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# INTRODUCTION

## Background

8.1 This chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, provides supporting information to accompany a Planning Application to Cork County Council by Kilsaran. It primarily addresses potential air quality related impacts from the continuance of use of the existing permitted quarry at Rossmore, Carrigtohill, Co. Cork.

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

## Scope of Work

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

8.4 The principal air quality impact associated with the development is fugitive dust emission. Dust emissions are likely to arise in the course of the following activities:

- trafficking by heavy goods vehicles (HGVs) over paved / unpaved surfaces;
- handling and processing of fragmented rock;
- stockpiling of aggregates;
- landscaping and final restoration activities.

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

8.6 This EIAR Chapter describes and assesses the existing air quality characteristics of the area at and around the existing quarry based on site specific surveys and EPA data. Air emissions arising from the activities at the quarry are considered and the resulting air quality impacts assessed. Mitigation measures are identified where required, to eliminate and reduce these impacts insofar as practical.

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

- relevant legislation, standards and guidance;
- methodology used to assess the potential impacts of the activities at the development on air quality at sensitive receptors;
- baseline conditions pertaining to the measured existing air quality levels around the existing quarry;
- assessment of the impacts;
- description of mitigation measures that are incorporated into the operation of the existing quarry to eliminate or reduce the potential for increased air quality impacts;

- summary of any residual impacts and reinstatement;
- summary of cumulative impacts; and
- monitoring proposals.

## Consultations / Consultees

8.8 Consultations were undertaken with statutory consultees, where necessary, during preparation of the EIAR.

## Contributors / Author(s)

8.9 SLR Consulting Ireland undertook the impact assessment presented in this chapter on behalf of Kilsaran. The lead consultants for the study were Aldona Binchy, MSc Environmental Engineer, and Tim Paul, Chartered Engineer and Chartered Mineral Surveyor. Mr. Paul was co-author of the EPA (2006) environmental management guidelines for the sector. Dust deposition monitoring was carried out by BHP on behalf of Kilsaran.

## Limitations / Difficulties Encountered

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

# REGULATORY BACKGROUND

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

## Legislation

### *Air Quality Standards*

8.12 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).

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

8.14 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).

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

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

8.16 These pollutants are monitored at 32 stations across the country and together they form the national ambient air quality network. A summary of relevant air quality limit values in relation to human health are presented in Table 8-1. Air quality limit values in relation to vegetation protection are presented separately in Table 8-2.

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

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

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

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

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

## Planning Policy and Development Control

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

8.18 The National Spatial Strategy (NSS) 2002-2020 (published in November 2002) was a 20-year coherent national planning framework for Ireland. It aimed to achieve a better balance of social, economic, and physical development across Ireland, supported by more effective and integrated planning. The strategy emphasised continued strong growth in the Greater Dublin Area (GDA), but with significant improvement in other regions to achieve more balanced regional development. The NSS provided the policy framework for all regional and local plans.

8.19 There were no specific policies relating to air emissions in the NSS for extractive industry or related production activities. It was left to Local Authorities to consider the land use and planning issues associated with extractive industry and related activities in preparing their County Development Plans. The general objective in planning is to ensure that activity and outputs are managed in a sustainable way, so as to achieve a balance between environmental, economic, and social considerations.

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

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

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

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

## Guidelines Extractive Industry Emissions Limit Values

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

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

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

### *Guidance Relating to Dust*

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

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

8.28 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.

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

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

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

### *Dust and Ecological Receptors*

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

*8.33 "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."*

8.34 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) incorporated into HA207/07) suggests that only dust deposition levels above 1,000mg/m$^2$/day are likely to affect sensitive ecological receptors. This level of dust deposition is approximately five times greater than the level at which most dust deposition may start to cause a perceptible nuisance to humans. It states that most species appear to be unaffected until dust deposition rates are at levels considerably higher than this.

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

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

### *Air Quality and Health Effects*

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

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

## Rossmore Quarry Specific Emission Limit Values

8.37 Condition no. 12 of the planning permission ref. 03/4570 states that:

*Soiling levels of ambient dust arising out of activities on site shall be such that the soiling level of standardised sticky pads shall not exceed 3% effective area coverage/day at the site boundaries. Monitoring shall be performed on a seven-day average basis or as otherwise directed by the Planning Authority. A control site plus seven sampling locations shall be agreed with the Planning Authority and the monitoring shall be carried out at the applicants own expense. No spot sample shall exceed 5% EAC. Monitoring of soiling levels shall be carried out when the activity is in operation. The frequency of monitoring and the number of sample sites required shall be reviewed by the Planning Authority after one year. Sampling and analytical methods shall be agreed with the Planning Authority. These methods shall be reviewed during the period of this permission and shall be demonstrated to be equivalent to standard methods agreed with the Planning Authority. The implementation of this programme shall be agreed with the Planning Authority.*

8.38 Condition no. 13 of planning permission ref. 03/4570 states that:

*Dust deposition levels arising out of activities on site shall not exceed 130 milligrammes per square metre per day, averaged over 30 days, when measured at the site boundary. The location and monitoring stations shall be agreed with the Planning Authority and the monitoring stations shall be installed and operational prior to the commencement of the development.*

8.39 Condition no. 14 of planning permission ref. 03/4570 states that:

*Particulate matter (PM10) dust levels arising out of activities on the site shall not exceed 50ug/m3 when measured at the site boundaries. The frequency of monitoring and the number of sample sites required shall be agreed with the Planning Authority. Sampling and analytical methods shall be agreed with the Planning authority by 31/12/2004.*

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

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

# RECEIVING ENVIRONMENT

## Study Area

8.40 The quarry is located approximately 1.7 km south of Carrigtohill in Co. Cork. Access to the quarry is via the N25 Cork to Waterford national road, the R624 regional road and the local road network.

## Site Description

8.41 The existing development comprises an operating quarry extracting limestone using industry standard blasting techniques. The fragmented rock is processed (crushed and screened) to produce aggregates for concrete, road-surfacing and general construction purposes.

8.42 The overall site includes processing (crushing and screening) plant and conveyor systems; and value-added manufacturing facilities comprising two concrete plants, a block making facility, and a mortar plant (Plan. Ref. S/99/3411)

8.43 There is existing ancillary infrastructure in place serving the quarry operations. This comprises offices, canteen, storage areas, storage sheds, workshop, weighbridge, ESB sub-station, effluent treatment system (Plan. Ref. S/99/3411).

## Surrounding Land-Use

8.44 The surrounding landscape is characterised by Cork Harbour and the numerous islands, tidal estuaries, loughs and channels that make up Cork Harbour. The land use consists primarily of agricultural land but also includes a number of other quarries as well as golf courses. The large active Lagan Asphalt Ltd. quarry is immediately east of the Site. A private road enters the Site from the north to accommodate quarry traffic. A local county road, with a number of residential dwellings located along it, runs in an east-west direction north of the Site.

8.45 Rossmore Bay is immediately adjacent to the southern and western boundary of Kilsaran Concrete Quarry. Rossmore Bay forms part of Cork Harbour Special Protected Area (SPA) 004030 and the Great Island Channel Special Area of Conservation (SAC) 001058.

## Baseline Study Methodology

8.46 Dust deposition monitoring is carried out at and around the application site using the 'Bergerhoff method' referred to in the TA Luft Air Quality Standard as part of the overall environmental monitoring programme at the existing quarry.

8.47 The deposition gauges used in the surveys are the 'Bergerhoff' dust gauge, which comprises a plastic collection bottle and a post with protective basket, set at 1500mm above ground level. The input of the atmospheric material into the bottle is determined over a planned period measurement (usually one month) by exposing the plastic collection bottle to the environment. The total dust collected in the bottle is expressed as deposition of insoluble particulate matter ($mg/m^2/day$) arising from fugitive actions in the area surrounding the application site.

8.48 Sticky pad monitoring is carried out at and around the application site by BHP.

## Sources of Information

8.49 Met Eireann, the National Meteorological Service, was consulted in relation to the climate / weather data in respect of the study area (http://www.met.ie/), refer to EIAR Chapter 9 – Climate.

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

## Air Quality Monitoring Data

8.51 Dust deposition monitoring is undertaken at the three locations on a monthly basis. The dust deposition monitoring results recorded over these periods are reviewed as part of this assessment.

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

- D1 – at the north-east corner (overburden storage area);
- D2 – at the northern boundary (to the east of the weighbridge);
- D3 – at the north-western boundary of the quarry extraction area

8.53 The results of the baseline dust deposition monitoring are presented in Table 8-3 below.

Table 8- 3
Existing Quarry – Dust Deposition Monitoring Results

| Sample Date | Location D1 | Location D2 | Location D3 | Recording Period | Comments |
|---|---|---|---|---|---|
| 03/01/2017 | 31.3 | 47.7 | 50.3 | 07/12/16 to 03/01/17 | |
| 01/02/2017 | 14.5 | 30.2 | 19.6 | 03/01/17 to 01/02/17 | |
| 01/03/2017 | 8.0 | 289.2 | 42.2 | 01/02/17 to 01/03/17 | |
| 04/04/2017 | 69.1 | 17.6 | 223.5 | 01/03/17 to 04/04/17 | |
| 02/05/2017 | 30.5 | 97.0 | 25.1 | 04/04/17 to 02/05/17 | |
| 06/06/2017 | 56.6 | 54.7 | 14.9 | 02/05/17 to 06/06/17 | |
| 05/07/2017 | 19.4 | 158.8 | 79.8 | 06/06/17 to 05/07/17 | |
| 01/08/2017 | 46.9 | 256.1 | 52.1 | 05/07/17 to 01/08/17 | |
| 07/09/2017 | 49.0 | 137.0 | 170.0 | 03/08/17 to 07/09/17 | |
| 05/10/2017 | 69.0 | 191.0 | 274.0 | 07/09/17 to 05/10/17 | |
| 02/11/2017 | 370.0 | 460.0 | 344.0 | 05/10/17 to 02/11/17 | Please note, Storm event Ophelia during this time period causing elevated results. |
| 07/12/2017 | 34.0 | 69.0 | 65.0 | 02/11/17 to 07/12/17 | |
| 11/01/2018 | 74.0 | 93.0 | 98.0 | 07/12/17 to 11/01/18 | |
| 08/02/2018 | 100.0 | 127.0 | 87.0 | 11/01/18 to 08/02/18 | |

| Sample Date | Location D1 | Location D2 | Location D3 | Recording Period | Comments |
|---|---|---|---|---|---|
| 08/03/2018 | 84.0 | 165.0 | 121.0 | 08/02/18 to 08/03/18 | |
| 05/04/2018 | 52.0 | 80.0 | 29.0 | 08/03/18 to 05/04/18 | |
| 03/05/2018 | 192.0 | 357.0 | 188.0 | 05/04/18 to 03/05/18 | |
| 07/06/2018 | 140.0 | 142.0 | 155.0 | 03/05/18 to 07/06/18 | |
| 05/07/2018 | 99.0 | 233.0 | 87.0 | 07/06/18 to 05/07/18 | |
| 02/08/2018 | 79.0 | 331.0 | 222.0 | 05/07/18 to 02/08/18 | |
| 06/09/2018 | 122.0 | 144.0 | 200.0 | 02/08/18 to 06/09/18 | |
| 04/10/2018 | 63.0 | 218.0 | 442.0 | 06/09/18 to 04/10/18 | D3 - Blasting took place in this area |
| 01/11/2018 | 717.0 | 341.0 | 259.0 | 04/10/18 to 01/11/18 | D1 - No activity in this area, possible 3rd party interference. |
| 06/12/2018 | 310.0 | 123.0 | 156.0 | 01/11/18 to 06/12/18 | |
| 03/01/2018 | 342.0 | 100.0 | 71.0 | 06/12/18 to 03/01/18 | |
| 07/02/2019 | 105.0 | 61.0 | 54.0 | 03/01/19 to 07/02/19 | |
| 07/03/2019 | 326.0 | 95.0 | 253.0 | 07/02/19 to 07/03/19 | |
| 04/04/2019 | 56.0 | 149.0 | 557.0 | 07/03/19 to 04/04/19 | D3 - No activity in this area, possible 3rd party tampering. |
| 02/05/2019 | 1027.0 | 327.0 | 131.0 | 04/04/19 to 02/05/19 | D1 - No activity in this area, possible 3rd party interference. |
| 06/06/2019 | 87.0 | 234.0 | 243.0 | 02/05/19 to 06/06/19 | |
| 04/07/2019 | 74.0 | 118.0 | 295.0 | 06/06/19 to 04/07/19 | |
| 01/08/2019 | 55.0 | 157.0 | 362.0 | 04/07/19 to 01/08/19 | D3 - Blasting took place in this area. |
| 05/09/2019 | 210.0 | 317.0 | 1612.0 | 01/08/19 to 05/09/19 | D3 - Blasting took place in this area. |
| 03/10/2019 | 276.0 | 219.0 | 125.0 | 05/09/19 to 03/10/19 | |
| 07/11/2019 | 42.0 | 118.0 | 224.0 | 03/10/19 to 07/11/19 | |
| 05/12/2019 | 85.0 | 123.0 | 518.0 | 07/11/19 to 05/12/19 | D3 - Blasting took place in this area. |
| 09/01/2020 | 144.0 | 149.0 | 209.0 | 05/12/19 to 09/01/20 | |
| 06/02/2020 | 74.0 | 52.0 | 126.0 | 09/01/20 to 06/02/20 | |
| 05/03/2020 | 167.0 | 307.0 | 277.0 | 06/02/20 to 05/03/20 | |
| 20/05/2020 | 108.0 | 132.0 | 133.0 | 05/03/20 to 20/05/20 | |
| 18/06/2020 | 147.0 | 254.0 | 297.0 | 20/05/20 to 18/06/20 | |
| 15/07/2020 | 361.0 | 86.0 | 268.0 | 18/06/20 to 15/07/20 | D1 - No activity in this area, possible 3rd party interference |
| 12/08/2020 | 157.0 | 232.0 | 268.0 | 15/07/20 to 12/08/20 | |
| 09/09/2020 | 326.0 | 175.0 | 295.0 | 12/08/20 to 09/09/20 | |
| 07/10/2020 | 144.0 | 56.0 | 14.0 | 09/09/20 to 07/10/20 | |

| Sample Date | Location D1 | Location D2 | Location D3 | Recording Period | Comments |
|---|---|---|---|---|---|
| 04/11/2020 | 163.0 | 323.0 | 194.0 | 07/10/20 to 04/11/20 | |
| 02/12/2020 | 146.0 | 96.0 | 183.0 | 04/11/20 to 02/12/20 | |

8.54 A review of the above results indicates compliance with the DoEHLG (2004) and EPA (2006) recommended dust deposition limit value of 350 milligrammes per square metre per day (averaged over 30 days) when measured using the Bergerhoff Method.

8.55 Condition 13 of the 03/4570 permission suggest limit value of 130 mg/m2/day however the more recent Environmental Management in the Extractive Industry Guidelines (Non-Scheduled Minerals), EPA 2006 recommends that the dust deposition limit value to be adopted at the site boundaries associated with quarry developments (for the Bergerhoff Method (German Standard VDI 2119, 1972)) is 350 mg/m$^2$/ day (when averaged over a 30-day period).

8.56 Soiling levels of ambient dust arising out of activities (sticky pads) monitoring is undertaken at nine locations SP1 to SP9. The location of the sticky pads monitors is shown on Figure 8-1:

8.57 The results of the sticky pads monitoring are presented in Tables 8-4 below.

Table 8- 4
Existing Quarry – Sticky Pads Monitoring Results

| Date | SP1 | SP2 | SP3 | SP4 | SP5 | SP6 | SP7 | SP8 | SP9 |
|---|---|---|---|---|---|---|---|---|---|
| 11/01 to 18/01 | 0.71 | 0.71 | 1.29 | 0.14 | 0.29 | 0.29 | 1.14 | *N/A | 0.43 |
| 18/01 to 25/01 | 0.43 | 1.86 | <0.14 | 0.57 | *N/A | 0.43 | 0.57 | 0.43 | <0.14 |
| 25/01 to 01/02 | 0.71 | <0.14 | 0.71 | 0.14 | 0.57 | 0.57 | 0.29 | 0.57 | 0.29 |
| 01/02 to 08/02 | 0.14 | <0.14 | 0.57 | 0.29 | 0.43 | 1.00 | <0.14 | 0.14 | 0.43 |
| 08/02 to 15/02 | 0.57 | 1.00 | 0.43 | 0.29 | 0.29 | 0.71 | 0.29 | 0.14 | 0.86 |
| 15/02 to 22/02 | <0.14 | 0.29 | 0.43 | 1.00 | 0.29 | 1.00 | 0.57 | 1.29 | 1.14 |
| 22/02 to 08/03 | 0.57 | 0.36 | 0.29 | <0.14 | 0.29 | *N/A | 0.21 | 0.71 | 0.29 |
| 08/03 to 15/03 | <0.14 | <0.14 | 1.00 | <0.14 | 1.00 | *N/A | 0.43 | 0.86 | *N/A |
| 15/03 to 22/03 | 0.57 | *N/A | 1.00 | 1.29 | 0.14 | 0.57 | 0.86 | 0.14 | 0.29 |
| 22/03 to 29/03 | 0.43 | *N/A | 0.71 | 0.57 | 0.29 | 0.57 | 1.00 | 0.29 | 0.14 |
| 29/03 to 05/04 | 0.86 | 1.00 | 0.57 | 1.86 | 0.14 | 1.29 | 0.57 | 0.71 | 0.29 |
| 05/04 to 12/04 | 0.29 | 1.14 | 0.86 | 0.14 | 1.14 | 1.14 | 0.14 | 0.71 | 1.14 |
| 12/04 to 19/04 | 0.29 | 0.29 | 0.14 | 0.43 | *N/A | 0.43 | <0.14 | 0.43 | 0.14 |
| 19/04 to 26/04 | 0.14 | 0.71 | 0.29 | 0.71 | 1.57 | 1.86 | 0.57 | 0.14 | 0.29 |
| 26/04 to 03/05 | 0.71 | 0.71 | 0.14 | 1.00 | <0.14 | 0.86 | 0.29 | 0.57 | 0.29 |
| 03/05 to 10/05 | 0.14 | 1.14 | 0.14 | 0.57 | 0.29 | <0.14 | 0.29 | 0.71 | 0.57 |
| 10/05 to 17/05 | *N/A | 0.29 | 1.29 | 0.86 | 0.86 | 1.43 | 0.71 | 0.86 | 1.43 |
| 17/05 to 24/05 | 0.29 | <0.14 | 0.71 | 1.29 | 1.43 | 1.29 | 1.29 | 0.43 | 0.14 |
| 24/05 to 31/05 | 1.14 | 0.14 | 0.57 | 0.14 | <0.14 | 0.71 | 0.86 | 0.57 | 0.57 |
| 31/05 to 07/06 | <0.14 | <0.14 | 1.14 | 0.29 | <0.14 | 1.14 | 0.29 | 0.43 | 0.14 |
| 07/06 to 14/06 | 1.29 | 0.29 | 0.29 | 0.86 | 0.57 | 0.43 | 0.14 | 0.14 | 0.43 |
| 14/06 to 21/06 | <0.14 | 0.50 | 0.25 | <0.14 | 0.38 | 0.88 | 0.63 | <0.14 | 0.25 |

| Date | SP1 | SP2 | SP3 | SP4 | SP5 | SP6 | SP7 | SP8 | SP9 |
|---|---|---|---|---|---|---|---|---|---|
| 21/06 to 29/06 | 0.83 | 0.50 | 0.33 | 0.17 | 0.17 | 1.17 | 0.33 | 0.33 | 0.33 |
| 28/06 to 05/07 | 0.14 | <0.14 | 0.29 | 1.00 | 0.71 | 0.29 | 0.14 | <0.14 | 0.29 |
| 05/07 to 12/07 | 0.29 | 0.43 | <0.14 | 0.86 | 0.57 | 0.43 | 1.00 | 0.57 | 1.00 |
| 12/07 to 19/07 | 0.57 | 0.14 | <0.14 | 1.43 | 0.57 | *N/A | 0.43 | 0.14 | <0.14 |
| 19/07 to 26/07 | 0.29 | 0.14 | 0.14 | 0.57 | 0.43 | 0.71 | 0.14 | <0.14 | 0.14 |
| 26/07 to 02/08 | 0.57 | 1.00 | 1.00 | <0.14 | *N/A | 0.29 | 0.71 | <0.14 | 1.14 |
| 02/08 to 09/08 | <0.14 | 1.00 | 0.14 | 0.29 | 0.71 | 0.29 | 0.43 | <0.14 | 0.57 |
| 09/08 to 16/08 | 0.57 | 0.29 | 0.57 | 0.43 | <0.14 | 0.71 | 0.57 | 0.14 | 1.00 |
| 16/08 to 23/08 | 0.57 | 0.14 | <0.14 | *N/A | 0.86 | 0.29 | 0.43 | <0.14 | 0.43 |
| 23/08 to 30/08 | 0.57 | 1.14 | 1.00 | 1 | 0.71 | <0.14 | 0.43 | 0.29 | 0.14 |
| 30/08 to 06/09 | 0.57 | 0.57 | 0.71 | <0.14 | 0.71 | 0.14 | 0.71 | 0.29 | 0.71 |
| 06/09 to 13/09 | 0.29 | 0.71 | 0.14 | *N/A | 1.00 | 0.29 | 0.57 | 0.71 | 0.14 |
| 13/09 to 20/09 | <0.14 | 1 | 0.14 | 1.14 | 0.57 | 0.57 | 0.29 | 1.29 | 1.57 |
| 20/09 to 27/09 | 1.00 | 0.29 | 0.57 | 0.14 | 1.14 | 0.14 | 0.29 | 0.86 | 0.71 |
| 27/09 to 04/10 | <0.14 | 0.43 | <0.14 | 0.14 | 1.00 | 1.00 | 0.14 | 0.14 | 0.57 |
| 04/10 to 11/10 | 0.43 | 0.43 | 0.86 | 0.29 | *N/A | 0.43 | 0.29 | 0.71 | 0.43 |
| 11/10 to 18/10 | <0.14 | 0.14 | *N/A | 0.71 | *N/A | 0.14 | 0.43 | 0.43 | <0.14 |
| 18/10 to 25/10 | 0.57 | 0.57 | 0.57 | 0.14 | 0.57 | 0.57 | 0.71 | 0.29 | <0.14 |
| 25/10 to 01/11 | <0.14 | 0.57 | 1.14 | 1.29 | 0.57 | 1.14 | 0.29 | 0.71 | 0.14 |
| 01/11 to 08/11 | 0.43 | 0.71 | 1.00 | 0.86 | <0.14 | 0.57 | 0.14 | <0.14 | 0.57 |
| 08/11 to 15/11 | 0.29 | 0.43 | 0.57 | 0.57 | *N/A | <0.14 | 0.14 | 0.14 | 1.29 |
| 15/11 to 22/11 | 0.71 | *N/A | 0.86 | 0.86 | 1.00 | 0.86 | 0.29 | 0.14 | 0.43 |
| 22/11 to 29/11 | 0.71 | 1.71 | 1.43 | 1.00 | *N/A | 1.29 | *N/A | 0.86 | 0.86 |
| 29/11 to 06/12 | 0.29 | <0.14 | 0.43 | 0.14 | 0.71 | 0.57 | 0.57 | 0.57 | <0.14 |
| 06/12 to 13/12 | 1.86 | 2.43 | 2.14 | 1.14 | *N/A | 2.14 | *N/A | 0.43 | 1.43 |
| 13/12 to 20/12 | <0.14 | 0.57 | 0.57 | 1.29 | 1.14 | 0.71 | <0.14 | 0.43 | 0.14 |
| 2019 | | | | | | | | | |
| 03/01 to 10/01 | 0.86 | 0.14 | <0.14 | 0.14 | 0.86 | 0.14 | 0.29 | 0.71 | 0.71 |
| 10/01 to 17/01 | <0.14 | 0.86 | 0.29 | <0.14 | 0.29 | <0.14 | 0.14 | 0.14 | <0.14 |
| 17/01 to 24/01 | 0.14 | <0.14 | 1.57 | 0.71 | <0.14 | 0.29 | 0.14 | 0.43 | <0.14 |
| 24/01 to 31/01 | 1.86 | 0.14 | <0.14 | 0.57 | 1.14 | 0.29 | <0.14 | 0.71 | 0.71 |
| 31/01 to 07/02 | <0.14 | <0.14 | 0.86 | 0.29 | 0.43 | 0.57 | 0.29 | <0.14 | 1.14 |
| 07/02 to 15/02 | 0.75 | <0.14 | 0.25 | 1.38 | 0.63 | 0.13 | 0.50 | 0.75 | 0.50 |
| 15/02 to 21/02 | 0.17 | <0.14 | 2.33 | 0.83 | 0.50 | <0.14 | 0.17 | 0.33 | 0.83 |
| 21/02 to 27/02 | 0.67 | 0.17 | <0.14 | 1.00 | 1.00 | 0.67 | 1.00 | 0.50 | 0.33 |
| 27/02 to 07/03 | 0.88 | 1.50 | 0.38 | 1.75 | 0.63 | 0.50 | 0.63 | 0.75 | 0.38 |
| 07/03 to 14/03 | <0.14 | <0.14 | 0.43 | 0.29 | 1.14 | 0.71 | 0.14 | 0.43 | 0.71 |
| 14/03 to 21/03 | <0.14 | 0.57 | 0.29 | 0.14 | 0.71 | 0.43 | 1.71 | 0.57 | <0.14 |
| 21/03 to 27/03 | 0.17 | 0.50 | 0.50 | 0.83 | 0.17 | 0.50 | 0.17 | <0.14 | 1.00 |
| 27/03 to 04/04 | <0.14 | 1.13 | 1.38 | 0.25 | 1.38 | <0.14 | 0.25 | 0.25 | <0.14 |
| 04/04 to 11/04 | 0.71 | 0.43 | <0.14 | 1.14 | 1.00 | 0.14 | 0.14 | 0.57 | 0.29 |
| 11/04 to 18/04 | 0.14 | 1.29 | 1.29 | 4.57 | 3.00 | 1.43 | 0.14 | 1.86 | 2.57 |

| Date | SP1 | SP2 | SP3 | SP4 | SP5 | SP6 | SP7 | SP8 | SP9 |
|---|---|---|---|---|---|---|---|---|---|
| 18/04 to 25/04 | 0.29 | 0.43 | 0.29 | <0.14 | 0.29 | 0.86 | 1.29 | <0.14 | 0.43 |
| 25/04 to 02/05 | 0.14 | 0.57 | 0.29 | 1.00 | 1.43 | 1.00 | 0.29 | 0.57 | <0.14 |
| 02/05 to 09/05 | 0.43 | 0.71 | 0.71 | 0.86 | 0.57 | 0.43 | 0.43 | <0.14 | 0.29 |
| 09/05 to 16/05 | 1.14 | 0.57 | 0.29 | 0.29 | <0.14 | 0.57 | 1.43 | <0.14 | <0.14 |
| 16/05 to 23/05 | 0.14 | 0.86 | <0.14 | 0.14 | <0.14 | 1.29 | 0.71 | 0.57 | 0.57 |
| 23/05 to 30/05 | 0.29 | 0.86 | 0.29 | 0.71 | 0.43 | 1.14 | 0.29 | 1.14 | 0.43 |
| 30/05 to 06/06 | 0.86 | 0.57 | 0.57 | 1.14 | 1.29 | 0.29 | 0.86 | 0.14 | 0.29 |
| 06/06 to 13/06 | 0.86 | 0.71 | 0.14 | 1.00 | 0.43 | <0.14 | 0.29 | 0.29 | 0.14 |
| 13/06 to 20/06 | 0.43 | 0.29 | 0.43 | 0.86 | 0.29 | 0.29 | 0.14 | <0.14 | 0.86 |
| 20/06 to 27/06 | 0.29 | 0.71 | 0.57 | 0.57 | 0.71 | 0.57 | 0.14 | 0.29 | 0.29 |
| 27/06 to 04/07 | 0.29 | 0.14 | 0.86 | 0.57 | <0.14 | 0.71 | 0.57 | 0.14 | <0.14 |
| 04/07 to 11/07 | <0.14 | 0.43 | <0.14 | 0.71 | 1.29 | 0.43 | <0.14 | 0.43 | 0.29 |
| 11/07 to 18/07 | 0.29 | 0.14 | 0.57 | 0.14 | 0.14 | 0.14 | 0.29 | 0.86 | 0.14 |
| 18/07 to 25/07 | 0.14 | 0.14 | 0.29 | 0.29 | 0.29 | 0.43 | 0.86 | 0.29 | 0.29 |
| 25/07 to 01/08 | <0.14 | 0.71 | <0.14 | 1.14 | 0.57 | 3.29 | 0.14 | 0.86 | 0.43 |
| 01/08 to 08/08 | 0.57 | <0.14 | 0.57 | 0.57 | 2.14 | 0.57 | <0.14 | 0.14 | 1.14 |
| 08/08 to 15/08 | 2.43 | <0.14 | 0.14 | 1.43 | 0.86 | 0.14 | 2.14 | 0.71 | 0.86 |
| 15/08 to 22/08 | 0.86 | 0.29 | 0.29 | 0.43 | 0.71 | <0.14 | <0.14 | 0.57 | 0.57 |
| 22/08 to 29/08 | 0.57 | <0.14 | 0.57 | 0.57 | 0.29 | 0.43 | 0.14 | 0.43 | 0.14 |
| 29/08 to 05/09 | 0.43 | <0.14 | 0.86 | 1.00 | <0.14 | 0.57 | 1 | 0.14 | <0.14 |
| 05/09 to 12/09 | 1.29 | 0.57 | 0.43 | 1.71 | 0.14 | 0.14 | 0.43 | 0.86 | 0.71 |
| 12/09 to 19/09 | 1.00 | 1.14 | 1.00 | 0.57 | 0.29 | <0.14 | 0.57 | 0.29 | 0.43 |
| 19/09 to 26/09 | <0.14 | 0.14 | 0.71 | 0.86 | 0.14 | 0.57 | <0.14 | 0.86 | 0.86 |
| 26/09 to 03/10 | 0.14 | 0.29 | 2.14 | 2.71 | 2.29 | 1.86 | <0.14 | 0.57 | 0.86 |
| 03/10 to 10/10 | <0.14 | 0.29 | 0.14 | 1.14 | 0.29 | 0.86 | 0.29 | <0.14 | 0.57 |
| 10/10 to 17/10 | <0.14 | 0.57 | 0.29 | 0.57 | <0.14 | <0.14 | <0.14 | 0.14 | 1.43 |
| 17/10 to 24/10 | 0.29 | <0.14 | 0.43 | <0.14 | 0.71 | 0.71 | 0.71 | <0.14 | <0.14 |
| 24/10 to 31/10 | <0.14 | 1.29 | 0.43 | 1.14 | 0.43 | 0.57 | 0.71 | 1.00 | <0.14 |
| 31/10 to 07/11 | 0.86 | 0.43 | 0.29 | <0.14 | 0.86 | <0.14 | 0.14 | 1.71 | 1.57 |
| 07/11 to 14/11 | 0.57 | 0.43 | <0.14 | 0.14 | 0.14 | 1.43 | 0.71 | <0.14 | 0.43 |
| 14/11 to 21/11 | <0.14 | 1.14 | <0.14 | <0.14 | 0.43 | 0.43 | 0.29 | 1.43 | <0.14 |
| 21/11 to 28/11 | 0.71 | 0.57 | <0.14 | 1.14 | 0.71 | 1.14 | 0.86 | 1.29 | 2.43 |
| 28/11 to 05/12 | 0.71 | 0.29 | <0.14 | <0.14 | 0.71 | 0.14 | 0.29 | 0.86 | 0.86 |
| 05/12 to 12/12 | 1.71 | <0.14 | <0.14 | 0.86 | 0.86 | 1.00 | <0.14 | 0.43 | 1.57 |
| 2020 | | | | | | | | | |
| 09/01 to 16/01 | 0.57 | Lost | 0.14 | 1.71 | Lost | 0.14 | 1.00 | 0.57 | 0.43 |
| 16/01 to 23/01 | 1.29 | 0.71 | 0.57 | 0.57 | 0.43 | 0.86 | 0.71 | 0.57 | 0.71 |
| 23/01 to 30/01 | 1.43 | 0.43 | 1.29 | 1.29 | 1.14 | 0.57 | 0.57 | 0.29 | 2.00 |
| 30/01 to 06/02 | 0.71 | 0.57 | 0.57 | 0.43 | 1.57 | 0.43 | 0.29 | 1.14 | 0.86 |
| 06/02 to 13/02 | 0.43 | 0.29 | 0.57 | Lost | Lost | 0.14 | 0.29 | 0.43 | 0.57 |
| 13/02 to 20/02 | 0.57 | 1.14 | 0.57 | 1.00 | 1.71 | 0.57 | 0.86 | 1.57 | 3.00 |
| 20/02 to 28/02 | 0.25 | 1.00 | 0.38 | 0.63 | 0.25 | 0.50 | 0.38 | 0.50 | 2.25 |

| Date | SP1 | SP2 | SP3 | SP4 | SP5 | SP6 | SP7 | SP8 | SP9 |
|---|---|---|---|---|---|---|---|---|---|
| 05/03 to 12/03 | 1.29 | 0.14 | 0.14 | 0.86 | 0.86 | 0.43 | 1.14 | 0.43 | 0.29 |
| 12/03 to 19/03 | 0.57 | 0.43 | 0.29 | 0.71 | 0.57 | 0.14 | 0.43 | 0.71 | 0.43 |
| 19/03 to 26/03 | 0.29 | 0.43 | 0.57 | 0.43 | 0.57 | 1.43 | 0.29 | 0.43 | 0.86 |
| 26/03 to 21/05 | <0.14 | 0.32 | 0.20 | 0.25 | 0.23 | 0.20 | 0.25 | 0.23 | <0.14 |
| 21/05 to 27/05 | 0.33 | 0.17 | <0.14 | 0.50 | 0.33 | 1.17 | 1.50 | 0.50 | 0.67 |
| 27/05 to 03/06 | 0.57 | 0.29 | 1.14 | 0.14 | 0.43 | 0.57 | 0.14 | 0.43 | 0.14 |
| 03/06 to 10/06 | 0.57 | 0.29 | 1.43 | 0.14 | 1.14 | 0.57 | 0.43 | 0.71 | 0.29 |
| 10/06 to 18/06 | 0.25 | <0.14 | 0.38 | <0.13 | 0.50 | 0.63 | 0.50 | 1.38 | 0.75 |
| 18/06 to 24/06 | 0.50 | 0.67 | 1.00 | 0.83 | 1.33 | 0.17 | 0.33 | 0.33 | 1.00 |
| 24/06 to 01/07 | 2.00 | 1.00 | 0.38 | 0.63 | 0.50 | 1.00 | <0.14 | 0.88 | 0.63 |
| 01/07 to 08/07 | 0.29 | 0.71 | 1.29 | 1.00 | 0.57 | 0.71 | 1.14 | 1.29 | 2.57 |
| 08/07 to 15/07 | 0.14 | 0.29 | 0.71 | 0.71 | 1.43 | 0.86 | 0.43 | 0.71 | 2.00 |
| 15/07 to 22/07 | 0.43 | 0.29 | 0.86 | 0.29 | 0.57 | 0.43 | 0.57 | 0.43 | 0.57 |
| 22/07 to 29/07 | 0.57 | 0.14 | 1.14 | 2.29 | 2.14 | 0.43 | 0.43 | 1.57 | 2.57 |
| 29/07 to 05/08 | 0.43 | 1.29 | Lost | 0.71 | 0.71 | 1.86 | 0.71 | 0.14 | 0.71 |
| 05/08 to 12/08 | 1.00 | 0.14 | 0.57 | 0.29 | 0.86 | 0.71 | <0.14 | 1.29 | 0.71 |
| 12/08 to 19/08 | 0.57 | 0.71 | 0.71 | 1.00 | 0.57 | 0.86 | 1.00 | 0.57 | 1.14 |
| 19/08 to 26/08 | 1.43 | 1.86 | 0.86 | 0.14 | 0.29 | 1.57 | 0.86 | 1.57 | 0.14 |
| 26/08 to 02/09 | 1 | 2.14 | 0.71 | 1.43 | 1.29 | 0.71 | 0.29 | 0.29 | 0.14 |
| 02/09 to 09/09 | 0.43 | 0.71 | 0.86 | 1.00 | 2.14 | 0.14 | 1.29 | 0.57 | 0.29 |
| 09/09 to 16/09 | 0.86 | 0.29 | 0.71 | 0.57 | 1.29 | 0.14 | 0.57 | 0.71 | 1.57 |
| 16/09 to 23/09 | 0.43 | 2.00 | 1.71 | 1.43 | 3.29 | 1.00 | 0.71 | 0.71 | 2.43 |
| 23/09 to 30/09 | 1.00 | <0.14 | 1.29 | 0.14 | 1.57 | 0.86 | 1.00 | 0.86 | 1.00 |
| 30/09 to 07/10 | 1.00 | 0.43 | 0.71 | 1.43 | 0.57 | 1.00 | 2.00 | 0.86 | 1.14 |
| 07/10 to 14/10 | 1.86 | 0.86 | 0.71 | <0.14 | 0.57 | 0.57 | 0.43 | 1.00 | 0.86 |
| 14/10 to 21/10 | 2.14 | 0.57 | 1.14 | 0.29 | 0.86 | 0.71 | 0.43 | 1.14 | 0.71 |
| 21/10 to 28/10 | 2.00 | 0.43 | 0.86 | 0.57 | 1.29 | 0.29 | <0.14 | 0.43 | 1.57 |
| 28/10 to 04/11 | 0.29 | 4.00 | 1.71 | 0.57 | 0.14 | 1.14 | 0.71 | 1.57 | 1.43 |
| 04/11 to 11/11 | 0.14 | 2.00 | 2.86 | 2.43 | 1.57 | 1.57 | 0.14 | 1.57 | 1.71 |
| 11/11 to 18/11 | 0.57 | 0.71 | 1.43 | 0.57 | 1.43 | 1.00 | 0.57 | 1.29 | 0.71 |
| 18/11 to 25/11 | 0.14 | 0.29 | 2.14 | 0.43 | 0.71 | 2.57 | 0.14 | 0.29 | 1.29 |
| 25/11 to 02/12 | 0.57 | 1.14 | 4.14 | 0.71 | 1.43 | 0.43 | 0.43 | 0.86 | 0.43 |
| 02/12 to 09/12 | 0.71 | 0.86 | 1.00 | 0.14 | 0.43 | 0.14 | 0.29 | 0.14 | 0.43 |
| 09/12 to 16/12 | 0.86 | <0.14 | 0.71 | 0.57 | 1 | 0.14 | 0.43 | 0.71 | 0.86 |

8.58 A review of the above results indicates compliance with the Condition 12 of the 03/4570 permission.

8.59 The application site is located in environs of Air Quality Zone B Cork conurbation. No monitoring in the vicinity of the site is routinely undertaken for air pollutants regulated under the Air Quality Standards Regulations (S.I. No. 180 of 2011).

8.60 The closest air quality monitoring location to the asphalt plant is located at Old Station Road / South Link Road and Heatherton Park, approximately 15km west of the application site, situated in

a suburban location within Air Quality Zone B and, as such, is considered the most appropriate dataset available for assessment baseline concentrations in the study area.

8.61 Those monitoring stations continuously monitors concentrations of particulate matter with an aerodynamic diameter of less than 10µm (PM10). Recent annual mean concentrations monitored at those stations (downloaded from the EPA website) are presented in Table 8-5.

Table 8- 5
PM10 Background Concentrations

| Year | Annual Mean (µg/m$^3$) | Number of Days >50µg/m$^3$ |
|---|---|---|
| Old Station Road/ South Link Road | | |
| 2012 | 17 | 7 |
| 2013 | 19 | 5 |
| 2014 | 19 | 5 |
| 2015 | 17 | 3 |
| 2016 | 17.9 | 7 |
| 2017 | 17.2 | 4 |
| 2018 | 17 | 0 |
| PM10 Background Concentrations – Heatherton Park | | |
| 2012 | 13 | 1 |
| 2013 | 15 | 2 |
| 2014 | 19 | 1 |
| 2015 | 11 | 0 |
| 2016 | 11.5 | 2 |
| 2017 | 10.4 | 0 |
| 2018 | 11 | 0 |

8.62 Table 8-5 indicate that PM10 concentrations monitored at the Old Station Road / South Link Road and Heatherton Park monitoring site are below the annual mean Air Quality Standards (AQS) of 40µg/m$^3$ and comply with the requirement that a 24-hour mean of 50µg/m3 should not be exceeded more than 35 times in a calendar year.

## Meteorology: Dispersion of Emissions

8.63 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.

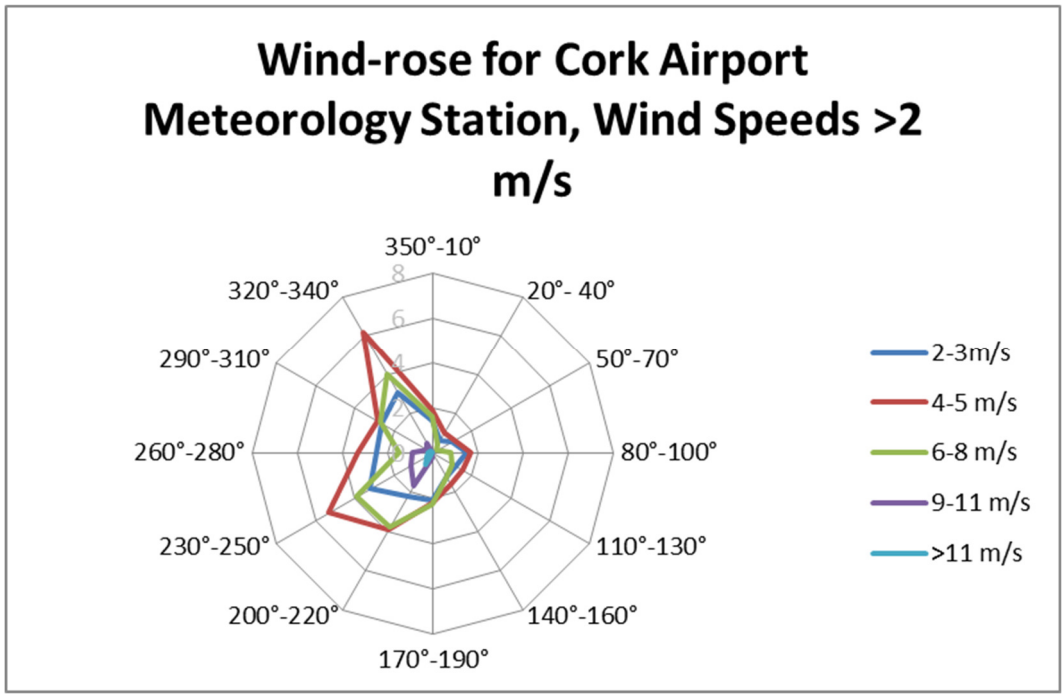
8.64 Rainfall is also an important climatological parameter in the generation of dust; sufficient amounts of rainfall can suppress dust at the source and eliminate the pathway to the receptor. According to Arup (1995) rainfall greater than 0.2mm per day is sufficient to suppress dust emissions.

## Local Wind Speed and Direction Data

8.65 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 Cork Airport Meteorological Station.

8.66 A wind-rose for the average conditions recorded at Cork Airport over a ten-year period is presented in Figure 8-2. The predominant wind direction is from the south-western and north-eastern quadrants.

**Figure 8-2**
Windrose for Cork Airport Meteorology Station




## Rainfall Data

8.67 Relevant rainfall data applicable to the site has been obtained from the Irish Meteorological Service website for Cork Airport meteorological station (1981 – 2010 averages), located approximately 12 km north-east of the quarry. The annual average days with rainfall, greater than 0.2 mm is 204 days per year. Natural dust suppression (from rainfall) is therefore considered to be effective for 56% of the year.

## Sensitive Receptors

### *Ecological Receptors*

8.68 The application site is not subject to any statutory nature conservation designation. Rossmore Bay forms part of Cork Harbour Special Protected Area (SPA) 004030 and the Great Island Channel Special Area of Conservation (SAC) 001058 and adjoins the southern and western boundary of the quarry.

### *Human Receptors*

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

8.70 Receptors within a 300-metre distance of the existing quarry extraction area boundary at Rossmore have been identified (refer to Figure 8-1). The relevant receptors are listed in Table 8-6 and their locations are shown in Figure 8-1**.** As residences are clustered in some areas, receptors have been identified at the nearest location to the application site boundary.

8.71 There are 15 sensitive residential receptors identified within the study area of the application site.

**Table 8-6**
Receptors

| Receptor Reference | Receptor | Sensitivity | Distance (m) / Direction from Site Boundary(approx.) |
|---|---|---|---|
| R1 | Residential | Medium | 17 (N) |
| R2 | Residential | Medium | 42 (N) |
| R3 | Residential | Medium | 53 (N) |
| R4 | Residential | Medium | 330 (N) |
| R5 | Residential | Medium | 311 (N) |
| R6 | Residential | Medium | 252 (N) |
| R7 | Residential | Medium | 229 (N) |
| R8 | Residential | Medium | 211 (N) |
| R9 | Residential | Medium | 205 (N) |
| R10 | Residential | Medium | 226 (NE) |
| R11 | Residential | Medium | 289 (NE) |
| R12 | Residential | Medium | 31 (N) |
| R13 | Residential | Medium | 70 (N) |
| R14 | Residential | Medium | 83 (N) |
| R15 | Residential | Medium | 107 (N) |

# IMPACT ASSESSMENT - METHODOLOGY

## Evaluation Methodology

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

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

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

8.75 The impact assessment is based upon a comparison of the existing quarry development against the air quality impacts resulting from the proposed development which is continuance of use of the existing permitted quarry. The potential for 'in-combination' effects from other planned or proposed sources or air pollutants in the area has also been considered.

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

- emissions from soils placement and final restoration (earthworks, trackout)[5];
- emissions from rock extraction and ancillary processing activities;
- traffic exhaust emissions.

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

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

## Significance Criteria

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

8.80 To determine the significance of particulate matter effects associated with the development, an evaluation of the sensitivity of the surrounding area is required. Receptors can demonstrate

[5] Note: As the development is continuance of use of an existing permitted quarry within the existing extraction area no soil stripping operations are required.

different sensitivities to changes in environment and are classified as per Table 8-7 below (and IAQM Construction Dust Guidance[6]).

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

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

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

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

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

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

## Soils Placement and Restoration- Methodology

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

- Earthworks;
- Trackout.

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

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

**Table 8- 9**
Determination of Risk Category from Earthworks Activities

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

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

**Table 8- 10**
Determination of Risk Category from Trackout Movements

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

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

## Rock Extraction - Methodology

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

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

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

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

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

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

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

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

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

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

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

## $PM_{10}$ Contribution from Extraction Activities - Methodology

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

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

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

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

## Traffic Emissions - Methodology

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

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

8.102 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 >= 5m

# ASSESSMENT OF IMPACTS

## Soils Placement and Restoration - Assessment

8.103 The development comprises continuance of use of an existing quarry within the existing extraction area. There is a small volume of overburden soil to be moved in the northwest corner of the extraction area. Soil placement will be required as part of the final restoration process. An overview of the sources and processes associated with the extraction activities, and their respective potential for dust deposition (both dust and smaller particles), is presented below in Table 8-11.

**Table 8-11**
Soil Placement & Restoration: Sources of Dust Emissions

| Activity | Source | Emission Potential | Comments |
|---|---|---|---|
| Earthworks and trackout | Excavators/ Dozers | High - dry or fine materials during strong windy weather | Temporary, variable from day to day depending on prevailing meteorological conditions, level, and location of activity.<br><br>Final restoration to natural habitat will require limited transport and placement of soils in localised areas. |
| | | Low – coarse or wet materials during conditions of low wind speed | |

8.104 During the final quarry restoration to natural habitat, earthworks will require limited transport and placement of soils in localised areas at distances greater than 100 metres from residential dwellings. The duration of such activities will be short. In light of this, the dust risk category is considered to be 'Low' to 'Medium'.

8.105 During the final restoration, given the localised nature of the works within the site and use of soils stored on site, the trackout dust risk category is considered to be 'low'.

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

**Table 8-12**
Soil Placement & Restoration: Risk of Dust Emissions (without Mitigation)

| Source | Risk of Dust Soiling Effects | Ecological Effects |
|---|---|---|
| Earthworks | Low to Medium | Low to Medium |
| Trackout | Low | Low |

8.107 The risk of dust emissions during the final restoration is assessed as Low to Medium (without Mitigation.

## Rock Extraction & Processing - Assessment

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

**Table 8-13**
**Rock Extraction & Processing: Sources of Dust Emissions**

| Activity | Source | Dust Emission Potential | Comments |
|---|---|---|---|
| Transfer of fragmented rock to processing plant | Onsite vehicle, dry loose coarse material. | Medium (relatively coarse material) | Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces. |
| Processing of fragmented rock | Processing plant, dry loose material | Medium (relatively coarse material) when dry material being processed during strong windy weather | Emissions due to prevailing meteorological conditions (high winds). |
| Material transfer to storage area | Onsite vehicle, dry loose material | Medium (relatively coarse material) 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 | Medium (relatively coarse material) when dry material being stored during strong windy weather | Emissions due to prevailing meteorological conditions (high winds). |
| Material Loading to HDV | Onsite vehicle, Dry loose material | Medium (relatively coarse material) when dry material being handled during strong windy weather | Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces. |
| Transfer off site & traffic off site | HDV/Road vehicles | Low - on paved road surfaces | Dependant on the amount of loose material on road surface available for re-suspension and track out. |

### *Residential Receptors*

8.109 There were 15 receptors identified within the study area around the application site. These receptors are all located within 500 metres of the extraction area and have progressed onto a Tier 2 assessment.

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

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

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

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

8.114 A summary of the risk assessment of dust impacts from sources within the proposed development is presented in Table 8-14 below.

**Table 8- 14**

Rock Extraction & Processing: Dust Risk Assessment Screening (Without Mitigation Measures)

| Receptor Reference | Distance from Operations (m) | Relevant. Wind Direction (A) | Potential Exposure Duration (B) | Relative Wind / Distance Rank (C) | Risk Evaluation |
|---|---|---|---|---|---|
| R1 | 17 (N) | 170-220 | 12.0 | 4/8 | Moderate Adverse |
| R2 | 42 (N) | 170-220 | 12.0 | 4/8 | Moderate Adverse |
| R3 | 53 (N) | 170-220 | 12.0 | 4/8 | Moderate Adverse |
| R4 | 330 (N) | 240-290 | 10.5 | 4/3 | Acceptable |
| R5 | 311 (N) | 240-290 | 10.5 | 4/3 | Acceptable |
| R6 | 252 (N) | 240-290 | 10.5 | 4/4 | Slight Adverse |
| R7 | 229 (N) | 240-290 | 10.5 | 4/4 | Slight Adverse |
| R8 | 211 (N) | 240-290 | 10.5 | 4/4 | Slight Adverse |
| R9 | 205 (N) | 240-290 | 10.5 | 4/4 | Slight Adverse |
| R10 | 226 (NE) | 240-290 | 10.5 | 4/4 | Slight Adverse |
| R11 | 289 (NE) | 240-290 | 10.5 | 4/4 | Slight Adverse |
| R12 | 31 (N) | 170-220 | 12.0 | 4/8 | Moderate Adverse |
| R13 | 70 (N) | 170-220 | 12.0 | 4/8 | Moderate Adverse |
| R14 | 83 (N) | 170-220 | 12.0 | 4/8 | Moderate Adverse |
| R15 | 107 (N) | 170-220 | 12.0 | 4/5 | Slight Adverse |

**Table Note:**

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

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

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

Refer to Figure 8-1 for Receptor Locations

8.115 From Table 8-14, it is observed that the risk of impact from dust emissions associated with the development (**without any mitigation measures in place**) generally varies from Acceptable at R4, R5, Slight Adverse at R6,R7,R8,R9;R10,R11,R15 to Moderate Adverse at R1, R2, R3, R412 and R13.

8.116 (Note: this assessment ***does not take into account implementation of mitigation measures*** within the development that include provision of perimeter screening berms, dust suppression measures

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

etc. (outlined in the Mitigation Measures section below). This assessment is considered conservative on the basis of the moderate wind speeds included in the risk evaluation.

### *Ecological Receptors*

8.117 Dust deposition monitoring at the quarry indicates that the levels of dust generated are well below the level of 1000 mg/m$^2$/day, where it is considered that dust could be likely to have a significant effect on sensitive ecosystems, refer to section 8.53 above.

8.118 Based on the above, it is concluded that the planned development will have an insignificant dust deposition impact on ecological receptors, and it is considered that all ecological site(s) including the adjoining SAC and SPA can be screened out from any further dust impact assessment.

## Traffic Emissions - Assessment

8.119 A detailed traffic assessment for the development is included in EIAR Chapter 14.

8.120 The proposal is for an extraction rate not exceeding 500,000t per annum. The current permitted extraction rate of 750,000t per annum is 50% higher than that currently sought under this application. The current proposal will give rise to a significant reduction in the potential traffic generation of the site from that currently permitted.

8.121 The proposed development operating at the current recorded rate of extraction not exceeding 500,000t has an average extraction rate of 419,245t per annum and manufactures approximately 46,000m$^3$ of concrete and 3.3M concrete blocks and is calculated to generate an average daily HGV traffic flow in the order of 95 HGV trips per day which is a potential reduction of 76 HGV from the average traffic flow of 171 HGV trips that would arise from the current development permitted under Plan. Ref. 03/4570 operating at the permitted maximum extraction rate.

8.122 The above figures relating to the proposed development and can be expected to fluctuate. The average traffic generation of the site is in the order to 95 HGV per day. In periods when demand for product is at the highest proposed value of 500,000t per annum the daily HGV generation can be calculated to be in the region of 120. Conversely where demand is low the daily HGV traffic generation will fall as low as 69 per day (approximate representative annual extraction rate 200,000t/yr).

8.123 Comparing proposed traffic generation with that permitted under Reg. Ref. No 03/4570 shows a reduction in the average traffic generation of the existing site in the order of 76 to 101 HGV trips per day.

8.124 As none of criteria for traffic emissions set out in Section 8.99 (DMRB (LA 105)) are exceeded an air quality assessment related to traffic emissions can be scoped out. Furthermore, with the reduction in HGV traffic generation as outlined above the impact of the development on air quality will be significantly less than that previously permitted under planning permission ref. no. 03/4570.

## $PM_{10}$ Contribution from Quarry Activities - Assessment

8.125 In terms of $PM_{10}$, the maximum annual mean measured baseline background concentration was 19µg/m$^3$ 2013&2014 and 19µg/m$^3$ in 2014 at Old Station Road / South Link Road and Heatherton Park, Co. Cork monitoring station. Therefore, the potential contribution up of 5µg/m$^3$ towards annual mean background concentrations of the coarse fraction (2.5 – 10µm diameters) of

particulates (in the immediate area of the site) is considered to be insignificant and well below the annual objective of 40µg/m³.

8.126 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.

## Cumulative / Synergistic Impacts

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

8.128 Dust deposition monitoring carried out at the overall site boundaries at Rossmore Quarry complies with the recommended dust deposition emission limit value of 350 mg/m$^2$/day (averaged over 30 days).

8.129 This existing dust monitoring programme includes other sources of emission to air within close proximity to the site, i.e. from the adjoining Lagan quarry and therefore cumulative effects are considered.

8.130 The cumulative impact of the development will not be significant.

## Interaction with Other Impacts

8.131 The potential impact on air quality by the development 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

8.132 A range of existing management and mitigation measures are implemented at Rossmore Quarry. These measures are listed in Table 8−15 .

## Site Specific Mitigation Measures

**Table 8-15**
Dust Emissions – Existing Management & Mitigation Measures

| Source | Emission Potential | Recommended Mitigation Measures | Effectiveness |
|---|---|---|---|
| Excavators/HDV | High – dry material during strong windy weather | Minimise drop heights when handling materials. | High |
| | Low – material of high moisture content during conditions of low wind speed | Minimise drop heights when handling material, protection from wind where possible. | High |
| Onsite Vehicles | High when travelling over un-surfaced and dry site roads. | Minimise distances of onsite haul routes. | High |
| | | Use of water sprays / tractor & bowser to moisten surfaces during dry weather. | High |
| | | Restrict vehicle speeds through signage / staff training. | High |
| | | | |
| Road Vehicles (transfer offsite) | Low / Moderate on paved road surfaces | Use of road sweeper to reduce the amount of available material for re-suspension. | Moderate / High |
| | | Wheelwash facility | |
| | | Surfacing of the access road. | High |
| Stockpiles | High when dry or fine material being stored or handled during strong windy weather | Seed surfaces of completed soil storage areas / screening berms. | High |
| | | Limit mechanical disturbance. | High |
| Slight to Moderate Adverse Risk Receptors | High – during dry and strong windy weather | Retention of hedgerows | High |
| | | Perimeter screening berms | High |
| | | Ensure implementation of all measures above | High |

# RESIDUAL IMPACT ASSESSMENT

8.133 With the range of existing management and mitigation measures implemented at the quarry, it is considered that the risk of dust impact at receptors from the development reduces further.

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

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

| Receptor Reference | Risk Evaluation |
|---|---|
| R1 | Acceptable to Slight Adverse |
| R2 | Acceptable to Slight Adverse |
| R3 | Acceptable to Slight Adverse |
| R4 | Insignificant |
| R5 | Insignificant |
| R6 | Acceptable |
| R7 | Acceptable |
| R8 | Acceptable |
| R9 | Acceptable |
| R10 | Acceptable |
| R11 | Acceptable |
| R12 | Acceptable to Slight Adverse |
| R13 | Acceptable to Slight Adverse |
| R14 | Acceptable to Slight Adverse |
| R15 | Acceptable |

8.135 After an assessment of potential adverse effects from the development, and the mitigation and management measures implemented it is concluded that there would be no significant adverse air quality effects for both human and ecological receptors which cumulatively would not hinder the site or the surrounding area. Overall, the effects of the development on air quality are considered to be acceptable.

# MONITORING

8.136 Dust deposition monitoring will continue be undertaken as part of the existing environmental monitoring programme at the quarry. Dust monitoring locations shall be reviewed and revised where and as/when necessary. The results of the dust monitoring shall be submitted to Cork County Council on a regular basis for review and record purposes.

# AIR QUALITY: APPENDIX 8 – A

# APPENDIX 8- A

# DUST RISK SCREENING ASSESSMENT METHODOLOGY

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

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

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

## Frequency of Exposure Criterion

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

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

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

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

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

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

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

## Distance to Source Criterion

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

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

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

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

**Table 8 A- 2**
Distance to Source – Risk Classification

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

## Sensitivity of Receptors

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

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

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

## Evaluation of Risk

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

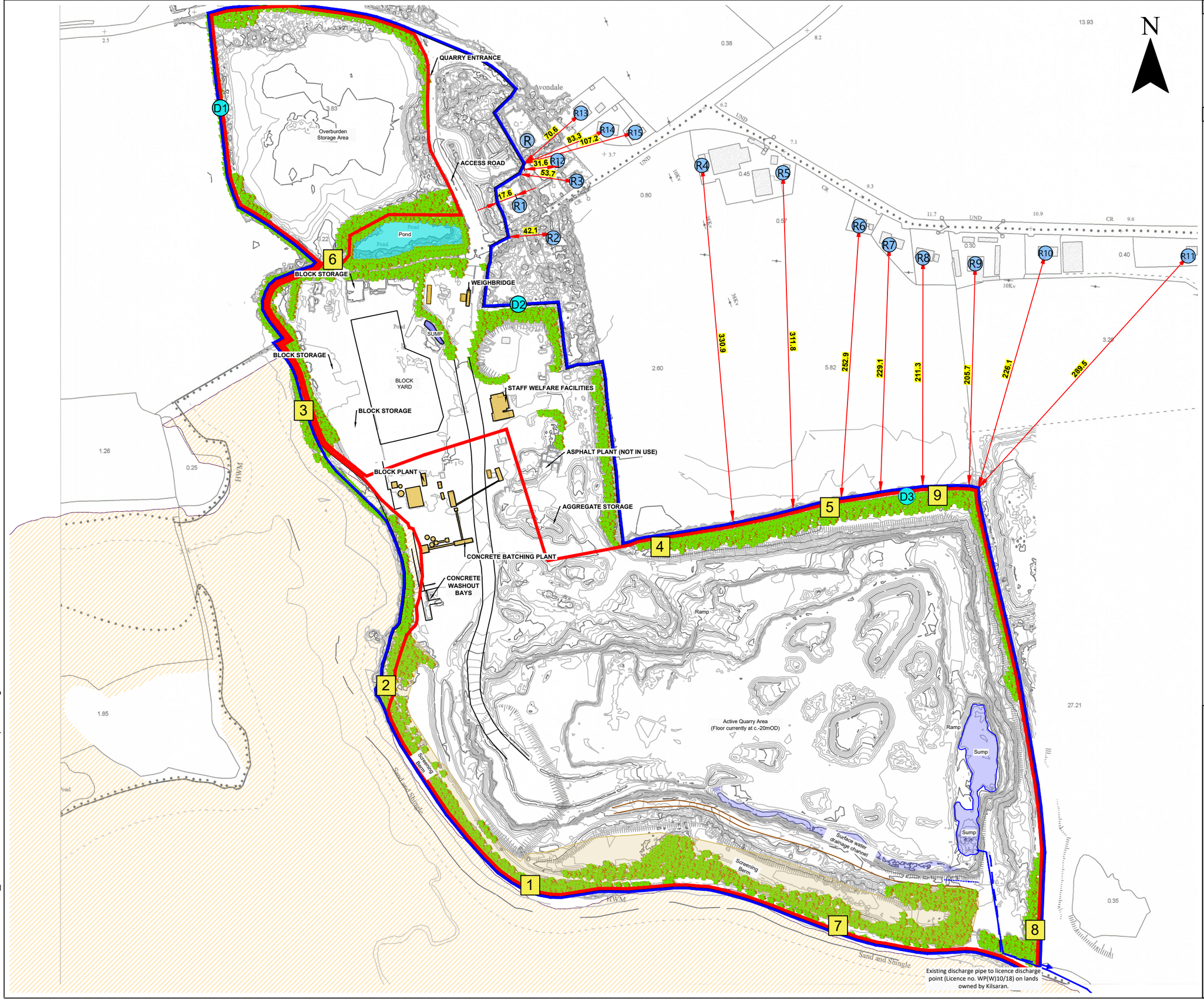
For each receptor, the relative magnitude of risk is given by identifying which of the score categories in Table 8 A-4 it falls into. This final evaluation represents the risk of dust impacts prior to control and mitigation measures being employed on site.

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

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

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

# FIGURES




NOTES

**1.** BASED ON EXTRACT FROM 1:2500 O.S.I MAP NO. 6386A 6386B 6386C AND 6386D.

**2.** ORDNANCE SURVEY IRELAND LICENCE NO. **CYAL50167032** (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND.

LEGEND

- APPLICANTS LAND INTEREST
- PLANNING APPLICATION AREA (c.24.7 ha)
- RESIDENTIAL PROPERTY LOCATION (RECEPTORS)
- DUST MONITORING LOCATIONS (BERGERHOFF)
- DUST MONITORING LOCATIONS (STICKY PADS)
- SPECIAL AREA OF CONSERVATION (SAC)

**NOTE:**
The SAC / SPA boundaries have been downloaded from the NPWS mapping webviewer database as a dxf data-set.

The NPWS mapping data was digitised on the old 6 inch (1841 and revised 1929-1930) mapping system in Irish Grid which has resulted in discrepancies when overlaid on the more updated 2500 scale mapping.

*'Orthomosaic produced from Aerial Photography flown **MAY 2018** by SLR Consulting Ireland (IAA Permit No. 150052) www.slrconsulting.com Tel. +353-1-2964667.*

*Orthomosaic produced using Ground Control Points; Related to Irish Transverse Mercator Coordinate System and OS Malin Head Level Datum.*

*The accuracy of the orthomosaics and the digital elevation models (DEM) strongly depends on the flight height, lighting conditions, availability of textures, image quality, overlap, and type of terrain. Contours / 3D data relates to the surface model and not terrain levels. Typical accuracies: E: 0.05 m; N:0.05 m; Levels: 0.30 m.*

*All Dimensions and Levels are to be checked on site.*

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**KILSARAN CONCRETE**

**ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

ROSSMORE QUARRY, CARRIGTOHILL, CO. CORK

**DUST ASSESSMENT RECEPTORS**

# FIGURE 8-1

| Scale | Date |
|---|---|
| NTS @ A3 | JUNE 2021 |

00036.00070.0001.FIG_8-1.R0.18.Dust Assessment Receptors.dwg

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## FIGURES

# INTRODUCTION

## Background

9.1 This chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, provides supporting information to accompany a Planning Application to Cork County Council by Kilsaran. It primarily addresses potential climate related impacts from the proposed continuance of use of the permitted quarry at Barryscourt & Rossmore Tds., Carrigtohill, Co. Cork.

9.2 The development consists of continuance of use of the existing permitted quarry. A description of the development is provided in EIAR Chapter 2.

9.3 This quarry is located at a coastal location with the southern boundary of the property being adjacent to Rossmore Bay.

## Scope of Work

9.4 The following sections of this Chapter describe the potential climate change impacts associated with the proposed development. The following issues are addressed separately:

- climate change legislative framework/policy context;
- analysis of evolving environmental baseline trends;
- identifying climate change concerns in relation to proposed development;
- assessing effects (cumulative effects and uncertainty);
- identifying alternatives and mitigation measures;
- identifying monitoring and adaptive management.

## Contributors / Author(s)

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

## Limitations / Difficulties Encountered

9.6 There are currently no published guidelines and established methodology providing specifically for assessment of climate impacts from extraction or associated quarrying activities in Ireland. This Chapter of the EIAR has therefore been prepared on the basis of published, general cross-sectoral guidance.

# Legislative Framework/ Policy Context

## Adaptation to Climate Change

9.7 In recent years, there has been increasing public awareness about the implications of past, ongoing and continued future emissions of greenhouse gases on the earth's climate. The implications of such

change will potentially have significant impact on local communities and national populations across the world. The ever-increasing awareness and acceptance of this reality has, in recent years, prompted significant public policy development around emissions and climate change.

9.8 An overview of the legislative framework and policy context which informs this assessment of potential climate impacts of future backfilling and waste recovery activities at Rossmore Quarry is presented in Appendix 9-A and provides background detail in respect of the following :

- National Policy on Adaption to Climate Change
  - Sectoral Adaption Plans
  - Local Level Adaption
- Regulation / Control of Greenhouse Gas Emissions
  - Paris Agreement (2015)
  - Kyoto Protocol (2008-2012)
  - EU 2021-2030 Targets for non-ETS sector emissions- Effort Sharing Regulations
  - Energy White Paper (2015)
- Future Management of Flood Risk
- EIA Directive 2014/52/EU
- Published Guidelines
  - Guidance on Integrating Climate Change and Biodiversity into EIA
  - Assessing Greenhouse Gas Emissions and Evaluating their Significance
  - Climate Change and Major Projects
  - Sector Planning Guidelines for Climate Change Adaption
  - Local Authority Strategy Development Guidelines.

# RECEIVING ENVIRONMENT

## Climate Environmental Baseline

### *Regional Context*

9.9 Observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising sea level are unequivocal evidence of warming of the climate system globally. Global mean temperature has increased by 0.8°C compared with pre-industrial times for land and oceans, and by 1.0°C for land alone. Most of the observed increase in global average temperatures is very likely due to increases in anthropogenic greenhouse gas concentrations.

9.10 Landmasses are expected to warm more than the oceans, and northern, middle and high latitudes. Despite possible reductions in average summer precipitation over much of Europe, precipitation amounts exceeding the 95th percentile are very likely in many areas; thus, episodes of severe flooding may become more frequent despite the general trend towards drier summer conditions. In an ensemble-based approach using outputs from 20 global climate models (GCMs), the Mediterranean, northeast and northwest Europe are identified as warming hot spots but with regional and seasonal variations in the pattern and amplitude of warming. Regional climate models (RCMs) also project rising temperatures for Europe until the end of the 21st century, with an accelerated increase in the second half of the century. For precipitation, the larger-scale summer pattern shows a gradient from increases in Northern Scandinavia to decreases in the Mediterranean region. By contrast, increases in wintertime precipitation primarily north of 45°N

are a consistent feature of RCM projections over Europe, with decreases over the Mediterranean. Overall, then, there are consistent projections of change for northern and northwest Europe.

9.11 Ireland has a typical maritime climate, with relatively mild and moist winters and cool, cloudy summers. The prevailing winds are south-westerly in direction. The climate is influenced by warm maritime air associated with the Gulf Stream which has the effect of moderating the climate, and results in high average annual humidity across the country. The area of least precipitation is along the eastern seaboard of the country, in the rain shadow of the Leinster uplands.

9.12 Mean seasonal temperature will change across Ireland. A number of studies have applied selected IPCC Special Reports on Emissions Scenarios (SRESs) to model climatic changes across Ireland at a regional scale. Despite the different methods and scenario combinations used, there is agreement in projected changes in temperature for Ireland. However, there are more disparities in the magnitude and sign for the precipitation changes projected for the island.

9.13 Table 9-1 summarises climate impact projections for Ireland, estimates of projections confidence are derived from published projection data from the Local Authority Adaptation Strategy Development Guidelines.

Table 9- 1
Climate Impacts Projections: 30-year overview[1]

| Variable | Summary | Confidence | Projected changes |
|---|---|---|---|
| Sea Levels Rise | Strong increase | High | Projections of sea level rise to 2100 suggest a global increase in the range of 0.09-0.88m with a mean value of 0.48. For 2050, it is reasonable to assume a sea level rise in the region of 25 cm above present levels. |
| Storm surge | Strong increase | Medium | An increase in the numbers of intense cyclones and associated strong winds are expected over the north - east Atlantic. By the 2050s, storm surge heights in the range of 50-100cm are expected to increase in frequency for all coastal areas with exception of the southern coast. |
| Costal Erosion | Moderate increase | Low | Currently approximately 20% of Ireland's coastline is at risk of costal erosion, particularly areas of the south and east coast and also in isolated areas on the west coast. Rates of increase will be determined by local circumstances; however, it is expected that areas of the south-west are likely to experience the largest increase. |
| Cold Snaps/ Frost | Moderate decrease (winter/night) | High | By mid-century, minimum temperatures during winter are projected to increase by ~2$^0$C in the southeast and ~2.9$^0$C in the north. This change will result in fewer frost days and milder nigh-time temperatures. |

[1] Local Authority Adaptation Strategy Development Guideline, EPA 2016

| Variable | Summary | Confidence | Projected changes |
|---|---|---|---|
| Heatwaves | Strong increase (summer) | High | Seven significant heatwaves (defined as 5+ days@>25$^0$C) have been recorded in Ireland over the past 30 years, resulting in approximately 300 excess deaths. By mid-century, a projected increase in summer maximum daily temperature of approximately 2$^0$C will likely intensify heatwaves, with maximum temperatures increasing and heatwave duration lengthening. |
| Dry Spells | Strong increase (summer) | Medium | There have been seven periods of insignificant rainfall in Ireland in the past 40 years. Of these, the events of 1976 and 1995 were the most severe, averaging 52 and 40 days in duration respectively across Irish rainfall stations. An approximate 20% decrease in summer precipitation receipts in many areas is strongly indicated under a high emissions scenario. This decrease is likely to results in progressively longer periods without significant rainfall, posing potentially severe challenges to water sensitive sectors and regions. |
| Extreme Rainfall | Strong increase (winter) | Low | Heavy precipitation days (in which more than 20mm of rainfalls) are likely to increase in frequency in winter. By the 2050s an increase in the number of heavy precipitation days of around 20% above the level of 1981-2000 is projected under both low-medium and high emissions scenarios. This may have serious consequences for flood risk in sensitive catchments. |
| Flooding | Moderate increase (winter) | Low | An Irish Reference Network of hydrometric stations has been established to assess signals of climate charge in Irish hydrology. This network has detected an increasing trend in high river flows since 2000. Projections of future flows are beset by uncertainty at the catchment scale, but a broad signal of wetter winters and drier summers is evident across a number of independent studies. |
| Wind Speed | Minor increase (winter) | Medium | Observed wind speed over Ireland has not changed significantly in recent times, but it is anticipated that the distribution of wind will alter slightly in future, with winters marginally winder and summers marginally less so. Though the average wind speed is anticipated to change in only a minor way over the coming decades, the frequency of extreme windstorms is expected to increase due to alternations in the origin and track of tropical cyclones. |

## *Local Context*

9.14 The weather station at Cork Airport which is located approximately 15km to the south-west of the application site is considered representative of conditions experienced at the application site.

### Temperature

9.15 The moderating influence of the Atlantic Ocean is felt throughout Ireland. The annual mean temperature for different areas in Ireland varies between mountainous regions, lowlands and the coast. Mean daily maximum temperatures are typically between 8.2 to 18.7°C and mean daily minimum temperatures are typically between 3.0 to 11.8°C.

9.16 The mean daily duration recording of sunshine for the area around Cork Airport is 3.9 hours. December is the dullest month, with 1.7 hours for Cork Airport of mean daily duration. May is the sunniest month, with 6.2 hours for Cork Airport and of mean daily duration, explained largely by its long days and finer weather.

Table 9- 2
Cork Airport 1981-2010 Temperature Averages

| Temperature (degrees Celsius) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
| Mean Daily Max | 8.2 | 8.3 | 9.9 | 11.8 | 14.4 | 17 | 18.7 | 18.5 | 16.5 | 13.2 | 10.3 | 8.5 | 12.9 |
| Mean Daily Min | 3.0 | 3.1 | 4.0 | 4.9 | 7.4 | 10.0 | 11.8 | 11.8 | 10.2 | 7.7 | 5.2 | 3.7 | 6.9 |
| Mean Temperature | 5.6 | 5.7 | 6.9 | 8.4 | 10.9 | 13.5 | 15.3 | 15.2 | 13.3 | 10.5 | 7.8 | 6.1 | 9.9 |

## Wind

9.17 Results from the synoptic meteorological station at Cork Airport, located approx. 15km south -west of the application site over the period 1990-2007, indicate that the main wind direction is from a west and south-westerly direction, with an annual incidence of 37.9% for winds between 200° and 280°; and 30% for winds between 290° and ° refer to **Error! Reference source not found.**. The lowest frequency is for winds blowing from the east and northeast direction.

9.18 The mean yearly wind speed at Cork Airport over the period 1981 to 2010 is 10.5 knots, or 5.4 m/s, with maximum gusts of 65.9 knots or 33.9 m/s. The average number of gale days per year is 10.8; indicating that the area is “windy”, without experiencing the extreme gusts that occur on the west coast (Table 9-3).

Table 9- 3
Cork Airport Wind

| WIND (knots) | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean monthly speed | 12.1 | 12.0 | 11.6 | 10.3 | 10.1 | 9.4 | 9.0 | 9.0 | 9.4 | 10.7 | 10.9 | 11.6 | 10.5 |
| Max. gust | 78.0 | 83.0 | 70.0 | 62.0 | 59.0 | 49.0 | 57.0 | 54.0 | 58.0 | 75.0 | 66.0 | 80.0 | 65.9 |
| Max. mean 10-minute speed | 52.0 | 54.0 | 43.0 | 40.0 | 40.0 | 33.0 | 40.0 | 38.0 | 39.0 | 48.0 | 46.0 | 56.0 | 44.1 |
| Avg days with gales | 2.3 | 1.8 | 1.3 | 0.3 | 0.3 | 0.0 | 0.1 | 0.2 | 0.3 | 1.0 | 1.2 | 1.9 | 10.8 |

## Rainfall / Precipitation

9.19 During the period 1981-2010, long-term monthly rates of precipitation were between 76.5mm and 133.1mm at the Cork Airport station, with winter months receiving the heaviest amounts. The mean of the Met Eireann records indicates that average annual rainfall around Cork Airport is approximately 1227.9mm / year; refer to Table 9-4. The average rainfall data indicates that the greatest daily total (73.2mm) falls in the month of July.

Table 9- 4
Average Precipitation Cork Airport (mm) 1981-2010

| Rainfall (mm) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
| Mean Monthly Total | 131.4 | 97.8 | 97.6 | 76.5 | 82.3 | 80.9 | 78.8 | 96.8 | 94.6 | 138.2 | 120.0 | 133.1 | 1227.9 |
| Greatest Daily Total | 45.7 | 49.9 | 55.2 | 34.2 | 34.9 | 59.7 | 73.2 | 60.9 | 58.9 | 52.1 | 47.9 | 41.9 | 73.2 |
| Mean num. of days with ≥ 0.2mm | 20 | 17 | 19 | 16 | 15 | 14 | 15 | 15 | 16 | 19 | 19 | 19 | 204 |

9.20 Rainfall is an important climatological parameter in the generation or control of dust; sufficient amounts of rainfall can suppress dust at the source and eliminate the pathway to the receptor. According to Arup Consulting Engineers (1995)[2], rainfall greater than 0.2mm per day is sufficient to suppress dust emissions. For the 30-year period (1981-2010) Cork Airport has recorded an average of 204 days per year (55%) where rainfall is equal to or above 0.2mm.

## Sea Level Rising and Storm Surge

9.21 Relative sea level for Ireland is rising 1 mm/y on average, although there are significant regional variations (Devoy (2008)).

[2] Arup Environmental. Environment Effects of Surface Mineral Workings. UK DoE, October 1995

9.22 Coastal flooding events, particularly those associated with storm surge events that occur in combination with spring tides can cause devastating effect. Towards the end of the century there is likely to be an increase in the number of intense cyclones and associated strong winds, over the North Atlantic; a slight shift of the storm tracks is also likely. These changes will have a direct impact on storm surges. Rising sea levels will enhance the impact of surges. According to the research of Lowe et al. (2001), along the south Irish Sea coast the surge height is dominated by the low-pressure effect, with the wind forcing providing only 16% of the surge height.

9.23 Model projections of climate change impact on storm surge in the Irish Sea was made for two 30-year time-slice periods (1961–1990 and 2031–2060). A climate change scenario characterized by low population growth, rapid economic growth and rapid introduction of new and efficient technologies (the so-called SRES A1B emission scenario in the IPCC report of 2000). The atmospheric CO2 concentration in this scenario reaches 720 ppm at the end of 21st century and the global mean temperature will rise about 3.8 degrees Celsius by the end of this century (relative to the mean temperature between 1961 and 1990). From their analysis Wang et al. (2008) concluded that their model is capable of reproducing storm surge events with reasonable accuracy, supporting its use as a suitable tool in climate change studies.

9.24 For 2031–2060 relative to 1961–1990 changes (%) in the annual mean wind speed are relatively small; there is an increasing tendency along the west and north-west coast of Ireland and part of the UK coast, but a decrease over the open sea. For the difference changes of mean sea level pressure, the distribution pattern shows an increase around Ireland and to the south, and a decrease to the northwest. This is consistent with an increase in the frequency of intense cyclones over the area in the future.

9.25 Study shows that storm surge heights in the range 50–100 cm are increasing in frequency around all Irish coastal areas from 1961–1990 to 2031–2060; up to 20% in the west and northwest. There is also a significant increase in the height of the extreme surges along the west and east coasts, with most of the extreme surges occurring in wintertime. Changes in extreme surge heights also appear to be related to changes in extreme wind speeds and mean sea level pressure. There are also significant changes in the return values of surge heights.

9.26 Due the complex bathymetry in the continental shelf area, some non-local surge propagating along the coast also caused the discrepancy between the surge height and wind speed. The significant test results show that large fraction of the extreme surge heights in the southern Irish sea area are significant at 10% level, while almost non-significant in the northern area, which is totally different from the extreme wind speed distribution.

# IMPACT ASSESSMENT

## Methodology

9.27 In Ireland some sectors have independently begun the process of identifying key vulnerabilities for their activities. The report by the Irish Academy of Engineering, Ireland at Risk Critical Infrastructure – Adaptation for Climate Change (The Irish Academy of Engineering, 2009) and the report by the Heritage Council and Fáilte Ireland (the National Tourism Development Authority), Climate Change,

Heritage and Tourism, Implications for Ireland's Coast and Inland Waterways (ed. Kelly and Stack, 2009) are examples of initiatives of this kind.

9.28 Other research work on adaptation in specific sectors has been carried out or commissioned by other Government Departments/bodies such as the OPW, CoFoRD (programme of competitive forest research for development research programme, etc. (e.g. CLIMADAPT).

9.29 A National Climate Change Vulnerability Scoping Study (Sweeney and Coll, 2012) was undertaken to identify first generation vulnerabilities for Ireland based on a sensitivity analysis across key sectors. The analysis identified a clustering of impacts and their importance in relation to an assessment of likely resilience by sector. The assessment methodology used was an impacts-first, science-first classical approach. The priority sectors identified are: biodiversity and fisheries; water resources and the built coastal environment; forestry and agriculture. As each sector develops its sectoral adaptation plan (under the Climate Action and Low Carbon Development Act 2015), detailed vulnerability and risk analysis will be required. Some preliminary work has been undertaken on costing the impacts of climate change in Ireland. This is now being supported by more detailed analysis of the current and future costs of flood risk management.

9.30 The implementation of adaptation is being supported by the development of a suite of guidelines, tools and approaches. These include the Local Authority Adaptation Strategy Development Guideline; and the Irish climate information platform "Climate Ireland", which includes data, information, tools and approaches for local level adaptation decision making. Work is ongoing to develop sectoral decision-making tools and supports.

9.31 The EPA is currently funding a research project called Urb-Adapt which aims to identify the impact of climate change on Dublin city and surrounding towns within the greater Dublin region. The project aims to identify possible risks to the population living in that area and future risks posed to it by the changing climate.

9.32 There are no specific tools developed for assessing climate change for extraction industry. The Climate Change and Major Project guideline on how to make vulnerable investments resilient to climate change provides methodology for undertaking a vulnerability and risk assessment.

9.33 Climate change adaptation and mitigation shall be integrated in the preparation and approval of proposed development. Adaptation seeks to ensure adequate resilience of proposed development to the adverse impacts of climate change based on Vulnerability. Mitigation seeks to reduce the emissions greenhouse.

### *Development Vulnerability*

9.34 The aim of the vulnerability assessment is to identify the relevant climate hazards for the development at the foreseen location. Main steps in include identifying and combining the sensitivity and exposure of the project which will describe the vulnerability, the risk will be defined as likelihood and impact.

9.35 Adaptation through project options, appraisal, and planning will depend on the assessed project vulnerability and risk.

9.36 Timescale for the project vulnerability and risk assessment shall correspond to the lifespan of the project. During the lifespan, there could be significant changes in frequency and intensity of weather events due to climate change, which should be taken into account. Detailed methodology charts for development vulnerability assessment are presented in Appendix 9- B.

### *Greenhouse Gases Emissions*

9.37 All projects have the potential to emit greenhouse gas (GHG) emissions to atmosphere during the construction, operational and decommissioning phase of the development. Direct GHG emissions may be caused by operational activities, and project decommissioning. Indirect GHG emissions may be due to increased demand for energy and indirect GHG activities. Indirect GHG activities are linked to the implementation of the proposed project and may include transport, office space heating of buildings or loss of habitats that provide carbon sequestration, (e.g. through land-use change). The significance of project's GHG emissions should be based on its net impact, which may be positive or negative. Where GHG emissions cannot be avoided, significance of project's emissions shall be reduced by mitigation or project design. Where GHG emissions remain significant but cannot be reduced further approaches to compensate project emissions should be considered.

9.38 Currently in Ireland, there is no set methodology to evaluate significance criteria or a defined threshold for GHG emissions for mineral extraction industry. Due to the inconsistences between the different methods and their assumptions for assessment, there is no single agreed method by which to assess a project carbon budget. The method of assessment varies according to the type and scale of the development.

9.39 Due to a lack of guidelines and an established methodology, the assessment of significance of the GHG emissions is based on whether the development's GHG emissions cumulatively represent a considerable contribution to the global atmosphere and whether the development as continued or extended will replace existing development that would have a higher GHG profile.

9.40 Where the GHG emissions cannot be avoided, the mitigation should aim to reduce the development emissions at all stages.

## Assessment

### *Development Vulnerability*

9.41 The aim of the vulnerability assessment is to identify the relevant climate hazards for the project at the foreseen location. Detailed development vulnerability assessment for the proposed development is presented in Appendix 9-C.

9.42 Based on the development vulnerability assessment, measures to improve the resilience of the project to extreme rainfall, flood, flash flood, storms, and winds, are required.

9.43 The relative sea level rise (c. 25 cm over the next 50 years) and storm surges (50 to 100cm) will not materially impact on the quarry development over its operational life due to the topographic level differences between Rossmore Bay and the property.

## Greenhouse Gas Emissions

9.44 For the purpose of this assessment, GHG emissions have been calculated for the quarry development based on energy and fuel use. Assuming a maximum limestone production of up to 500,000 tonnes / year.

9.45 Total annual GHG emissions for the quarry development are presented in Table 9-5.

Table 9- 5
GHG Emissions Calculations

| Type | Calculated | Total Annual $CO_{2e}$ kg |
|---|---|---|
| Traffic (Movements) | 2104.3 | - |
| Energy Diesel / Oil | 48,728 | - |
| Energy Electricity | 942,399 | |
| TOTAL | | 993,231 |

9.46 Based on a calculated total annual emission of 993,231 $CO_{2e}$ kg and a comparison to Ireland's 2018 emissions value of 60.51 MTonnes of $CO_{2e}$, it is assessed that the proposed operations would represent a maximum of just 0.00164% of Ireland's annual $CO_{2e}$ emissions for the duration.

9.47 Based on the scale and extent of proposed activities, GHG emissions are assessed as not making a significant contribution to the global atmosphere.

# MITIGATION

9.48 Mitigation is designed to increase the resilience of the development, or wider environmental receptors, to climate change and should focus on increasing its capacity to absorb climate related shocks.

## Project Adaptation against Expected Climate Change Effects

9.49 In the context of climate change adaptation to increase adaptive capacity of Rossmore Quarry, disaster risk reduction strategies shall be developed with a view to reducing vulnerability and increase resilience of the development. Significant incidents related to the climate change that affect operation of Rossmore Quarry shall be recorded for future analysis.

9.50 Based on the development vulnerability assessment, measures to improve the resilience of the project to extreme rainfall, flood, flash flood, storms, and winds are required. Table 9-6 details specific mitigation measures for Rossmore Quarry related to climate change adaptation.

9.51 Table 9- 6

**Mitigation Measures Related to Climate Change Adaptation**

| Main Concerns Related to: | Mitigation Measures |
|---|---|
| Extreme Rainfall, Flood, Flash Flood | Design that allows for rising water levels and ground water levels. |
| | Robust water management system implemented |
| Storms and Winds | Project design can withstand increases high winds and storms |
| | Choice of equipment working at the project is weather efficient. |
| Risk Reduction Mechanism | Appropriate insurance for damage of assets / incidences. |

## Proposed Reduction of GHG Emissions

9.52 Kilsaran shall adopt GHG monitoring programme at Rossmore Quarry. Based on the GHG monitoring results Kilsaran shall establish short, medium, and long-term objectives and targets for GHG reduction programme and energy management plan.

9.53 Table 9-7 details specific mitigation measures for Rossmore Quarry related to GHG reduction programme.

**Table 9- 7**

Mitigation Measures Related to GHG Reduction Programme

| Main Concerns Related to: | Mitigation Measures |
|---|---|
| Increased demand for energy | Consider using renewable energy sources/ suppliers.<br>Use low carbon construction materials. |
| Direct GHG emissions | Use energy efficient machinery/ energy. |
| GHG emissions related to transport | Unnecessary equipment/ transport journeys should be avoided by management of transport and travel demands. Equipment should not be left idling. |

# MONITORING

## Project Adaptation against Expected Climate Change Effects

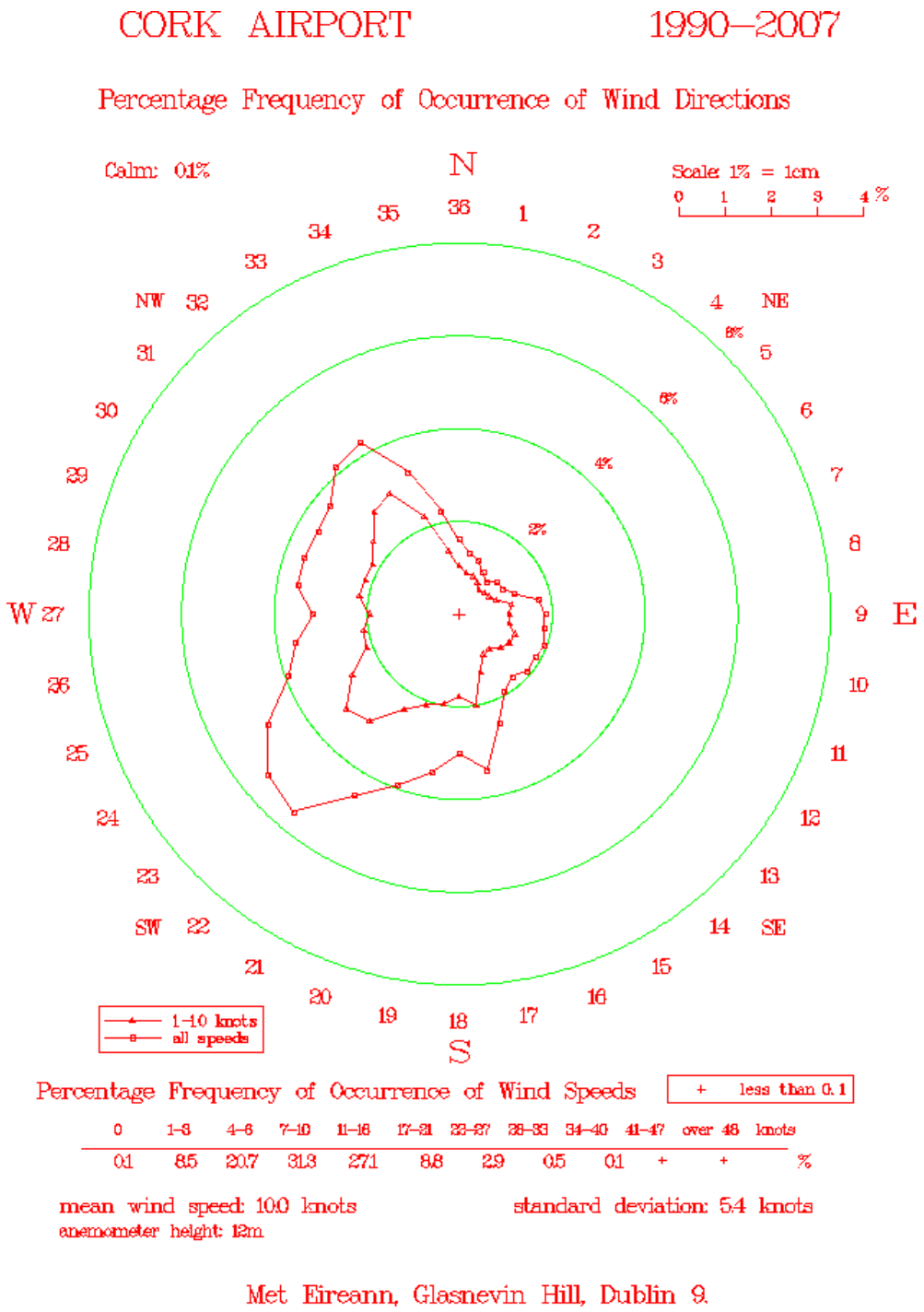
9.54 Monitoring of the climate resilience measures shall be undertaken on a regular basis, and details of these reviews shall be recorded under the Environmental Management System (EMS) for the development.

## GHG Emissions

9.55 Monitor report and review GHG reduction progress.

# FIGURES

**Figure 9-1**
**Windrose for Cork Airport Meteorology Station 1990 - 2000**



# Appendix 9- A

## Adaptation to Climate Change

9.56 The Irish National Policy Position on Climate Action and Low Carbon Development[3] establishes the fundamental national objective of achieving transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050. It sets out the context for the objective; clarifies the level of greenhouse gas (GHG) mitigation ambition envisaged; and establishes the process to pursue and achieve the overall objective. Specifically, the National Policy Position envisages that policy development will be guided by a long-term vision based on:

- an aggregate reduction in carbon dioxide (CO2) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors;
- in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

9.57 The evolution of climate policy in Ireland will be an iterative process based on the adoption by Government of a series of national plans over the period to 2050. Greenhouse gas mitigation and adaptation to the impacts of climate change are to be addressed in parallel national plans – respectively through National Mitigation Plans and National Climate Change Adaptation Frameworks. The plans will be continually updated, as well as being reviewed on a structured basis at appropriate intervals, and at a minimum, every five years. This will include early identification and ongoing updating of possible transition pathways to 2050 to inform sectoral strategic choices.

9.58 The Climate Action and Low Carbon Development Act 2015[4] was enacted in December 2015. The Act identified and provided for the development and submission to the Government of national mitigation and adaptation plans. It also established the institutional and governance framework within which these plans can be developed and implemented on a cyclical basis.

9.59 The Department of Communications, Climate Action & Environment (DCCAE) published a National Adaptation Framework (NAF) in January 2018[5]. The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts.

9.60 The NAF builds on the work already carried out under the National Climate Change Adaptation Network (NCCAF, 2012). Under the NAF a number of Government Departments will be required to prepare sectoral adaptation plans in relation to a priority area that they are responsible for. Local authorities are required to prepare local adaptation strategies. The NAF also aims to improve the enabling environment for adaptation through ongoing engagement with civil society, the private sector, and the research community.

9.61 The production of aggregates was not specifically identified under the NAF to prepare sectoral adaptation plans in line with the requirements of the Climate Action and Low Carbon Development Act.

9.62 The Climate Action Plan 2019[6] sets out the Irish Government's plan to tackle climate breakdown and achieve net zero greenhouse gas emissions by 2050.

[3] https://www.dccae.gov.ie/en-ie/climate-action/publications/Pages/National-Policy-Position.aspx
[4] https://www.dccae.gov.ie/en-ie/climate-action/legislation/Pages/Climate-Action-and-Low-Carbon-Development-Act-2015.aspx
[5] https://www.dccae.gov.ie/en-ie/climate-action/topics/adapting-to-climate-change/national-adaptation-framework/Pages/default.aspx
[6] https://www.dccae.gov.ie/en-ie/climate-action/publications/Pages/Climate-Action-Plan.aspx

9.63 The Plan clearly identifies the nature and scale of the challenge. It outlines the current state of play across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and charts a course towards ambitious decarbonisation targets. Reflecting the central priority climate change will have in our political and administrative systems into the future, the Plan sets out governance arrangements including carbon-proofing our policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas.

9.64 This Plan clearly recognises that Ireland must significantly step up its commitments to tackle climate disruption. The leadership role both the Government and public bodies can play in taking early action on climate is fundamental to achieving our decarbonisation goals.

### *Sectoral Adaptation Plans*

9.65 Under the non-statutory 2012 Framework, four Government Departments prepared draft sectoral plans covering five sectors. These plans are:

- Sectoral Adaptation Plan for Flood Risk Management (OPW, 2015);
- Adaptation Planning - Developing Resilience to Climate Change in the Irish Agriculture and Forest Sector (DAFM, 2017);
- Adaptation Planning - Developing Resilience to Climate Change in the Irish Transport Sector (DTTAS, 2017);
- Adaptation Plan for the Electricity and Gas Networks Sector (DCCAE, 2017).

9.66 As mentioned previously a number of Government Departments are required develop statutory sectoral adaptation plans under NAF. These are to be prepared in accordance with a six-step adaptation planning process described in the Sectoral Planning Guidelines for Climate Change Adaptation[7]. The guidelines aim to ensure that a coherent and consistent approach to adaptation planning will be adopted by the key sectors in Ireland. The completed plans include actions that:

- Mainstream (integrate) adaptation into key sectoral plans and policies;
- Identify and understand the key vulnerabilities, risks, and opportunities facing their sectors. This should include major cross cutting risks;
- Ensure that plans related to emergencies assigned to a sectoral department as lead Government department under the Strategic Emergency Planning Guidelines are climate proofed;
- Identify and collect information on the costs and benefits of adaptation within their sectors;
- Build capacity within their sectors to cope with climate change;
- Identify and address key research gaps within their sectors;
- Improve co-ordination with the local government sector;
- Develop appropriate monitoring and verification systems within their sectors.

9.67 Sectoral Adaptation Plans have already been published for the following twelve sectors under seven Government Departments[8]:

[7] https://www.dccae.gov.ie/documents/SPG%20Climate%20Change%20Adaptation.pdf
[8] https://www.dccae.gov.ie/en-ie/climate-action/topics/adapting-to-climate-change/national-adaptation-framework/sectoral-adaptation-planning/Pages/Sectoral.aspx

- Seafood - Department of Agriculture, Food and the Marine
- Agriculture - Department of Agriculture, Food and the Marine
- Forestry - Department of Agriculture, Food and the Marine
- Biodiversity - Department of Culture, Heritage and the Gaeltacht
- Built and Archaeological Heritage - Department of Culture, Heritage and the Gaeltacht
- Transport infrastructure - Department of Transport, Tourism and Sport
- Electricity and Gas Networks - Department of Communications, Climate Action and Environment
- Communications networks - Department of Communications, Climate Action and Environment
- Flood Risk Management - Office of Public Works
- Water Quality - Department of Housing, Planning and Local Government
- Water Services Infrastructure - Department of Housing, Planning and Local Government
- Health - Department of Health.

### *Local Level Adaptation*

9.68 The National Adaptation Framework (NAF) identifies the critical role to be played by local authorities in addressing climate change adaptation. This will effectively build on their existing expertise and experience as first responders in emergency planning scenarios. Under the NAF each local authority has developed their own adaptation strategies in line with guidelines developed for the sector.

9.69 The NAF explores how local authorities might adopt a joint or regional approach to adaptation planning. In January 2018 the Department entered into a five-year financial commitment of €10m establishing four Climate Action Regional Offices (CAROs). Building on a business case prepared by the local government sector itself, this commitment recognises the significant obligation which has been placed on local government to develop and implement its own climate action measures, as well as the need to build capacity within the sector to engage effectively with climate change – both in terms of mitigation and adaptation.

9.70 The Climate Action Regional Offices are being operated by a lead local authority in the four different regions that have been grouped together based on a climate risk assessment with a focus on the predominant risk(s) in each geographical area. The establishment of these offices enables a more coordinated engagement across the whole of government and will help build on the experience and expertise which exists across the sector.

9.71 Table 9A-1 summarises the adaptation actions to climate change in Ireland.

**Table 9A-1**
Summary of Adaptation to Climate Change Actions in Ireland[9]

| Item | Status | Programs |
|---|---|---|
| National Climate Adaptation Strategy | Legislation enacted.<br>Statutory Framework adopted | Climate Action and Low Carbon Development Act 2015<br>National Adaptation Framework |
| Action Plans | Sectoral Adaptation Plans published.<br>Local authority plans published. | Local Authority Adaptation Strategy Development Guidelines (2018)<br>Sectoral Planning Guidelines for Climate Change Adaptation (2018)<br>Local Authority Adaptation Support Tool |
| Impacts, Vulnerability and Adaptation Assessments | National Vulnerability Assessment | 2012 National Climate Change Vulnerability Scoping Study<br>Climate Change Impacts on Biodiversity in Ireland (2013)<br>Climate change Impacts on Phenology in Ireland(2013)<br>COCOADAPT (2013)<br>2013 Hydro Detect Project<br>Robust Adaptation to Climate Change in the Water Sector in Ireland (2013)<br>Ensemble of Regional Climate Projections for Ireland(2015)<br>Urb-ADAPT<br>Sectoral Adaptation Plan for Flood Risk Management (OPW, 2015).<br>Adaptation Planning - Developing Resilience to Climate Change in the Irish Agriculture and Forest Sector (DAFM, 2017)<br>Adaptation Planning - Developing Resilience to Climate Change in the Irish Transport Sector (DTTAS, 2017).<br>Adaptation Plan for the Electricity and Gas Networks Sector (DCCAE, 2017). |
| Research Programs | EPA Research Programme (Climate Pillar) | http://www.epa.ie |
| Climate services / Met Office | Established | http://www.met.ie |
| Web Portal | Established | http://www.climateireland.ie |
| Monitoring, Indicators, Methodologies | Established | Ensemble of regional climate model projections for Ireland (EPA 2015)<br>http://www.climatecouncil.ie/ |
| Training, Education | Ongoing / in development | http://www.climateireland.ie |

[9] http://climate-adapt.eea.europa.eu/countries-regions/countries/ireland

## Green House Gas Emissions

9.72 Ireland is a party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, which together provide an international legal framework for addressing climate change.

9.73 In December 2015, an ambitious new legally binding, global agreement on climate change was agreed in Paris. The Paris Agreement aims to restrict global temperature rise to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C. It aims to increase global ability to adapt to the adverse impacts of climate change and to foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten sustainable food production. It also seeks to achieve a balance between anthropogenic emissions by sources, and removals by sinks, of greenhouse gases in the second half of this century.

9.74 The first Irish National Mitigation Plan[10] represents an initial step to set us on a pathway to achieve the level of decarbonisation required. It is a whole-of-Government Plan, reflecting in particular the central roles of the key Ministers responsible for the sectors covered by the Plan – Electricity Generation, the Built Environment, Transport and Agriculture, as well as drawing on the perspectives and responsibilities of a range of other Government Departments.

9.75 The measures that will be implemented through the plan will lay foundations for transitioning Ireland to a low carbon, climate resilient and environmentally sustainable economy by 2050. To support this ongoing work, the Plan also includes over 100 individual actions for various Ministers and public bodies to take forward.

9.76 Emissions reduction measures and actions set out in this National Mitigation Plan are aligned with and build upon commitments made in the 2015 Energy White Paper. The Paper will be guided by the following strategic objectives:

- policy will contribute to reductions in Ireland's greenhouse gas emissions and enhancement of sinks in a manner that achieves the optimum benefits at least cost;
- a stable and predictable policy and regulatory framework will be underpinned by rigorous analysis and appraisal, supported by strong research and analytical capacity;
- the Government will pursue investment, innovation and enterprise opportunities towards building a competitive, low carbon, climate-resilient and environmentally sustainable economy; and
- the citizen and communities will be at the centre of the transition.

### *Paris Agreement*

9.77 The Paris Agreement entered into force on the 4th November 2016[11].

9.78 The Paris Agreement aims to tackle 95% of global emissions through 188 Nationally Determined Contributions (NDCs) which will increase in ambition over time. Ireland's contribution to the Paris Agreement will be via the NDC tabled by the EU on behalf of its Member States. This is a binding target for an overall reduction of at least 40% in greenhouse gas emissions by 2030 (relative to 1990 levels). The target will be delivered by the EU by 2030 through reductions in the Emissions Trading Scheme (ETS) and non-ETS sectors of 43% and 30% respectively (relative to 2005).

[10] https://www.dccae.gov.ie/en-ie/climate-action/topics/national-mitigation-plan/Pages/default.aspx
[11] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

### *Kyoto Protocol (2008 – 2012)*

9.79 The EPA has overall responsibility for the national greenhouse gas inventory in Ireland's national system, which was established in 2007 under Article 5 of the Kyoto Protocol[12].

9.80 Ireland currently accounts for GHG emissions under the Kyoto Protocol. The Kyoto Protocol required Ireland to limit total national greenhouse gas emissions to 314.2 Mtonnes of $CO_{2eq}$ over the five-year period 2008 – 2012 which is equivalent to 62.8 Mtonnes of $CO_{2eq}$ per annum. The Kyoto Protocol limit is calculated as 13% above Ireland's 1990 baseline value which was established and fixed at 55.61 Mtonnes of $CO_{2eq}$ following an in-depth review of Ireland's 2006 greenhouse gas inventory submission to the UNFCCC.[13]

### *EU 2021-2030 Targets for non-ETS sector emissions- Effort Sharing Regulations[14]*

9.81 Under the EU Commission's Climate and Energy Package, sectors of the economy not covered by the EU ETS must reduce emissions by 30% by 2030 compared to 2005 as their contribution to the overall target.

9.82 The non-ETS sectors cover those sectors that are outside the EU Emissions Trading Scheme and includes agriculture, transport, built environment (residential, commercial/institutional), waste and non-energy intensive industry.

### *2015 Energy White Paper*

9.83 The White Paper on Energy Policy, Ireland's Transition to a Low Carbon Energy Future 2015-2030[15], published in 2015, sets out a framework to guide energy policy in the period to 2030. The White Paper recognises that a radical transformation of our energy system is required to meet our national, EU and international climate objectives and sets a course for an energy sector where the State will provide the supports that enable consumers to become active energy citizens. It posits a policy approach where our energy system will change from one that is almost exclusively led by Government and utilities to one where individuals and communities are agents of change in the way Ireland generates, transmits, stores, conserves and uses energy. It sets out a vision, a framework and over 90 actions for Irish energy policy up to 2030 as we transition to a low carbon society and economy by 2050.

## Catchment Flood Risk Assessment and Management (CFRAM) Programme[16]

9.84 The Catchment Flood Risk Assessment and Management (CFRAM) Programme (see www.cfram.ie) is the mechanism established to facilitate future adaptation to climate change. It provides for long-term flood risk management in Ireland and the embedment of flood risk assessment in the future development of capital projects. The future scenario flood maps produced under the CFRAM Programme facilitate this approach, inform other industrial sectors, and provide a valuable resource for local adaptation planning and sustainable land use management and planning.

[12] http://unfccc.int/kyoto_protocol/items/2830.php
[13] http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/nc6_br1_ire.pdf
[14] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32018R0842

[15] https://www.dccae.gov.ie/en-ie/energy/publications/Pages/White-Paper-on-Energy-Policy.aspx
[16] https://www.cfram.ie/

## EIA Directive 2014/52/EU

9.85 Directive 2014/52/EU[17] of the European parliament and of the Council of 16th April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment had to be transposed into national law by 16th May 2017, necessitating changes in laws, regulations, and administrative provisions across a number of legislative codes.

9.86 Key changes introduced in the 2014 Directive (in Annex IV - Information referred to in Article 5(1) – Information for the Environmental Impact Assessment Report) and the national transposing regulations (the European Union (Planning and Development)(Environmental Impact Assessment) Regulations, S.I. No. 296 of 2018) include a requirement for information on the impact of a project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change to be provided in the Environmental Impact Assessment Report.

## Guidelines

### *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (EC, 2013)[18]*

9.87 EU Guidelines provide recommendations how to integrate climate change and biodiversity in Environmental Impact Assessment (EIA). The need for action on climate change and biodiversity loss is recognised across Europe and around the world. The guidelines contain explanation as to why climate change and biodiversity are so important in EIA, present the relevant EU-level policy background, provide advice on how to integrate climate change and biodiversity into selected stages of the EIA process. The annexes provide sources of further reading and links to other relevant information, data, and tools.

### *Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017)[19]*

9.88 IEMA Guidance provides information to assist practitioners with addressing greenhouse gas (GHG) emissions assessment and mitigation in statutory and non-statutory Environmental Impact Assessment (EIA). It complements IEMA's earlier guide on Climate Change Resilience and Adaptation and builds on the Climate Change Mitigation and EIA overarching principles. The requirement to consider this topic has resulted from the 2014 amendment to the EIA Directive.

### *Climate Change and Major Projects (EC, 2016)[20]*

9.89 This publication provides guidance for assessing vulnerability and risk from Climate Change for major projects funded by the European Regional Development Fund (ERDF) and the Cohesion Fund and listed in the concerned operational programmes.

### *Sectoral Planning Guidelines for Climate Change Adaptation[21]*

9.90 The guidelines aim to ensure that a coherent and consistent approach to adaptation planning is adopted by the key sectors in Ireland. Sectors preparing sectoral adaptation plans under the NAF are

[17] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052
[18] http://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf
[19] https://www.iaia.org/pdf/wab/EIA%20Guide_GHG%20Assessment%20and%20Significance_IEMA_16May17.pdf
[20] https://ec.europa.eu/clima/sites/clima/files/docs/major_projects_en.pdf
[21] https://www.dccae.gov.ie/documents/SPG%20Climate%20Change%20Adaptation.pdf

required to prepare their plans in line with the process described in these guidelines while also being aware of the overall requirements regarding the development of sectoral adaptation plans.

### *Local Authority Adaptation Strategy Development Guidelines*[22]

9.91 Guidance was produced to provide a consistent and coherent process for local authorities in helping them develop local adaptation strategies and contain information on the process of developing an adaptation strategy:

- provide background information on what adaptation entails and provides the rationale behind implementing a local scale adaptation strategy;
- outline the initial steps required in launching a strategy development process, describing key roles and who can fulfil them, and setting out important factors to consider in the early stages of strategy development;
- explains how to assess the role that weather extremes and periods of climate variability currently play within the local jurisdiction, and it describes why doing so is a fundamental element of working towards a more climate-resilient future;
- moves from the present to the identification of future climate risks, describing a staged risk assessment process and positioning the adaptation strategy within more detailed risk assessments undertaken during shorter term decision-making processes such as statutory plan-making;
- on the basis of the risk assessment process undertaken determination of adaptation goals and objectives and the types of adaptation actions that are available and outlines how each might be identified, assessed, prioritised and implemented is described;
- outlines the steps required to move from a phase of planning to one of implementation, and it explains the importance of monitoring and evaluation in ensuring that the strategy is achieving its anticipated adaptation objectives.

9.92

[22]https://www.dccae.gov.ie/documents/LA%20Adaptation%20Guidelines.pdf

# Appendix 9- B

## Development Vulnerability Assessment Methodology

9.93 The scale for assessing the likelihood of a climate hazard is presented in Table 9B-1. The output of the likelihood analysis is an estimation of the likelihood for each of the essential climate variables and hazards.

**Table 9B- 1**
Scale of Likelihood of Climate Hazard

| Term | Qualitative | Quantitative |
|---|---|---|
| Rare | Highly unlikely to occur | 5% |
| Unlikely | Unlikely to occur | 20% |
| Moderate | As likely to Occur | 50% |
| Likely | Likely to Occur | 80% |
| Almost certain | Very likely to occur | 95% |

9.94 The scale for assessing the potential impact of a climate hazard is presented in Table 9B-2. The impact analysis provides an assessment of the potential impact of each of the essential climate variables and hazards.

**Table 9B- 2**
Example Table for Climate Hazard Impact Analysis

| Risk Areas | Insignificant | Minor | Moderate | Major | Catastrophic |
|---|---|---|---|---|---|
| Asset damage, engineering, operational | | | | | |
| Safety and Health | | | | | |
| Environment | | | | | |
| Social | | | | | |
| Financial | | | | | |
| Reputation | | | | | |

9.95 The matrix for assessing the sensitivity of project to climate hazards is presented in Table 9B-3. The sensitivity is summarised, along with the ranking of the relevant climate variables and hazards relating to the project.

**Table 9B- 3**
Example Table for Sensitivity of Project to Climate Hazards

| | Extreme rainfall, flood , flash flood | Heat | Drought | Wildlife Fires | Storms and winds | Landslides | Cold Spells and snow | Freeze –thaw damage | Rising sea levels |
|---|---|---|---|---|---|---|---|---|---|
| On site assets | | | | | | | | | |
| Inputs - Water | | | | | | | | | |
| Inputs - Energy | | | | | | | | | |
| Outputs - product | | | | | | | | | |
| Transport links | | | | | | | | | |

9.96 The matrix for assessing exposure of a project to climate hazards is presented in Table 9B-4. The exposure analysis ranks climate variables and hazards as low, medium or high based on current and future climate.

**Table 9B- 4**
Example Table of Exposure of the Project to Climate Hazards

| | Extreme rainfall, flood , flash flood | Heat | Drought | Wildlife Fires | Storms and winds | Landslides | Cold Spells and snow | Freeze –thaw damage | Rising sea levels | Storm surge |
|---|---|---|---|---|---|---|---|---|---|---|
| Current Climate | | | | | | | | | | |
| Future Climate | | | | | | | | | | |

9.97 An example of the vulnerability of a project to climate hazards is presented in Table 9B-5. The vulnerability combines the sensitivity and the exposure analysis.

**Table 9B- 5**
Example Table for Vulnerability Analysis of Project to Climate Hazards

| Sensitivity | Exposure ( Current & Future Climate) | | |
|---|---|---|---|
| | Low | Medium | High |
| Low | | | |
| Medium | | | |
| High | | | |

# Appendix 9- C

## Development Vulnerability Assessment

9.98 The likelihood analysis of the proposed development to climate hazards is presented in Table 9C-1.

9.99 The proposed development has been assessed to be moderate affected by extreme rainfall, flood, flash flood, storms, and winds. The proposed development would be unlikely affected to cold spells and snow. The proposed development would not be affected by heat, drought, wildlife fires, landslides, and freeze –thaw damage. The proposed development will likely be affected by rising sea level and storm surge.

**Table 9C- 1**
Analysis of Likelihood of Climate Hazards at Rossmore Quarry

| | Extreme rainfall, flood , flash flood | Heat | Drought | Wildlife Fires | Storms and winds | Landslides | Cold Spells and snow | Freeze –thaw damage | Rising sea levels | Storm Surge |
|---|---|---|---|---|---|---|---|---|---|---|
| Rare | | √ | √ | √ | | √ | | √ | | |
| Unlikely | | | | | | | √ | | | |
| Moderate | √ | | | | √ | | | | √ | √ |
| Likely | | | | | | | | | | |
| Almost certain | | | | | | | | | | |

9.100 Table 9C-2 shows the climate hazard impact analysis of the proposed development. It was assessed that climate hazards will have major impacts on health and safety, the environment and financial areas and climate hazards will have moderate impacts on asset damage and engineering, operational, social and reputation areas.

**Table 9C- 2**
Climate Hazard Impact Analysis

| Risk Areas | Insignificant | Minor | Moderate | Major | Catastrophic |
|---|---|---|---|---|---|
| Asset damage, engineering, operational | | | √ | | |
| Safety and Health | | | | √ | |
| Environment | | | | √ | |
| Social | | | √ | | |
| Financial | | | | √ | |
| Reputation | | | √ | | |

9.101 Table 9C-3 below assesses the sensitivity of the project to climate hazard. It was assessed that site assets, energy inputs and transport links are of high sensitivity to extreme rainfall, flood, flash floods, storms and winds; storm surge, water inputs will be highly sensitive to droughts. On site

assets will be medium sensitive to cold spells and snow and freeze – thaw damage. Transport links will be medium sensitive to cold spells and snow.

**Table 9C- 3**
Sensitivity of Project to Climate Hazards

| | Extreme rainfall, flood , flash flood | Heat | Drought | Wildlife Fires | Storms and winds | Landslides | Cold Spells and snow | Freeze –thaw damage | Rising sea levels | Storm surge |
|---|---|---|---|---|---|---|---|---|---|---|
| On site assets | High | Low | Low | Low | High | Low | Medium | Medium | Low | Low |
| Inputs - Water | Low | Low | High | Low | Low | Low | Low | Low | Low | Low |
| Inputs - Energy | High | Low | Low | Low | High | Low | Low | Low | Low | Low |
| Outputs - product | Low | Low | Low | Low | Low | Low | Low | Low | Low | Low |
| Transport links | High | Low | Low | Low | High | Low | Medium | Low | Low | Low |

9.102 In Table 9C-4, the exposure of the project to climate hazards was assessed. In the current climate, the exposure of the project to extreme rainfall, flood, flash flood, storms and winds has been assessed to be medium. The project was assessed to have high future climate exposure to rainfall, flood, flash flood, storms, and winds.

**Table 9c- 4**
Exposure of the Development to Climate Hazards without Mitigation

| | Extreme rainfall, flood, flash flood | Heat | Drought | Wildlife Fires | Storms and Winds | Landslides | Cold Spells and Snow | Freeze –thaw damage | Rising sea levels | Storm surge |
|---|---|---|---|---|---|---|---|---|---|---|
| Current Climate | Medium | Low | Low | Low | Medium | Low | Low | Low | Low | Low |
| Future Climate | High | Low | Low | Low | High | Low | Low | Low | Medium | Medium |

9.103 Table 9c-5 shows the vulnerability analysis of the project to climate hazards; it combines the sensitivity and the exposure analysis. The project was assessed to be most sensitive to extreme rainfall, flood, flash flood, storms, and winds.

**Table 9B- 5**

Vulnerability Analysis of Project to Climate Hazards

| Sensitivity | Exposure (Current & Future Climate) | | |
|---|---|---|---|
| | Low | Medium | High |
| Low | Freeze –thaw damage, Landslides, Drought, Heat, Wildlife Fires | Rising sea level, storm surges | |
| Medium | | Cold Spells and Snow | |
| High | | | Extreme rainfall, flood, flash flood, Storms and winds |