predominantly comprise farm fields. The application site is not subject to any statutory or non-statutory nature conservation designations. Dwellings in the vicinity of application site are generally located along the local road network and comprise farmsteads or isolated on-off residences, with some occasional small clusters. The nearest dwellings to the application site boundary are shown in **Figure 8-1**.

## Baseline Study Methodology

### *Baseline Dust Monitoring*

8.48 Ongoing, baseline dust monitoring has been undertaken by BHP Laboratories Ltd to measure compliance with the 350 mg/m$^2$/day emission limit around the existing quarry footprint.

8.49 Monitoring is undertaken using 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*

8.50 The application site and surrounding area are located in Air Quality Zone D, categorised as rural Ireland. The location with the longest continuous $PM_{10}$ air quality monitoring record within a similar Zone D area is located at Kilkitt, Co. Monaghan. As such, it is considered the most appropriate dataset available for assessment of air quality baseline concentrations within the study area.

## Sources of Information

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

8.52 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

8.53 Dust deposition surveys were undertaken at and around the application site by BHP Laboratories Ltd, at monitoring locations shown in **Figure 8-1**. 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.

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

- D1 – southwest of the landholding / application area;
- D2 – west of the landholding / application area near the existing site entrance;
- D3 – north of the landholding / application area;
- D4 – east of the landholding / application area;
- D5 – southeast of the landholding / application area.

## Background Air Quality

8.55 As previously noted, an air quality monitoring location in a rural location like that of the quarry in a Zone D area is located at Kilkitt, Co. Monaghan. Monitoring stations continuously monitor concentrations of particulate matter with an aerodynamic diameter of less than 10µm ($PM_{10}$). Recent annual mean concentrations monitored at Kilkitt (published on the EPA website[6]) are presented in **Table 8-3** below.

**Table 8-3**
**Background $PM_{10}$ Concentrations**

| Year | Annual Mean (µg/m$^3$) | Number of days >50µG/m$^3$ |
|---|---|---|
| 2014 | 9 | 2 |
| 2015 | 9 | 1 |

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

| Year | Annual Mean (µg/m³) | Number of days >50µG/m³ |
|---|---|---|
| 2016 | 8.1 | 0 |
| 2017 | 7.8 | 0 |
| 2018 | 9 | 0 |
| 2019 | 7 | 0 |
| 2020 | 8 | 0 |
| 2021 | 7.8 | 0 |



8.56 **Table 8-3** indicates that $PM_{10}$ concentrations monitored at the Kilkitt monitoring site are below the annual mean Air Quality Standards (AQS) of 40µg/m³ and comply with the requirement that a 24-hour mean of 50 µg/m³ should not be exceeded more than 35 times in a calendar year.

8.57 For rural areas, such as those surrounding the application site, the primary source of $PM_{10}$ would be residential solid fuel emissions and local agricultural or rural based activities for deposited dust.

### *Dust Deposition Monitoring*

8.58 The results of the dust deposition monitoring undertaken by BHP Laboratories Ltd. between January 2019 and July 2023 are presented in **Table 8-4** below.

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

| Date | D1 (mg/m²/day) | D2 (mg/m²/day) | D3 (mg/m²/day) | D4 (mg/m²/day) | D5 (mg/m²/day) |
|---|---|---|---|---|---|
| 08/01/2019 | 65.8 | 173.2 | 82.6 | 21.4 | Void |
| 07/02/2019 | 19.0 | 30.4 | 16.1 | 5.0 | 8.4 |
| 06/03/2019 | <7.8 | Void | 11.6 | <10.4 | <8.7 |
| 08/04/2019 | 19.9 | 46.3 | 47.9 | 21.3 | 25.0 |
| 01/05/2019 | 210.6 | 223.2 | 53.0 | 137.4 | Void |
| 08/06/2019 | 1.2 | 22.2 | 12.6 | 68.1 | 46.7 |
| 02/07/2019 | 12.4 | 53.9 | 7.8 | Void | 77.5 |
| 07/08/2019 | 85.1 | 50.3 | 11.3 | 42.1 | 80.8 |
| 04/09/2019 | Void | 55.2 | 58.0 | 18.4 | 21.2 |
| 02/10/2019 | 193.4 | 63.4 | 50.8 | 36.8 | 25.7 |
| 08/11/2019 | 9.9 | 59.1 | 51.7 | 21.6 | 27.4 |
| 03/12/2019 | <5.0 | 177.2 | 90.6 | 30.0 | 39.8 |
| 08/01/2020 | 10.0 | 16.5 | <5.1 | 7.4 | 85.7 |
| 04/02/2020 | 23.7 | 29.5 | 35.9 | 17.4 | 35.0 |
| 04/03/2020 | 96.4 | 18.6 | <15.0 | 21.6 | <13.5 |
| Covid-19 | | | | | |
| 26/05/2020 | 44.0 | 9.0 | 115.0 | * | 29.0 |
| 19/06/2020 | 133.0 | 334.0 | 202.0 | 218.0 | 96.0 |
| 14/07/2020 | 110.0 | 205.0 | 230.0 | 107.0 | 87.0 |
| 10/08/2020 | 229.0 | 82.0 | 36.0 | 79.0 | 50.0 |
| 08/09/2020 | 85.0 | 209.0 | 101.0 | 46.0 | 80.0 |
| 08/10/2020 | 104.0 | 161.0 | 129.0 | 53.0 | 55.0 |

| Date | D1 (mg/m²/day) | D2 (mg/m²/day) | D3 (mg/m²/day) | D4 (mg/m²/day) | D5 (mg/m²/day) |
|---|---|---|---|---|---|
| 10/11/2020 | 43.0 | 355.0 | 81.0 | 145.0 | 190.0 |
| 07/12/2020 | 7.0 | 36.0 | 35.0 | 79.0 | 55.0 |
| 14/01/2021 | - | - | - | - | - |
| 05/02/2021 | 30.0 | 25.0 | 61.0 | 50.0 | 42.0 |
| 04/03/2021 | 50.0 | 74.0 | 45.0 | 15.0 | 61.0 |
| 09/04/2021 | 162.0 | 163.0 | 105.0 | 84.0 | 128.0 |
| 07/05/2021 | 49.0 | Void | 98.0 | 44.0 | 49.0 |
| 03/06/2021 | 54.0 | Void | 231.0 | 172.0 | 202.0 |
| 09/07/2021 | 42.0 | 339.0 | 142.0 | 59.0 | 44.0 |
| 06/08/2021 | 198.0 | 164.0 | 164.0 | 109.0 | 52.0 |
| 06/09/2021 | 30.0 | Void | 304.0 | 170.0 | 49.0 |
| 08/10/2021 | 77.0 | 69.0 | 197.0 | 242.0 | 80.0 |
| 05/11/2021 | 57.0 | 40.0 | 167.0 | 25.0 | 39.0 |
| 03/12/2021 | 53.0 | 32.0 | 51.0 | 36.0 | 25.0 |
| 10/01/2022 | 72.0 | 66.0 | 106.0 | 117.0 | 71.0 |
| 03/02/2022 | 48.0 | 105.0 | 20.0 | 113.0 | 72.0 |
| 04/03/2022 | 70.0 | 100.0 | 164.0 | 66.0 | 93.0 |
| 07/04/2022 | 33.0 | 238.0 | 24.0 | 49.0 | 79.0 |
| 05/05/2022 | 125.0 | - | 107.0 | 83.0 | 49.0 |
| 07/06/2022 | 178.0 | - | 141.0 | 294.0 | 140.0 |
| 12/07/2022 | 168.0 | 140.0 | 182.0 | 143.0 | 158.0 |
| 05/08/2022 | 61.0 | 38.0 | 214.0 | 66.0 | 90.0 |
| 07/09/2022 | 56.0 | 127.0 | 197.0 | 309.0 | 135.0 |
| 07/10/2022 | 54.0 | 122.0 | 135.0 | 52.0 | 95.0 |
| 04/11/2022 | 65.0 | 164.0 | 336.0 | 122.0 | 8.0 |
| 06/12/2022 | 59.0 | 31.0 | 71.0 | 77.0 | 47.0 |
| 11/01/2023 | 58.0 | 61.0 | 56.0 | 76.0 | 49.0 |
| 10/02/2023 | 21.0 | 72.0 | 72.0 | 43.0 | 54.0 |
| 09/03/2023 | 29.0 | 32.0 | 36.0 | 26.0 | 87.0 |
| 06/04/2023 | 78.0 | 324.0 | 104.0 | 71.0 | 55.0 |
| 05/05/2023 | 266.0 | 107.0 | 64.0 | 75.0 | 84.0 |
| 06/06/2023 | 67.0 | 68.0 | 42.0 | 38.0 | 71.0 |
| 07/07/2023 | 321.0 | 214.0 | 226.0 | 211.0 | 97.0 |

Void = gauge contaminated
* = dust jar missing

8.59 As may be seen, the recorded baseline mineral (inorganic) dust deposition rates at Clonard are below the compliance deposition limit of 350 mg/m²/ day.

## Meteorology: Dispersion of Emissions

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

- wind direction determines the broad transport of the emission and the sector of the compass into which the emission is dispersed; and

- wind speed will affect ground level emissions by increasing the initial dilution of particles in the emission. It will also affect the potential for dust entrainment.

8.61 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)[7], rainfall greater than 0.2 mm per day is sufficient to suppress dust emissions.



## Local Wind Speed and Direction Data

8.62 The weather station used in this assessment with sufficient records of wind direction and wind speed considered representative of conditions experienced at the application site is Dublin Airport Meteorological Station.

8.63 A windrose for the average conditions recorded at Dublin Airport over a ten-year period is presented in **Figure 8-2**. The predominant wind direction is from the south-western quadrant. Moderate to high-speed winds (>2 m/s) occur for approximately 94% of the time.

## Rainfall Data

8.64 Relevant rainfall data applicable to the overall site has been obtained from the Irish Meteorological Service website for the Dublin Airport Metrological Station, located approximately 50 km east of the application site. The annual average days with rainfall greater than 0.2 mm is 199.6 days per year. Natural dust suppression (from rainfall) is therefore considered to be effective for 54.7% of the year.

## Sensitive Receptors

### *Ecological Receptors*

8.65 The application site is not subject to any statutory nature conservation designation. There is no Natura 2000 site within a 2 km radius of the application site at Clonard.

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

### *Human Receptors*

8.67 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.

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

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

8.69 There are approximately 51 sensitive receptors identified within the 1 km of the application area of the application site, identified in **Table 8-5** below.



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

| Receptor Reference | Receptor | Sensitivity | Distance (m) / Direction from Site Boundary (approx.) i.e., Red line application area |
|---|---|---|---|
| R1 | Residential | Medium | 110 (W) |
| R2 | Residential | Medium | 85 (W) |
| R3 | Residential | Medium | 20 (W) |
| R4 | Residential | Medium | 40 (N) |
| R5 | Residential/Commercial | Medium | 450 (N) |
| R6 | Residential | Medium | 485 (E) |
| R7 | Residential | Medium | 455 (E) |
| R8 | Residential | Medium | 475 (E) |
| R9 | Residential | Medium | 490 (E) |
| R10 | Residential | Medium | 510 (E) |
| R11 | Residential | Medium | 370 (SE) |
| R12 | Residential | Medium | 500 (SE) |
| R13 | Residential | Medium | 190 (SE) |
| R14 | Residential | Medium | 40 (S) |
| R15 | Residential | Medium | 250 (S) |
| R16 | Residential | Medium | 240 (S) |
| R17 | Residential | Medium | 245 (S) |
| R18 | Residential | Medium | 180 (S) |
| R19 | Residential | Medium | 110 (S) |
| R20 | Residential | Medium | 55 (SW) |
| R21 | Residential | Medium | 40 (SW) |
| R22 | Residential | Medium | 110 (SW) |
| R23 | Residential | Medium | 100 (SW) |
| R24 | Residential | Medium | 465 (SW) |
| R25 | Residential | Medium | 475 (SW) |
| R26 | Residential | Medium | 515 (SW) |
| R27 | Residential | Medium | 550 (SW) |
| R28 | Residential | Medium | 630 (SW) |
| R29 | Residential | Medium | 850 (SW) |

| Receptor Reference | Receptor | Sensitivity | Distance (m) / Direction from Site Boundary (approx.) i.e. Red line application area |
|---|---|---|---|
| R30 | Residential | Medium | 880 (SW) |
| R31 | Residential | Medium | 685 (N) |
| R32 | Residential | Medium | 850 (N) |
| R33 | Residential | Medium | 860 (N) |
| R34 | Residential | Medium | 885 (N) |
| R35 | Residential | Medium | 915 (N) |
| R36 | Residential | Medium | 960 (N) |
| R37 | Residential | Medium | 850 (N) |
| R38 | Residential | Medium | 1000 (NE) |
| R39 | Residential | Medium | 975 (NE) |
| R40 | Residential | Medium | 995 (NE) |
| R41 | Residential | Medium | 850 (NE) |
| R42 | Residential | Medium | 770 (NE) |
| R43 | Residential | Medium | 820 (NE) |
| R44 | Residential | Medium | 910 (NE) |
| R45 | Residential | Medium | 615 (SE) |
| R46 | Residential | Medium | 880 (SE) |
| R47 | Residential | Medium | 770 (S) |
| R48 | Residential | Medium | 700 (S) |
| R49 | Residential | Medium | 830 (S) |
| R50 | Residential | Medium | 950 (S) |
| R51 | Equestrian Centre | Medium | 310 (E) |



# IMPACT ASSESSMENT METHODOLOGY

## Evaluation Methodology

8.70 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.

8.71 Increased combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the proposed extraction, processing and concrete production activities also have the potential to contribute to local air pollution.

8.72 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.

8.73 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.

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

- emission from preparatory works, including stripping, placement and stockpiling of soil, access road construction (earthworks / trackout);
- emissions from rock extraction and processing;
- emissions from the importation, transfer, end-tipping and stockpiling of aggregates;
- concrete production activities;
- $PM_{10}$ contribution from operational activities; and
- traffic exhaust emissions.

8.75 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.

8.76 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

8.77 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.

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

**Table 8-6**
**Methodology for Defining Sensitivity to Dust and $PM_{10}$ Effects**

| 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. | Nationally Designated sites |

| | | |
|---|---|---|
| | Local annual mean $PM_{10}$ concentrations close to the Objective (36 – 40 µg/m$^3$) | |
| 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 (<30µg/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. | | |



8.79 **Table 8-7** 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 8-7**
**Impact Significance Matrix – Dust Effects (With Mitigation)**

| Sensitivity Of Surrounding Area | Risk of Site Giving Rise to Dust or $PM_{10}$ Effects | | |
|---|---|---|---|
| | HIGH | MEDIUM | LOW |
| Very High | Slight Adverse | Slight Adverse | Negligible |
| High | Slight Adverse | Negligible | Negligible |
| Medium | Negligible | Negligible | Negligible |
| Low | Negligible | Negligible | Negligible |

## Stripping, Berm Construction, New Entrance and Access Road Construction and Restoration Stage Dust Impacts - Methodology

8.80 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 three potential activities:

- earthworks;
- new road construction activities; and
- trackout.

8.81 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.

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

**Table 8-8**
**Determination of Risk Category from Earthworks Activities**

| Distance to Nearest Receptor | | Dust Emission Class | | |
|---|---|---|---|---|
| Human (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 |

8.83 **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 ***construction activities***.

**Table 8-9**
**Determination of Risk Category from Construction 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 |

8.84 **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 |

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

## Operation Stage Dust Impacts - Methodology

8.86 A staged approach has been adopted to the assessment of operations stage impacts generated by rock extraction, importation of aggregates, processing, and concrete production activities. 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.

8.87 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.

8.88 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.

8.89 A semi-quantitative assessment of fugitive dust emissions from the proposed extraction and concrete production activities 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.

8.90 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.

8.91 Further assessment is required for those receptors within 500 m of dust generating activities. Receptors within 500 m of dust generating processes progress onto a Tier 2 assessment. Other residential receptors beyond 500 m are considered too far away to be impacted by potential dust from the application site and not considered any further in this assessment.

8.92 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).

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

8.94 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.

8.95 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

8.96 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.

8.97 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.

8.98 Given that the nature and scale of proposed future activities around Clonard 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.

## Traffic Emissions - Methodology

8.99 Atmospheric emissions related to site proposals are primarily associated with the exhaust emissions from heavy goods vehicles (HGVs). The decision as to whether an assessment of potential impact is required is based upon the criteria set out in the DMRB (Design Manual for Roads and Bridges).

8.100 The criterion for assessment of air quality contained within the latest guidance (LA 105) focuses on roads with relatively high changes in flows or high proportion of HGV traffic. Affected roads are defined as those that meet any of the following criteria:

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

# ASSESSMENT OF IMPACTS



## Stripping, Berm Construction, New Entrance and Access Road Construction and Restoration Stage Impacts – Assessment

8.101 An overview of the sources and processes associated with the preparatory site works and the construction / infrastructure installation 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 |
|---|---|---|---|
| Road Construction, Earthworks and Trackout | 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. Soils immediately used to construct berms, used in restoration works or placed in stockpiles. |
| | | Low – coarse or wet materials during conditions of low wind speed | |

8.102 During the road construction, site preparatory works (comprising soil stripping, perimeter bund construction, initial rock excavation, materials transfer, landscaping, and restoration works) will be completely confined within the application site and the wider quarry area.

8.103 Considering this, together with the separation distance to receptors and the boundary screening provided by existing vegetation, the dust risk category for these construction activities is assessed as 'low risk' to 'negligible'. A summary of the determined risk category for the various activities around the application site is presented in **Table 8-12** below.

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

| Source | Risk Of Dust Soiling Effects | Ecological Effects |
|---|---|---|
| Earthworks | Negligible | Negligible |
| Construction | Negligible | Negligible |
| Trackout | Negligible | Negligible |

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

## Operational Stage Dust Impact – Assessment

8.105 When commenced and operational, the principal air quality impacts generated by the quarry operation, processing, importation of aggregates, concrete production activities will be dust and traffic related emissions. An overview of the sources and processes associated with the extraction 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. |
| Extraction and processing of rock | Quarry, 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. |
| Material loading to concrete batching Plant | 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 | Dependant on the amount of loose material on road surface available for re-suspension and track out. |

### *Human Receptors*

8.106 A total of c. 51 receptors were identified within the c. 1 km study area around the application site. Using the tiered assessment methodology, 26 of these receptors located within or close to 500 m 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**.

8.107 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.

8.108 The wind-rose presented in **Figure 8-2** (for Dublin Airport Meteorological Station) indicates that the predominant wind direction is 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[8].

8.109 A wind rose showing the frequency of winds at wind speeds of greater than 2 m/s is presented in **Figure 8-2** with the individual frequencies for each 10-degree compass sector used within the assessment. In this assessment, wind speeds over 2 m/s were used as this is how the data on percentage occurrence of wind frequency and wind speed is calculated and presented by Met Eireann. For this reason, the impact assessment presented herein is conservative.

8.110 A summary of the risk assessment of dust impacts at the selected Tier 2 properties / 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 | Approx. Distance from Operations (M) | Relevant Wind Direction [A] | Potential Exposure Duration [B] | Relative Wind / Distance Rank [C] | Risk Evaluation |
|---|---|---|---|---|---|
| R1 | 110 (W) | 40-160 | 5.7 | 2 / 5 | Acceptable |
| R2 | 85 (W) | 40-160 | 5.7 | 2 / 8 | Slight Adverse |
| R3 | 20 (W) | 40-180 | 6.2 | 3 / 8 | Slight Adverse |
| R4 | 40 (N) | 150-220 | 4.3 | 2 / 8 | Slight Adverse |
| R5 | 450 (N) | 160-210 | 2.6 | 1 / 2 | Insignificant |
| R6 | 485 (E) | 220-280 | 9.6 | 4 / 2 | Acceptable |
| R7 | 455 (E) | 230-280 | 8.5 | 3 / 2 | Insignificant |
| R8 | 475 (E) | 230-290 | 9.2 | 4 / 2 | Acceptable |
| R9 | 490 (E) | 250-300 | 6.7 | 3 / 2 | Insignificant |
| R10 | 510 (E) | 250-300 | 6.7 | 3 / 1 | Insignificant |
| R11 | 370 (SE) | 280-320 | 3.1 | 2 / 3 | Insignificant |
| R12 | 500 (SE) | 290-330 | 2.3 | 1 / 1 | Insignificant |
| R13 | 190 (SE) | 280-330 | 3.3 | 2 / 5 | Acceptable |
| R14 | 40 (S) | 290-20 | 3.1 | 2 / 8 | Slight Adverse |
| R15 | 250 (S) | 300-60 | 3.3 | 2 / 4 | Acceptable |
| R16 | 240 (S) | 310-70 | 3.1 | 2 / 4 | Acceptable |
| R17 | 245 (S) | 330-70 | 2.3 | 1 / 4 | Insignificant |
| R18 | 180 (S) | 340-80 | 2.5 | 1 / 5 | Insignificant |
| R19 | 110 (S) | 360-90 | 2.5 | 1 / 5 | Insignificant |
| R20 | 55 (SW) | 20-90 | 2.2 | 1 / 8 | Acceptable |

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

| Receptor Reference | Approx. Distance from Operations (M) | Relevant Wind Direction (A) | Potential Exposure Duration (B) | Relative Wind / Distance Rank (C) | Risk Evaluation |
|---|---|---|---|---|---|
| R21 | 40 (SW) | 20-100 | 2.6 | 1 / 8 | Acceptable |
| R22 | 110 (SW) | 20-100 | 2.6 | 1 / 5 | Insignificant |
| R23 | 100 (SW) | 20-100 | 2.6 | 1 / 5 | Insignificant |
| R24 | 465 (SW) | 30-90 | 2.1 | 1 / 2 | Insignificant |
| R25 | 475 (SW) | 40-90 | 1.9 | 1 / 2 | Insignificant |
| R51 | 310 (E) | 240-290 | 7.8 | 3 / 3 | Acceptable |

*Table Notes:*

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

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

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

*Refer to Figure 8-1 for Receptor Locations*

8.111 From **Table 8-14** above, it is observed that the risk of impact from dust emissions associated with the proposed development at Clonard (without any mitigation measures in place) varies from Acceptable and Insignificant at all receptors except for:

- Slight Adverse at R2, R3, R4, and R14.

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

8.113 Note that this assessment ***does not consider*** implementation of mitigation measures within the proposed development including provision of perimeter screening berms and strengthened boundary vegetation / screen planting, dust suppression measures etc. (as outlined in the Mitigation Measures section below). The assessment is also considered to be conservative based on the moderate wind speeds included in the risk evaluation.

### *Ecological Receptors*

8.114 The application site is not subject to any statutory nature conservation designation. There is no Natura 2000 site within a 2 km radius of the application site at Clonard.

## Traffic Emissions - Assessment

8.115 For the purposes of assessment, it is assumed that the total volume of traffic generated in the future by all importation of aggregates, extraction, and production activities at Clonard (including production of aggregates and concrete) will be on average 60 trips per day. The volume of product transported from a quarry site is commercially driven accordingly the rate of production and extraction can fluctuate throughout the year resulting in a variance of approximately ± 15 trips per day to address certain demands when required.

8.116 In view of:

- the existing and previously permitted levels of quarry output and associated HGV traffic movements across the local road network with proposed traffic levels being c. 20% lower than previously permitted levels;

- 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 development at the application site can be deemed 'negligible' in terms of its resultant impact on local air quality and that no further air quality assessment is necessary.

8.117 On this basis, the impact of combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the transfer and/or transportation of materials are screened out, and it is determined that there is no potential for emissions to contribute to local air pollution.

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

8.118 In terms of $PM_{10}$, the maximum annual mean measured baseline background concentration is taken as 9 µg/m³ for the years 2014, 2015 and 2018 at the Kilkitt monitoring station.

8.119 Given the limited magnitude of change in the extent and scale of planned activities at the quarry, the available monitoring data are taken to be representative of ambient $PM_{10}$ concentrations likely to arise over the life of the proposed development. As set out earlier, to provide a robust assessment of potential $PM_{10}$ impacts, if an upper limit of 5 µg/m³ to represent potential future development contribution to annual concentrations, the $PM_{10}$ levels would still be well below the annual mean Air Quality Standards (AQS) of 40µg/m³. As such, any potential future impact in relation to increased ambient $PM_{10}$ concentrations is classified as 'negligible'.

## Unplanned Events (Accidents)

8.120 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 extraction and concrete production activities.

8.121 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;
- accidental material spillages during transport.

8.122 In relation to air quality, the impacts of any unplanned events are 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 quarry and 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

8.123 In essence, cumulative impacts are those which result from incremental changes caused by other past, present, or reasonably foreseeable actions 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.



8.124 This air quality impact assessment herein indicates that the planned development activities will not contribute to a significant increase in local air pollution by way of excessive air / dust emissions.

8.125 A former sand and gravel pit c. 400 m to the east of the existing site on the opposite side of the woodland area in Kilrainy which is not under the ownership of the applicant has been worked out. Planning history of this site indicates that remediation works to restore the site were submitted for planning (ref. 07/1675) and granted in 2009. An extension of duration was sought in 2014 (ref. 14/543) and refused.

8.126 A nearby equestrian centre, c. 310 m from the application site was granted permission (ref. 08/910) to construct a new grassed outdoor jumping area in August 2008. This has been considered as a receptor (R51) in the air quality assessment.

8.127 Approximate 950 m southwest of the application site in the townland of Brackagh is a greenfield site, for which Kilsaran Concrete received a notification decision to grant permission for sand and gravel extraction (dry working) for a period of 9 years (ref. 20/1409) in 2021. This decision was appealed to An Bord Pleanála and a final order to grant was made in August 2023. The site at Brackagh is considered too far removed from the application site at Clonard and the cumulative impact on air quality on the surrounding area of the proposed developments is therefore considered as insignificant.

8.128 To the east of the Kilsaran site at Brackagh and c. 850 m to the southwest of the Clonard site is a former sand and gravel site for which permission was sought and refused in 2015 (ref. 15/696) for "remediation works to worked out gravel pit consisting of levelling of existing material already on site and the importation of approximately 45,000 cubic metres of inert subsoil and top soil over a period of 2 years to return the site to agricultural use".

8.129 All other planning history in the vicinity of the application site are small-scale housing developments.

8.130 At a greater distance from the application at c. 2-3 km, there is several existing and disused sand and gravel sites located in the townlands of Balrinnet, Kilglass and Ballinderry which are also considered too far removed from the application site at Clonard and the cumulative impact on air quality on the surrounding area of the proposed developments is therefore considered as insignificant.

## 'Do-nothing Scenario'

8.131 If the proposed quarry development is not permitted, no further rock extraction will be carried out and the site will be restored to a mainly ecological after-use.

8.132 The current sand and gravel pit will operate until its planning permission expires in January 2024 and thereafter cease operations.

8.133 There would be no extraction / processing sources of dust or air emissions. There would be no management of dust at the site and there would be a loss of the proven aggregate resource and employment from the site.

## Interaction with Other Impacts

8.134 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

8.135 A comprehensive range of mitigation measures are recommended for implementation at the application site at Clonard. Specific mitigation measures are 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 quarry 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 |
| On-site Vehicles | High when travelling over un-surfaced and dry site roads. | Minimise length of on-site haul routes. | High |
| | | 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 with overhead spray bar | High |
| | | Proposed new site entrance and new internal road layout will significantly reduce the emission potential for the nearby residences, in particular R3. | 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 |

| Source / Receptor | Emission Potential | Recommended Mitigation Measures | Effectiveness |
|---|---|---|---|
| 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 canon, sprinklers, or water bowser. | High |
| Road Realignment | Medium | Road realignment into a centre of the Quarry, bigger potential for any airborne material to settle within the site. | High |



## Trackout Measures

8.136 A new sprinkler system will be installed along the new entrance laneway and will be operated by manual switch. The new entrance is located away from adjacent residents and can in the unlikely event of a breakdown of the sprinkler system be wetted using the onsite mobile loading shovels.

8.137 All heavy goods vehicles leaving the application site will be routed through the proposed new wheelwash facility at the realigned road 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.

8.138 Vehicles carrying loads of fine, dry particulate materials (which may be more likely to become airborne) will continue to be covered prior to exiting the quarry.

## Good Practice Measures

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

8.140 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.

8.141 A water spray / sprinkler system will be extended along the new internal access route from the new site entrance. For other areas, a mist cannon (also known as a dust control cannon) and/or water bowser will be always available to dampen down stockpiled / particulate materials and/or unpaved surfaces when adverse (dry, windy) conditions apply, and it is impractical to extend or operate the sprinkler system.

# RESIDUAL IMPACT ASSESSMENT

8.142 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.

8.143 After an assessment of potential adverse effects produced by the development it was concluded that there would be no significant adverse air quality effects for both human and ecological receptors which 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. 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 | Insignificant |
| R2 | Acceptable |
| R3 | Acceptable |
| R4 | Acceptable |
| R5 | Insignificant |
| R6 | Insignificant |
| R7 | Insignificant |
| R8 | Insignificant |
| R9 | Insignificant |
| R10 | Insignificant |
| R11 | Insignificant |
| R12 | Insignificant |
| R13 | Insignificant |
| R14 | Acceptable |
| R15 | Insignificant |
| R16 | Insignificant |
| R17 | Insignificant |
| R18 | Insignificant |
| R19 | Insignificant |
| R20 | Insignificant |
| R21 | Insignificant |
| R22 | Insignificant |
| R23 | Insignificant |
| R24 | Insignificant |
| R25 | Insignificant |
| R51 | Insignificant |

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

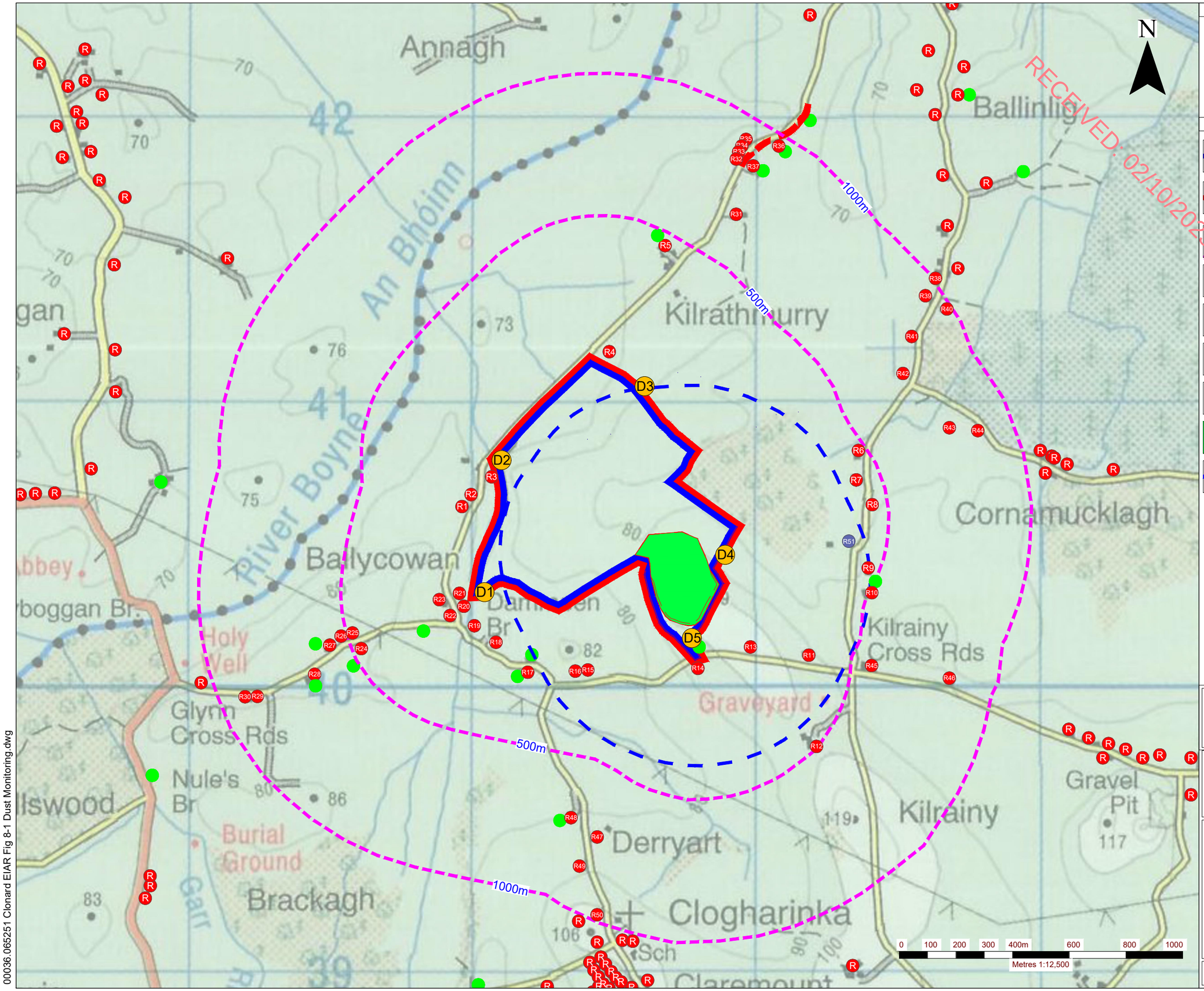
## MONITORING

8.145 Dust monitoring is already carried out at the overall site under the requirements of Condition 10 of P. Ref. 03/2754 (PL09.209480) and previously by Condition 5 of P. Ref. 99/2042 (PL09.123207).

8.146 The dust monitoring gauges are located close to sensitive receptors located beyond the site boundary. It is proposed that the existing dust monitoring stations will remain in place for the duration of extraction and processing operations at the site, as shown in **Figure 8-1**.

8.147 The provision of any additional monitoring locations if deemed necessary by the Planning Authority should planning permission be granted can be provided as necessary.

# FIGURES




RECEIVED: 02/10/2023

NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY MAPS NO. 49

2. ORDNANCE SURVEY IRELAND LICENCE NO. CYAL50316488
(C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- APPLICANTS LAND INTEREST BOUNDARY (c. 51.6 ha)
- SITE APPLICATION AREA c.51.6 ha
  TOTAL APPLICATION AREA c.51.7 ha
  (Site & Road Works)
- DISTANCE OFF-SET FROM PLANNING APPLICATION (RED LINE) BOUNDARY
- RESIDENCE LOCATIONS
- NON-RESIDENCE RECEPTOR LOCATIONS
- AGRICULTURAL BUILDINGS
- **EXISTING** BASELINE DUST MONITORING LOCATIONS (D1 - D5)
- QUARRY EXTRACTION AREA
- 500M OFF-SET FROM **QUARRY EXTRACTION FOOTPRINT**

Kilsaran
ideas taking shape

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TOWNLANDS, CO. KILDARE

**DUST MONITORING LOCATIONS**

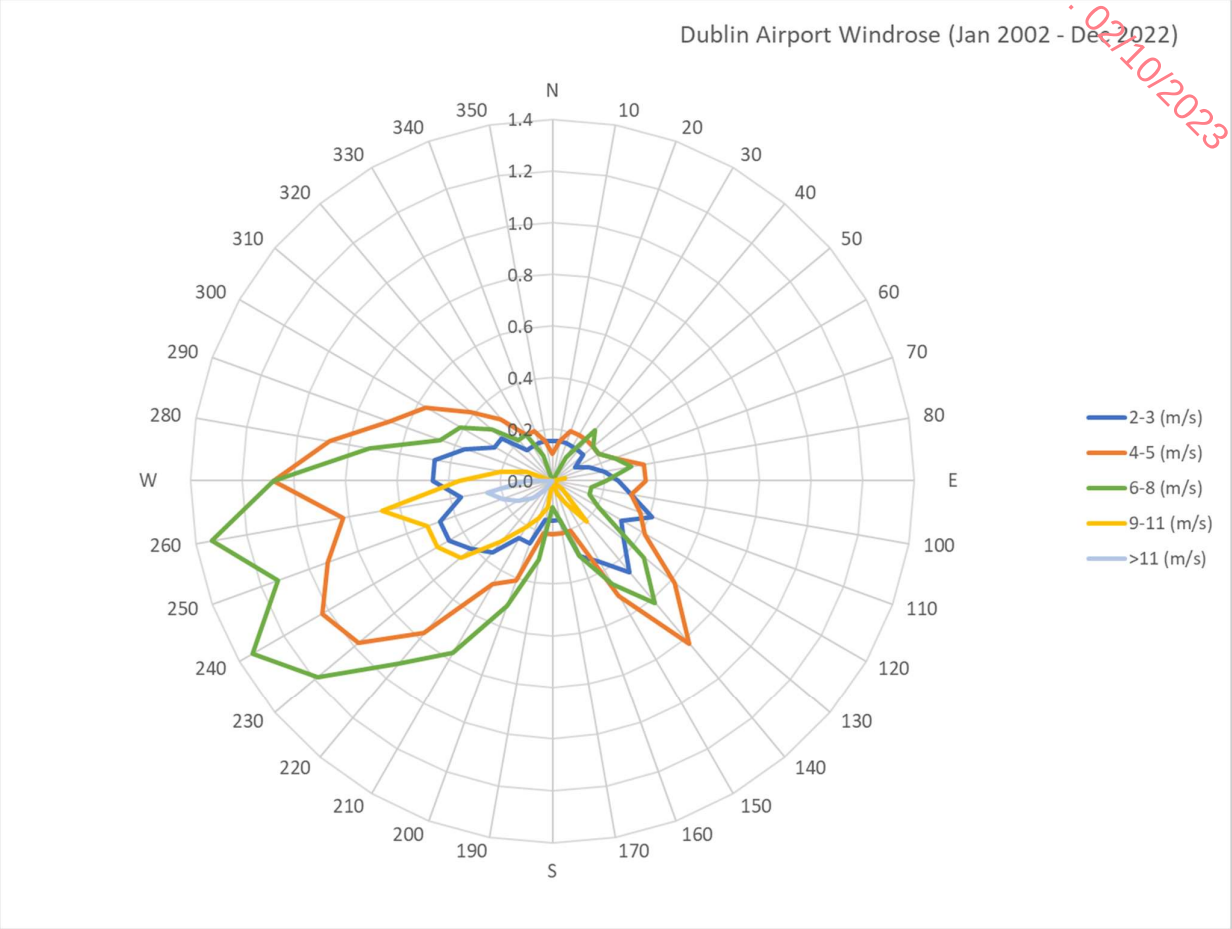
**FIGURE 8-1**

Scale 1:12,500 @ A3

Date SEPTEMBER 2023

00036.065251 Clonard EIAR Fig 8-1 Dust Monitoring.dwg

**Figure 8-2**
**Windrose for Dublin Airport Meteorological Station**



# APPENDICES

## APPENDIX 8-A
### Dust Risk Screening Assessment Methodology

## 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.

### 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[9] 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 considered to be 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.

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

**Table 8 A-1**
**Frequency of Exposure – Risk Classification**

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

## Distance to Source Criterion

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

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

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

The criteria for classifying the distance from receptor to source and thus assigning a rank value has therefore been based on the various references to dust behaviour described above. The rank classifications are presented below in Table 8 A-2. A risk category is maintained for receptors 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 |

## 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[10] shows examples of dust sensitive facilities.

**Table 8 A- 3**
**Examples of Dust Sensitive Facilities**

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

## Evaluation of Risk

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

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

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

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