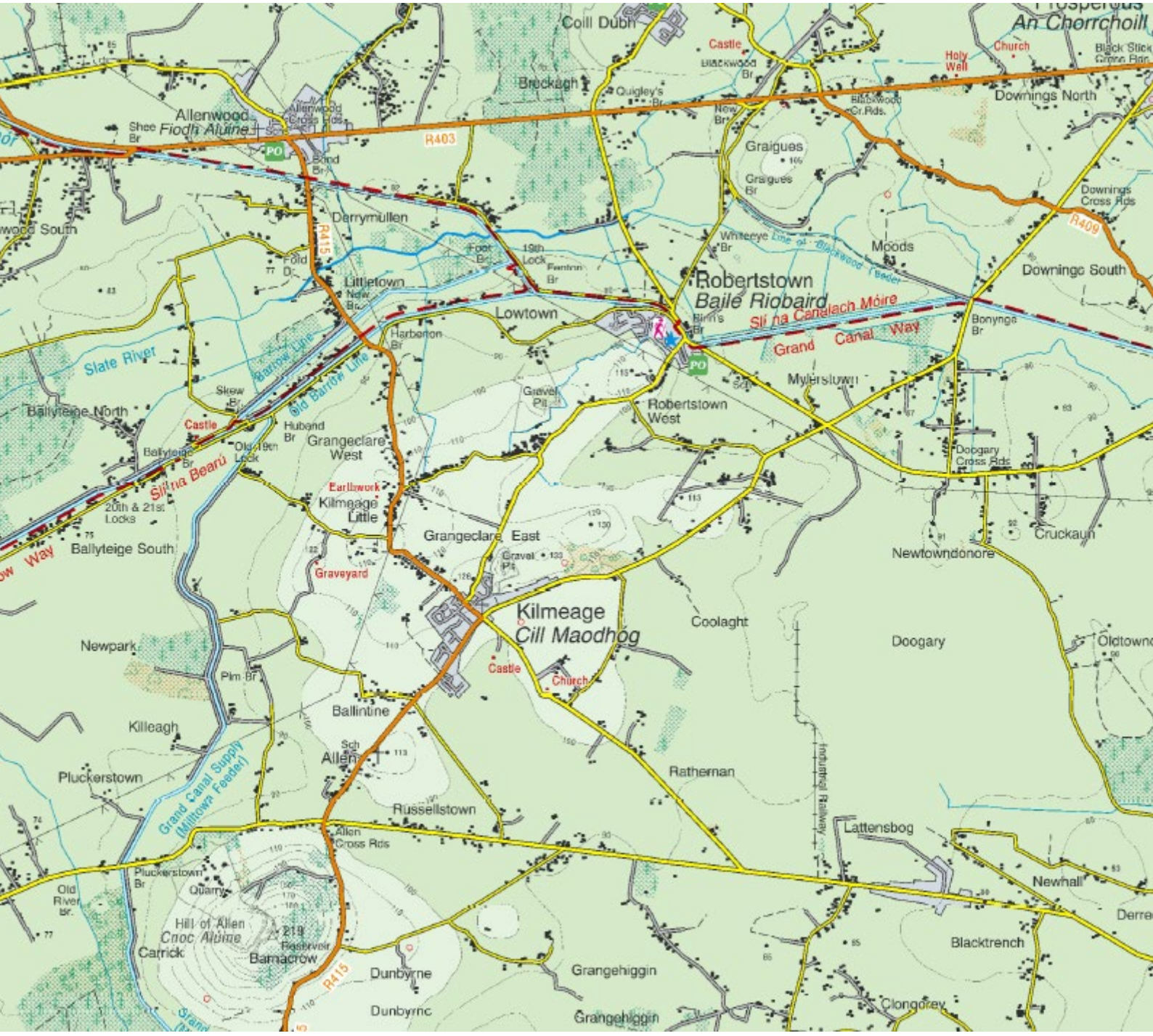
CHAPTER 10

AIR QUALITY



QUARRY CONSULTING

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CHAPTER 10: AIR QUALITY

Introduction

10.1 This Chapter of the Environmental Impact Assessment Report (EIAR), prepared by Quarry Consulting, addresses the potential air quality related impacts associated with a proposed sand & gravel pit and soil recovery facility at Coolaght, Kilmeague, Co. Kildare.

10.2 The proposed development involves the extraction of sand and gravel on a phased basis from an area of c. 8.65 ha to a final floor level at 95m above OD (Ordnance Datum);

10.3 Further information on the proposed site infrastructure, operations, environmental management systems, and controls at the proposed sand and gravel pit site is provided in Chapter 3 of this EIAR.

Purpose of the Chapter

10.4 This chapter is aimed at assessing and documenting the potential impacts on air quality that could arise from the sand and gravel pit and soil recovery facility. Within the context of a quarry / infill operation, such impacts are related to processes like excavation, deposition and transport of material.

10.5 The chapter is designed to comprehensively present the current baseline conditions, identify potential air pollutant sources, estimate the likely magnitude and significance of these impacts, and propose suitable mitigation measures. The key objective is to ensure the proposed project adheres to all relevant air quality regulations and standards, thereby protecting the health of the local population and the overall environmental integrity.

Scope of the Assessment

10.6 The primary focus of this air quality assessment is on the construction / operational phase of the proposed sand and gravel pit and soil recovery facility. The aim is to identify, analyse, and document potential alterations to local air quality that could result from various operations.

10.7 In addition, the assessment will utilize both qualitative and quantitative methodologies to offer an encompassing view of potential air quality impacts. These methodologies are in line with recognized scientific practices and conform to all relevant international, national, and local air quality standards and regulations.

10.8 The later sections of this chapter will discuss:

- Screening of Detailed Assessment.
- Legislative Policy and Context: This section will offer a comprehensive review of the applicable air quality standards, guidelines, and policies at the international, national, and local levels that govern the operational activities of the proposed development.
- Methodology: This part will outline the specific qualitative and quantitative techniques used to carry out the air quality assessment.
- Site Characteristics and The Proposed Development.
- Baseline Conditions: Providing an understanding of the current air quality conditions in and around the site.

- Impact Assessment: Identifying and assessing the potential air quality impacts resulting from the proposed development.
- Mitigation Measures and Best Practices: Proposing measures and strategies to mitigate any identified negative impacts on local air quality.
- Residual Impacts and Monitoring Program: Evaluating the air quality impacts that might persist after the implementation of mitigation measures, and suggesting a monitoring program to ensure continuous compliance with air quality regulations.

Contributors

10.9 The air quality impact assessment presented in this Chapter was prepared by Quarry Consulting. This chapter was prepared by Rory Brickenden (B.A. Geoscience) and Peter Kinghan (B.Sc. Mineral Surveying; PG Dipl. Environmental Engineering).

Screening of Detailed Assessment

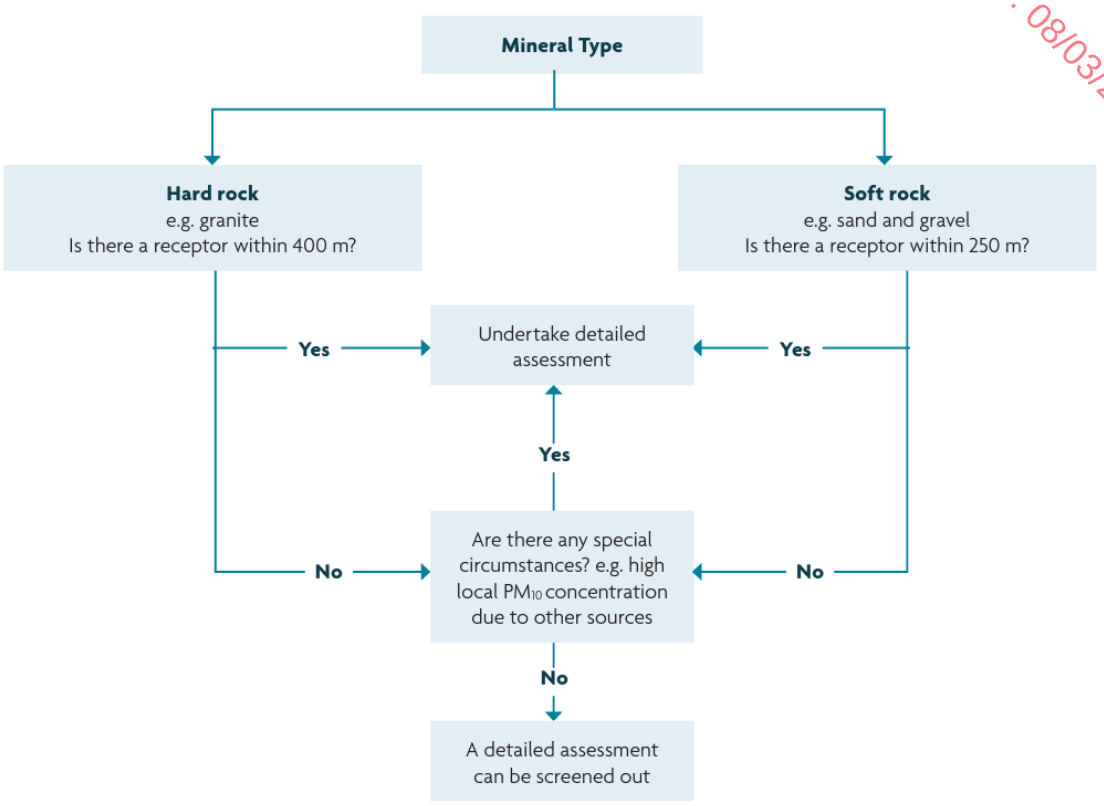
10.10 As per the 'Guidance on the Assessment of Mineral Dust Impacts for Planning[1]' there is the potential to screen the need for a detailed assessment. Section 3 of the report states:

> *"Where there are no receptors near to a mineral site there will be no significant effect. Therefore it is possible to screen out the need for a detailed assessment based on the distance from a mineral site to potentially sensitive receptors."*

10.11 The flow chart (figure 10.1) provides the steps undertaken in the screening of the detailed assessment.

[1] Guidance on the Assessment of Mineral Dust Impacts for Planning www.iaqm.co.uk May 2016 (v1.1) Institute of Air Quality Management UK

Figure 10.1: Screening of Detailed Assessment



10.12 The proposed development involves the extraction of sand and gravel, and there are no receptors within 250 metres of the proposed extraction / infill boundary.

10.13 However, the nearest receptor is located approx. 35m from the proposed access road into the development. Therefore, a detailed assessment has been carried out to assess the impacts arising from dust due to the proposed development.

Legislative Context and Policy

Air Quality Standards

10.14 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).

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

10.16 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).

10.17 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.

10.18 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 10.2. Air quality limit values in relation to vegetation protection are presented separately in Table 10.3.

10.19 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 10.1 Air quality limit values for human health

Human Health	**Limit Value**			**Information and Alert Thresholds**	
Pollutant	Averaging Period	Value	Maximum Number of Allowed Occurrences	Period	Threshold Value
Nitrogen Dioxide (NO_2)	Hour Year	200 μ g/m^3 40 μ g/m^3	18 0	1 hour alert	400 μ g/m^3 Exceeded for 3 consecutive hours
Sulphur Dioxide (SO_2)	Hour Day	350 μ g/m^3 125 μ g/m^3	24 3	1 hour alert	500 μ g/m^3 Exceeded for 3

					consecutive hours
Particulate matter with aerodynamic diameter of less than 10µm (PM_{10})	Day Year	50 μ g/m^3 40 μ g/m^3	35 0		
Particulate matter with aerodynamic diameter of less than 2.5µm ($PM_{2.5}$)	Year	25 μ g/m^3 20 μ g/m^3 (ECO)			

Table 10.2 Air quality limit values for vegetation

Vegetation	**Limit or Target Value**	
Pollutant	Averaging Period	Value
Nitrogen dioxide (NOx)	Calendar year	30 μ g/m^3
Sulphur Dioxide (SO_2)	Calendar year and winter (October to March)	20 μ g/m^3

Relevant Guidance

10.20 This assessment has been undertaken with guidance from the 'Guidelines on the information to be contained in environmental impact assessment reports', published in 'draft' by the EPA in May 2022 and 'Environmental Impact Assessment of projects, guidance on the preparation of the Environmental Impact Assessment Report' published by the European Commission in 2017.

10.21 Other guidance documents considered in this assessment include:

- IAQM; Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016;
- EPA; Guideline Document entitled Environmental Management in the Extractive Industries, 2006;
- Kildare County Development Plan 2023-2029
- Climate Action Plan, 2023
- Quarries and Ancillary Activities – Guidelines for Planning Authorities – DOEHLG, April 2004;
- Environmental Management in the Extractive Industry, EPA 2004.

Planning Policy

10.22 Currently, the National Planning Policy lacks dedicated regulations addressing air emissions within the realm of extractive industry or its associated production endeavours. The responsibility of evaluating land use and planning matters linked to extractive industry and

related undertakings falls upon Local Authorities when formulating their County Development Plans. The overarching goal of planning endeavours is to establish a sustainable management approach for activities and outcomes, achieving a well-balanced equilibrium among environmental, economic, and social factors.

Kildare County Development Plan 2023-2029

10.23 The current Kildare County Development Plan which was adopted in December 2022 includes a number policies and objectives for the planning and sustainable development of the County from 2023-2029. The following policies relate to air quality:

- IN O59

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

- IN O60

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

- IN O61

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

Guidelines Extractive Industry Emissions Limit Values

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

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

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

10.27 There are several methods to measure dust deposition but only the German TA Luft Air Quality Standards (TA Luft, 1986) specify a method of measuring dust deposition – the Bergerhoff Method (German Standard VDI 2119, 1972) – with dust nuisance.

10.28 On this basis, the EPA recommend a dust deposition limit value of 350 mg/m2/day (when averaged over a 30-day period) be adopted at Site boundaries associated with quarrying related activities. This limit value has been applied in this assessment.

Methodology

Selection of Casement Weather Station

10.29 The Casement Weather Station has been selected as the primary source of meteorological data for the comprehensive air quality assessment concerning the proposed sand and gravel pit and soil recovery facility. This selection is based on a thorough evaluation of multiple factors

contributing to the accuracy, dependability, and relevance of the weather data for the study. The Casement Weather Station aligns with the following criteria:

1) *Proximity to Quarry Site:* The Casement weather station is positioned in close proximity to the proposed development area. This ensures the meteorological data collected closely represented the conditions experienced at the proposed site.
2) *Topographical and Terrain Parallels:* The Casement Weather Station's geographical setting bears resemblances to the terrain surrounding the quarry site. This alignment is pivotal as variations in elevation, land features, and natural cover can significantly impact wind patterns and precipitation distribution.
3) *Consonance with Prevailing Wind Direction:* The same prevailing wind pattern is seen at the Casement weather station and the proposed site.
4) *Granular Temporal Data Frequency*: The weather station operates at high-frequency intervals, facilitating the capture of meteorological fluctuations.
5) *Comprehensive Rainfall Insight:* The Casement Weather Station provides reliable records of rainfall patterns. This data is of significance as rainfall substantially influences air quality through the mitigation of dust emissions and the alteration of atmospheric pollutant concentrations.

Windspeed Direction and Frequency

10.30 Data from Casement weather station was used to be obtain a Windrose that shows the frequency of winds greater than 2.5m/s and rainfall less than 0.2mm which a classed a potentially dusty wind under IAQM guidance. Met Eireann historical data (https://www.met.ie/climate/available-data/historical-data) was used to obtain hourly data on precipitation amount, mean wind speed and predominant wind direction from January 2013 to August 2023.

10.31 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.

10.32 A wind-rose for the site is presented in Figure 10.2 from Meteoblue.com for Kilmeague and illustrates the predominant wind directions from the south-west.

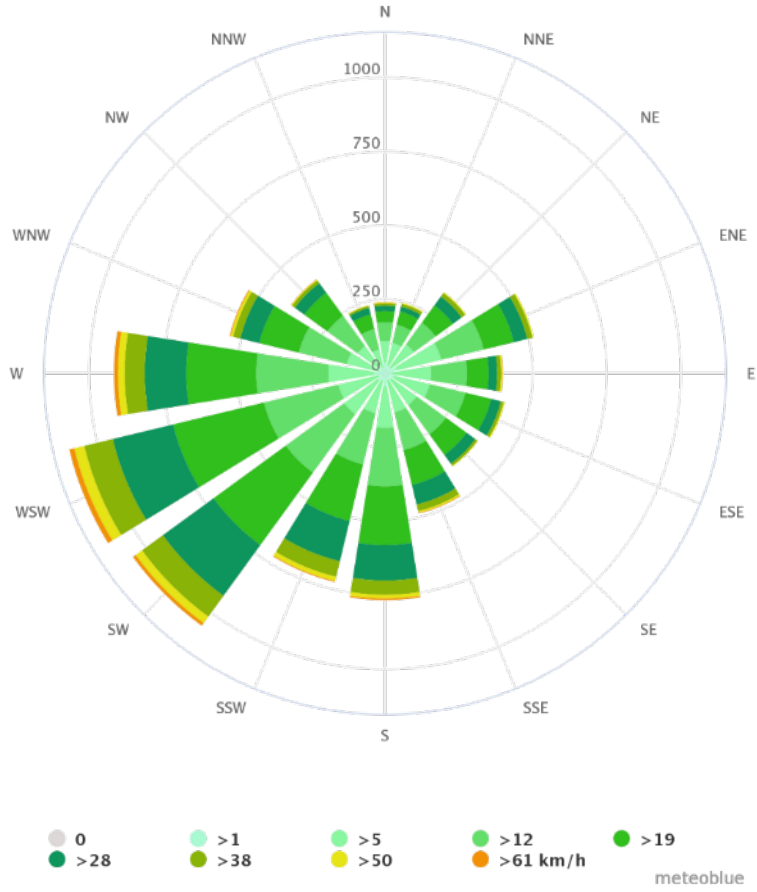


Figure 10.2: Windrose for Kilmeague (Meteoblue.com)

10.33 A detailed methodology is provided in Appendix A- Methodology. Figure 10.A1 in Appendix 1 shows a Windrose showing the frequency of potentially dusty winds.

Traffic Emissions

10.34 The Design Manual for Roads and Bridges published in May 2007 sets out the criteria for assessment of air quality under section 3 Environmental Assessment Techniques, Part 1 HA 207/07. Affected roads are defined as those that meet any of the following criteria:

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

10.35 The proposed development will not exceed the thresholds specified above in relation to traffic flows, and there will be no changed to road alignment or speed.

Existing Environment

Site Location

10.36 The site is located in the townland of Coolaght, Kilmeague, Co. Kildare, situated approximately 900m northeast of the centre of Kilmeague village. The site is 8.8km north of Newbridge and 11km northwest of Naas (see Planning Drawing 1).

10.37 Access to the site is provided from the L7081 local road, which joins the R415 at a t-junction in the village of Kilmeague, 1.3km southwest of the site. In the vicinity of the site, the L7081 comprises a single carriageway road with an 80km/hr speed limit.

10.38 The surrounding landscape is rural in character, consisting of a mix of pasture and arable land, with extensive areas of low grade agricultural land and bog in the wider area. The latter has predominately been cutover. The wider area also includes several examples of quarries and sand and gravel pits the nearest of which is situated 440m west of the site at Kilmeague village.

10.39 Residences within the general area are typically centred around the villages of Killmeague, Robertstown and Allen, though there are also examples of one-off rural houses and ribbon development along the local road network. The nearest properties to the site are situated on the southern site boundary. The nearest property to the north is situated approximately 400 m distant in Grangeclare East. The site is physically and visually separated from the properties in Kilmeague village by a wooded area immediately to the west.

Proposed Development

10.40 The development will consist of the following:

- The removal of woodland, vegetation and overlying soils & subsoils;
- the extraction of sand and gravel on a phased basis from an area of c. 8.65 ha to a final floor level at 95 m OD;
- the infilling of the lands using inert waste on a phased basis following the extraction of sand and gravel;
- the restoration of the lands back to original ground level and the establishment of native woodland planting;
- all related ancillary development and associated site works including processing (crushing, screening and washing) and stockpiling of materials; installation of infrastructure for the management of water on site; provision of landscaped screening berms and all other related activities;
- Provision of a site office, toilet (portaloo), canteen, weighbridge, wheelwash and site entrance.

10.41 The proposed development is within an overall application area of c. 13.2 hectares and is for a total period of 34 years (the sand and gravel extraction operational period is for 20 years and the importation of materials for restoration is for a further 14 years).

10.42 The Proposed Development will include for the importation of ca. 2,000,000 m^3 (or ca. 3.2 million tonnes) of inert soil and stone material to restore ground gradients to similar levels prior to sand and gravel extraction i.e. current ground levels.

10.43 The application is made in accordance with the requirements of the Planning and Development Regulations 2001-2015 (as amended).

10.44 Further details on The Proposed Development are provided in Chapter 3.

Receptors

10.45 The local environment surrounding the proposed development is comprised of a range of ecological and human receptors that may be potentially impacted by changes to air quality. A description of the sensitive receptors located within 400m of the proposed development is shown below:

Human Receptors

10.46 Within the context of the air quality assessment for the proposed development the potential impacts on human receptors in proximity to the quarry site is assessed.

10.47 It has been found that deposited dust does not generally travel beyond 250 m (IAQM, Appendix 2, 2016) for sand and gravel sites. There are no receptors within 250 metres of the proposed sand and gravel extraction area.

10.48 The guidance states that it is commonly accepted that the greatest impacts will be within 100m of a source and this can include both large (>30 µm) and small dust particles. The greatest potential for high rates of dust deposition and elevated PM10 concentrations occurs within this distance. Intermediate-sized particles (10 to 30 µm) may travel up to 400 m, with occasional elevated levels of dust deposition and PM10 possible. Particles less than 10µm have the potential to persist beyond 400 m but with minimal significance due to dispersion.

10.49 Within a 400-meter radius of the proposed development, there are approximately 7 residences.

10.50 Table 10.3 shows the classification based on the direction and frequency of potentially dusty winds in relation to each of the receptors.

Table 10.3 Receptor classification based on wind frequency

Receptor	Relevant Wind Direction (Based on Windrose)	Frequency of Potentially Dusty Winds	Frequency Classification
R1	200-230	26.89	Very frequent
R2	30-60	3.55	Infrequent
R3	220-250	27.1	Very Frequent
R4	350-20	1.12	Infrequent
R5	210-240	28.14	Very frequent
R6	10-40	2.23	Infrequent
R7	220-250	27.1	Very Frequent

10.51 Table 10.4 shows receptors within 400m of the application area which will be assessed. R1-4 are individual receptors and R5-7 are grouped and the closest receptor to the application boundary is assessed. Figure 10.3 shows the receptors within 400m of the application boundary.

Figure 10.3:

Table 10.4 Categorisation of receptor distance

Receptor	Sensitivity	Distance (m) / Direction From Application Boundary (approx.)	Distance Category
R1	High	5m Southeast	Close
R2	High	30m Southeast	Close
R3	High	129m Southeast	Intermediate
R4	High	222m South	Distant
R5	High	383m East	Distant
R6	High	345m Southwest	Distant
R7	High	388m Northeast	Distant

10.52 The frequency of potentially dusty winds and the distance from the application boundary is used to determine the pathway effectiveness.

Environmental Receptors

10.53 The Ballynafagh Bog SAC, located approximately 2.4 km northeast of the proposed development (table 10.5). The effects of air quality changes on Ballynafagh Bog are extremely unlikely due to the distance, therefore it is not included in this assessment.

Table 10.5 Distance of nearest ecological receptor

Receptor	SENSITIVITY	DISTANCE (M) / DIRECTION FROM APPLICATION BOUNDARY (APPROX.)
Ballynafagh Bog SAC	High	2.4km Northeast

Receptor Sensitivity

10.54 There are seven receptors being assessed, all of which are classified as highly sensitive receptors as seen in The Institute of Air Quality Management: Guidance on the Assessment of Mineral Dust Impacts for Planning (2016):

> 'High Sensitivity Receptor:
>
> - users can reasonably expect enjoyment of a high level of amenity; or
> - the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.

- indicative examples include dwellings, medium and long-term car parks and car showrooms.'

Baseline Conditions

Existing PM_{10} Concentrations

10.55 The proposed development is located in Air Quality Zone D – Rural Ireland. The monitoring station at Naas is also located in air quality zone D, is located close to the proposed development and has a historic data for PM_{10} concentrations; therefore, it will be used to determine existing PM_{10} concentrations. The available data for PM_{10} concentrations were taken from the 23rd of April 2021 till 2nd of September 2023.

Table 10.6 PM_{10} concentrations from Naas monitoring station

Time period	Annual Mean PM_{10} Concentrations ($\mu g/m^3$)
23rd April - 31st December 2021	10.42
2022	11.5
2023	10.68

10.56 Table 10.6 illustrates that PM10 concentrations monitored at the Naas monitoring site are below the annual mean Air Quality Standards (AQS) of 40µg/m3 and comply with the requirement that a 24-hour mean of 50µg/m3 should not be exceeded more than 35 times in a calendar year.

10.57 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 PM10 concentrations; and
- expected additional contribution of PM10 from site operations.

10.58 In terms of estimating the potential magnitude of impact from site operations, a UK edition of the Local Air Quality Management Technical Guidance (TG22) from the Department for Environment Food & Rural Affairs stated that fugitive dust from stockpiles, pit operations can potentially contribute up to 5 μ g/m^3 towards annual mean background concentrations of the coarse fraction (2.5 – 10 μ m diameters) of particulates in the immediate area.

10.59 Given the nature and scale of existing activities, the potential PM10 impact of increased intake is considered to be lower than this. However, to ensure a robust assessment of potential PM10 impacts, the upper limit of 5 μ g/m3 has been applied to represent the development contribution to annual ambient PM10 concentrations. This value has then been added to existing background levels to assess whether the Air Quality Standards objective is likely to be exceeded.

Impact Assessment

10.60 The construction, operational and restoration phases are included as part of the impact assessment due the potential for each of the phases to be occurring at the same time.

Dust Assessment

10.61 A summary of the risk assessment of dust impacts from sources within the proposed development is presented in Table 10.8 below.

Table 10.8 Summary of the impact assessment results

Receptor	Source Emissions Risk	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effect
R1	Medium	Highly effective	Medium Risk	High	Moderate Adverse Effect
R2	Medium	Ineffective	Medium Risk	High	Negligible Effect
R3	Medium	Highly effective	Negligible Risk	High	Moderate Adverse Effect
R4	Medium	Ineffective	Negligible Risk	High	Negligible Effect
R5	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect
R6	Medium	Ineffective	Negligible Risk	High	Negligible Effect
R7	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect

10.62 From Table 10.8, it is observed that the risk of impact from dust emissions associated with the proposed development (without any mitigation measures in place) varies from moderate adverse effect (R1 and 3), slight adverse effect (R5 and 7) and negligible effect (R2,4, and 6).

10.63 Note that this does not take into account implementation of mitigation measures within the proposed development that include provision of perimeter screening berms, landscape planting, dust suppression measures etc. (outlined in the Mitigation Measures section below).

PM_{10} Assessment

10.64 In terms of PM10, the maximum annual mean measured baseline background concentration was 11.5 μ g/m^3 in 2022 at Naas, Co. Kildare monitoring station. Therefore, the potential contribution up of 5 μ g/m^3 towards annual mean background concentrations of the coarse

fraction (2.5 – 10 μ m diameters) of particulates (in the immediate area of the site) is considered to be insignificant and well below the annual objective of 40 μ g/m³.

10.65 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.

Traffic Emissions Assessment

10.66 For the purposes of assessment, the projected traffic movements associated with the development have been set out in table 0-6 of Chapter 13. It has been calculated that the development would result in up to 130 HDV movements per day, with no significant changes to either road alignment or speed.

10.67 Therefore, as none of the roads in the surrounding local road network meet any of the traffic / alignment criteria set out in LA 105, then the impact of the scheme can be considered to be 'negligible' in terms of local air quality and no further air quality assessment is deemed necessary.

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

Mitigation Measures

Existing Mitigating Features

Hedgerows and Trees

10.69 The presence of established hedgerows and trees in the vicinity of the application site provides a degree of natural shielding against the dispersion of dust emissions. These vegetation features act as physical barriers that can help intercept and trap airborne particulate matter, thereby reducing the extent to which dust travels beyond the immediate operational area. However, it is acknowledged that while hedgerows and trees contribute to dust mitigation, their effectiveness may vary based on factors such as wind direction, foliage density, and the particle size of the emitted dust.

Topography

10.70 The existing changes in elevation within the sites surroundings, such as slight hills and ridges, can also offer a degree of natural mitigation against the dispersal of dust emissions. These elevation changes may create windbreaks, redirecting or slowing down wind currents that could otherwise carry dust particles further afield. Similarly, depressions and lower-lying areas may act as natural containment areas for settling dust. However, the extent of their impact depends on the specific topography, prevailing wind patterns, and the size of dust particles generated by quarry operations.

Mitigation Adequacy

10.71 The presence of hedgerows, trees, and changes in elevation offers initial mitigating effects on dust emissions from the proposed development. While these features contribute to reducing dust dispersion, it is prudent to acknowledge that they might not provide complete

containment. Thus, the affect of hedgerows, trees and topography of the dispersion of dust will not be included in this assessment to ensure a conservative approach.

Site Specific Mitigation Measures

10.72 Table 10.9 shows the site specific mitigation measures for the proposed development.

Table 10.9 Proposed mitigation measures

Source	Emission Potential	Mitigation Measures	Effectiveness
Excavators/HDV	High – dry or fine material during strong windy weather	Minimise drop heights when handling materials. Soils placed directly into screening berms or in progressive works. Avoid working in adverse/ windy conditions.	High
	Low – material of high moisture content during conditions of low wind speed		High
Onsite Vehicles	High when travelling over un-surfaced and dry site roads	Minimise distances of onsite haul routes.	High
		Use of water sprays / tractor & bowser to moisten surfaces during dry weather.	High
		Restrict vehicle speeds through signage / staff training.	High
		Location of haul routes away from sensitive receptors.	High
Road Vehicles (transfer offsite)	Low / Moderate on paved road surfaces	Use of road sweeper to reduce the amount of available material for re-suspension.	High
		Access road will be paved	High
Stockpiles	High when dry or fine material being stored or handled during strong windy weather	Located below ground level	High
		Limit mechanical disturbance.	High

Processing Plant	High – during dry and strong windy weather	Retention of hedgerows	High
		Proposed perimeter berms	High
		Avoid working in adverse weather conditions	High
		Locate plant within pit void below surrounding ground levels	High
		Screening berms seeded and planted	High

Residual Impacts

10.73 With the range of mitigation measures to be implemented and design measures to be incorporated into the working scheme, it is considered that the risk of dust impact at receptors from the proposed development reduces further. The proposed screening berms and the location of the processing plant and stockpiles below ground level act as significant mitigation measures against the dispersal of dust.

10.74 There will be a noise barrier and existing & proposed trees located along the access road which will reduce the dispersion of dust.

10.75 After an assessment of potential adverse effects produced by the development it was concluded that there would be no significant adverse air quality effects for both human and ecological receptors.

Cumulative Impacts

10.76 The 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.

10.77 There are no other significant sources of emission to air within close proximity to the site and therefore no potential for significant cumulative impacts has been identified.

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

Conclusion

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

Monitoring Program

10.80 Dust deposition monitoring will be carried out at the application site. Dust monitoring locations shall be reviewed and revised where necessary. The results of the dust monitoring will be submitted to Kildare County Council on a regular basis for review and record purposes.

APPENDICES

Appendix A - Methodology

Methodology

10.81 The section elaborates on the IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning (2016) employed to evaluate the effects of deposited dust and fine particulates stemming from extraction activities. This approach adheres to a conventional methodology involving source-pathway-receptor considerations. This report followed the guidelines as part of the assessment.

10.82 The residual source emissions are characterised based on the scale of the operations and the site activities and are classified as either small, medium or large.

10.83 Directions regarding the suitable categorization of the residual source are outlined in the IAQM guidance, specifically outlined in Appendix 4 from 2016. This characterization of the source encompasses an evaluation of the standard management and mitigation measures that will be executed at the Site.

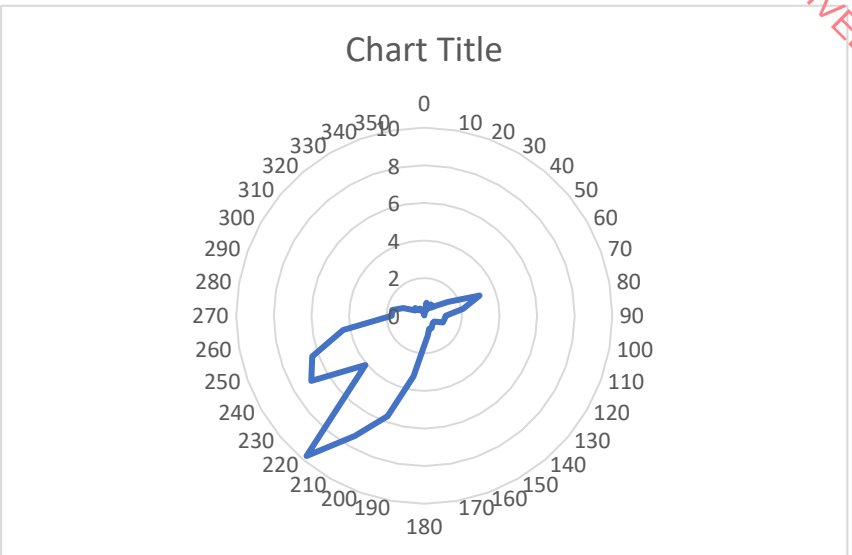
10.84 The evaluation of the pathway from the source to the receptor involves an assessment that considers the distance and orientation of receptors in relation to the prevailing wind and local meteorological conditions. Local meteorological data is also employed to appraise the frequency of winds in each direction. Research findings indicate that deposited dust typically doesn't disperse beyond 400 meters (IAQM, Appendix 2, 2016), thus all receptors located within 400 meters of the site boundary are taken into consideration. The guidance asserts that it's widely accepted that the most significant impacts will manifest within 100 meters of the source, with the potential for dispersion up to 400 meters.

10.85 The criteria utilized for categorizing the frequency of potentially dusty winds (Table 10.A2) and the distance between receptors and the source (Table 10.A3) are employed to define the effectiveness of the pathway (Table 10.A4). The residual source emissions and pathway effectiveness are combined to anticipate the potential Dust Impact Risk, as illustrated in Table 10.A5.

Windrose data

10.86 Hourly data from Met Eireann taken from 1st of January 2013 to 1st of August 2023 was used to generate a Windrose (Figure 10.A1) that shows the frequency of potentially dusty winds at Casement weather station. Potentially dusty winds are classed as having wind speeds greater than 2.5m/s and less than 0.2mm of rainfall as per IAQM guidelines.

Figure 10.A2: Potentially dusty winds from Casement weather station (2013 - 2023)



Source Emissions Classification

10.87 Table 10.A1 is extracted from the IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning. The guidance provides the factors that may be considered when determining if the source emissions will have a small, medium or large risk. The Dust Impact Risk was determined for each of the main operational activities:

10.88 The classification was determined based on the following reasons as per the IAQM 2016 guidance document:

Site Preparation/Restoration:

- The area for site preparation/restoration will include an area <10ha, bunds <8m in height, <10 heavy plant machinery simultaneously active. The site working area will be >2.5ha and there will be >20,000m^3 material movement. Therefore, site preparation/restoration is classified as medium risk.

Mineral Extraction:

- The mineral extraction area will be <10ha and will approx. 250,000 tonnes per annum of material extracted. Therefore, mineral extraction is classified as medium risk.

Materials Handling:

- There will be >5 plant machinery and the ground will be poorly surfaced. Therefore materials handling is classified as a medium risk.

On-site Transportation:

- The haul roads within the proposed development will be unpaved and have high a road surface of high dust potential. There will be <250 movements of heavy duty vehicles in one day and there will be a maximum speed limit of 15km/h in place on all haul roads. Therefore, on-site transportation is classified as medium risk.

Table 10.A1 Source emissions risk

Activity	Source Emissions Risk
Site Preparation and Restoration	Medium
Mineral Extraction	Medium
Materials Handling	Medium
On-site Transportation	Medium
Mineral Processing	Medium
Stockpiles and Exposed Surfaces	Medium
Off-site Transportation	Medium

Mineral Processing:

- As there will be 250,000 tonnes of sand and gravel processed per annum using a excavator with effective design in dust control. Therefore, mineral processing is classified as medium risk.

Stockpiles/Exposed Surfaces:

- The stockpiles will be located >100m from the site boundary. Therefore, stockpiles/exposed surfaces are classified as medium risk.

Off-Site Transportation

- A paved access road will to be used, along with the vehicle cleaning facilities and the access road is 350m in length. Therefore, offsite transportation is classified as medium risk.

10.89 For the assessment, it is assumed that each of the activities will be classified as medium risk and the distances will be taken from the site boundary and not the location of the individual site activity (see table 10.A1). This is a conservative approach in conducting the assessment.

Frequency of Potentially Dusty Winds

10.90 Table 10.A2 is extracted from the IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning. It shows the categorisation of the frequency of potentially dusty winds. Potentially dusty winds are winds that occur at greater than 2.4m/s and the rainfall is less than 0.2mm.

Table 10.A2 Categorisation of frequency of potentially dusty winds

Frequency Category	Criteria
Infrequent	Frequency of winds (>2.4 m/s) from the direction of the dust source on dry days are less than 5%
Moderately frequent	The frequency of winds (>2.4 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	The frequency of winds (>2.4 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very frequent	The frequency of winds (>2.4 m/s) from the direction of the dust source on dry days are greater than 20%

Receptor Distance from Application boundary

10.91 Table 10.A3 shows the categories for distance from the application boundary to the receptor.

Table 10.A3 Distance categories from the application boundary

Category	Criteria
Distant	Receptor is between 200m and 400m from the application boundary
Intermediate	Receptor is between 100m and 200 m from the application boundary
Close	Receptor is less than 100m from the application boundary

Pathway Effectiveness

10.92 The pathway effectiveness (table 10.A4) is determined using the frequency of potentially dusty winds and the receptor distance from the application boundary.

Table 10.A4 Pathway effectiveness

	Frequency of Potentially Dusty Winds			
	Infrequent	**Moderately Frequent**	**Frequent**	**Very Frequent**

Receptor Distance Category	**Close**	Ineffective	Moderately effective	Highly effective	Highly effective
	Intermediate	Ineffective	Moderately effective	Moderately effective	Highly effective
	Distant	Ineffective	Ineffective	Moderately effective	Moderately effective

Estimation of Dust Impact Risk

10.93 The dust impact risk (table 10.A5) is determined using the source emissions risk and the pathway effectiveness.

Table 10.A5 Dust impact risk

		Source Emissions Risk		
		Small	**Medium**	**Large**
Pathway Effectiveness	**Highly effective pathway**	Low Risk	Medium Risk	High Risk
	Moderately effective pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective pathway	Negligible Risk	Negligible Risk	Low Risk

Descriptors for Magnitude of Dust Effects

10.94 The magnitude of dust effects is determined using the sensitivity of the receptor. Table 10.A6 shows the magnitude of the dust effects.

Table 10.A6 Magnitude of dust effects

		Receptor Sensitivity		
		Low	**Medium**	**High**
Dust Impact Risk	**High Risk**	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
	Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
	Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
	Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect