Air Quality Assessment

Proposed Mineral Extraction and Restoration, Land off Bourbles Lane, Preesall, Lancashire

GREENFIELD ENVIRONMENTAL

R23.11292/3/AG
Date of Report: 27 March 2023

REPORT DETAILS

Client	Greenfield Environmental
Report Title	Air Quality Assessment – Proposed Mineral Extraction and Restoration
Site Address	Land off Bourbles Lane, Preesall, Lancashire
Report Ref.	R23.11292/3/AG
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QUALITY ASSURANCE

Issue No.	Issue Date	Comments	Author	Technical Review
1	24/02/22	Draft		
			A Gutteridge MIEnvSc Consultant	D Williams MIAQM Director
2	16/03/23	Amendments following baseline dust monitoring		
			A Gutteridge MIEnvSc Consultant	D Williams MIAQM Director
3	27/03/23	Amendments following client review		
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NON-TECHNICAL SUMMARY

1. A planning application is being submitted for a proposed sand and gravel quarry on land off Bourbles Lane in Lancashire. The proposed site is surrounded by agricultural land, and is situated to the northeast of the town of Preesall, southeast of the village of Knott End-on-Sea, and west of the village of Pilling and hamlet of Stake Pool.

2. The proposed development has the potential to generate dust and other airborne pollutants in the immediate vicinity of the operations. The likelihood of problems caused by such pollutants will be largely influenced by the effectiveness of on site environmental control.

3. Hence potential dust sources have been identified and best practice dust control measures recommended in order to minimise any such disturbance at nearby sensitive locations.

4. The current dust climate has been measured near representative locations of nearby sensitive human receptors with the dust climate being influenced by agricultural activity and the local road network.

5. Climatic conditions local to the site have been accessed and analysed to give an indication of how often the site could be susceptible to fugitive dust events. Such occasions are relatively few.

6. Using DEFRA Automatic Urban and Rural Network (AURN) 2018 baseline data and predictions, a PM_{10} assessment in line with the latest guidance has been undertaken and this clearly shows that the Air Quality Objectives are not expected to be exceeded.

7. Given the intended dust control measures, it is considered that the site can be operated with minimal impact on dust-sensitive locations in the vicinity of the site.

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1.0 INTRODUCTION

1.1 Overview

1.1.1 Vibrock Limited has been commissioned to undertake an air quality impact assessment in relation to a planning application for mineral extraction and restoration at land off Bourbles Lane near Preesall in Lancashire.

1.1.2 An assessment of the potential air quality impacts of the scheme at identified sensitive premises in the vicinity of the site has been conducted. Where necessary, suitable mitigation measures are recommended to control dust emissions from the site.

1.1.3 The study benefits from a site inspection and dust monitoring conducted in October 2022 in-line with the IAQM guidance on describing site characteristics and baseline conditions, see Appendix 4. Such information is used throughout this assessment.

1.2 Site Details

1.2.1 The existing site comprises a series of agricultural landholdings, including a number of farming interests and equestrian operations. All are situated in a mainly rural and agricultural landscape, with a range of small-holdings and isolated residential properties present together with small-scale areas of local commercial/ industrial activity.

1.2.2 The closest sensitive receptors to the site are identified within Figure 2. There is no Site of Special Scientific Interest (SSSI) within 1km of the proposed new quarry. The nearest SSSI location is Lune Estuary around over 1000m from the proposed boundary.

1.2.3 The nearest Air Quality Management Area (AQMA) declared within the boundary of Wyre Borough Council is Chapel St. AQMA located at over 8km away from the quarry proposals at its closest approach; the AQMA pollutant is NO_2.

1.3 Proposals

1.3.1 It is proposed that approximately 460,000 tonnes of sand and gravel will be extracted on a “campaign basis” (likely 2 per year) over a 4 – 5 year period. The proposed quarry will be worked in a phased manner across five phases and progressively restored via backfilling with overburden or imported inert materials. It is anticipated that each phase will be completed in around 12 – 18 months with overall mineral extraction and restoration operations likely to take around 5 to 6 years to complete.

1.3.2 It is proposed that restoration of the site would be to a mix of agricultural land and a range of priority wetland and grassland habitats, together with some limited leisure development in the southern part of the site in the vicinity of the proposed plant area. To complete the restoration, it is estimated that some 300,000 m3 of imported inert fill will be required.

1.4 Pre-Application Process

1.4.1 A Screening Opinion provided by Lancashire County Council in August 2022 confirmed the proposed development is EIA Development for the purposes of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

1.4.2 A Scoping Opinion Request was submitted to the Mineral Planning Authority (Lancashire County Council) in June 2022. The response to the request provided in August 2022 highlighted the requirement for an assessment of dust / particulate impacts to be included within the Environmental Statement.

1.4.3 An addendum to the Scoping Opinion was issued in November 2022 which stated that the assessment should contain an analysis of the human health impacts of dust including silica rich particles.

2.0 LEGISLATION, POLICY AND GUIDANCE

2.1 Legislation

The Air Quality (Standards) Regulations

2.1.1 Concentrations of key pollutants in outdoor air are regulated by the Air Quality Standards Regulations 2010 (amended in 2016).

2.1.2 These Regulations seek to control human exposure to pollutants in outdoor air to protect human health and the environment by requiring concentrations to be within specified limit values.

2.1.3 The limits and targets for nitrogen oxides and particulate matter (as PM_{10} and $PM_{2.5}$) are summarised in Table 1 below.

Table 1. National Air Quality Objectives

Pollutant	Concentration measured as:	Objective	Date to be achieved by (and maintained after)
PM_{10}	24 hour mean	50 µg/m^3 not to be exceeded more than 35 times a year	31 December 2004
	Annual mean	40 µg/m^3	
$PM_{2.5}$	Annual mean	Target of 15% reduction in concentrations at urban background	Between 2010 and 2020
		20 µg/m^3	1 January 2020
Nitrogen dioxide	1- hour mean	200 µg/m^3 not to be exceeded more than 18 times a year	31 December 2005
	Annual mean	40 µg/m^3	

The Environment Act

2.1.4 The Environment Act 1995 required the Government to produce a national Air Quality Strategy (AQS) for the UK setting out air quality standards, objectives, and measures for improving ambient air quality.

2.1.5 Under the Environment Act 2021, the Secretary of State must review the Strategy for England at least every five years, with a commitment for an initial review within 12 months of the measures coming into force. The first review will be published in 2023.

2.2 National Policy

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007

2.2.1 This Air Quality Strategy was published by DEFRA and sets out air quality objectives (AQO) and policy options to further improve air quality in the UK from today into the long term. As well as direct benefits to public health, these options are intended to provide important benefits to quality of life and help to protect our environment.

2.2.2 Chapter 2 of the Air Quality Strategy describes various pollutants and the potential effects on health and the environment. This chapter also charts a number of pollutants and the limits and targets associated with them.

The Clean Air Strategy, 2019

2.2.3 This strategy sets out the comprehensive actions required across all parts of government and society to improve air quality.

2.2.4 The strategy sets out how we will:

- protect the nation's health
- protect the environment
- secure clean growth and innovation
- reduce emissions from transport, homes, farming and industry
- monitor our progress

2.2.5 It complements three other UK government strategies: the Industrial Strategy, the Clean Growth Strategy and the 25 Year Environment Plan.

National Planning Policy Framework (NPPF)

2.2.6 The NPPF was first published on 27 March 2012 and last updated on 20 July 2021. This sets out the government's planning policies for England and how these are expected to be applied.

2.2.7 Chapter 17, Facilitating the sustainable use of minerals; suggests it is important to provide a supply of minerals to aid infrastructure, buildings, energy and goods nationwide, whilst outlining the fact that minerals are a finite resource, and it is also important to protect their long-term preservation. The NPPF thus provides a planning policy framework for mineral developments.

Planning Practice Guidance

2.2.8 Planning Practice Guidance (PPG) is a web-based resource, which accompanies the NPPF, giving guidance on numerous categories, with the air quality category (ID:32) and mineral category (ID:27) being relevant to this assessment.

2.2.9 Paragraph 001 of the Minerals section (ID: 27) of the PPG gives an overview as to why planning permission is required and details the following:

- minerals can only be worked (i.e. extracted) where they naturally occur, so location options for the economically viable and environmentally acceptable extraction of minerals may be limited. This means that it is necessary to consider protecting minerals from non-minerals development and has implications for the preparation of minerals plans and approving non-mineral development in defined mineral safeguarding areas;
- working minerals is a temporary use of land, although it often takes place over a long period of time;
- working minerals may have adverse and positive environmental effects, but some adverse effects can be effectively mitigated;
- since extraction of minerals is a continuous process of development, there is a requirement for routine monitoring, and if necessary, enforcement to secure compliance with conditions that are necessary to mitigate impacts of minerals working operations; and
- following working minerals, land should be restored to make it suitable for beneficial after-use.

2.2.10 Paragraph 001 of the Air Quality section (ID: 32) of the PPG gives an overview what air quality considerations are needed to be addressed. Referring to the 2008 Ambient Air Quality Directive, which is where the Air Quality Standards Regulations are derived. Reiterating the legally binding Air Quality Objectives and stating the UK's commitments to reducing emissions of 5 damaging air pollutants: fine particle matter, ammonia, nitrogen oxides, sulphur dioxide, and non-methane volatile organic compounds. This section also gives an overview of DEFRA's modelling and monitoring of air quality and discusses the local air quality management regime.

2.2.11 Paragraph 002 of the Air Quality section of the PPG advises that planning new developments needs to consider observed trends in local air quality, impact of the air pollution, cumulative impact including vehicle emissions, and mitigation measures.

2.2.12 Paragraph 005 suggests that air quality considerations are relevant to the development management process when a development may be located in a poor air quality area, or may have an adverse impact on sensitive receptors nearby, or if users of the development may experience poor health due to air quality emissions from the development.

2.2.13 Issues that need to be considered when assessing air quality impacts are detailed in paragraph 006. Vehicle emissions and their effects, introducing a new point source of air pollution, the exposing of air pollutants including dust, giving rise to potentially unacceptable impacts such as dust during the construction on nearby sensitive receptors and the potential adverse effect on biodiversity in the area.

2.3 Local Policy and Information

Local Air Quality Management

2.3.1 Local Authorities are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM).

2.3.2 Local air quality is assessed against the AQOs with AQMAs declared when there is an exceedance or likely exceedance of an AQO.

2.3.3 After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

Wyre Council 2021 Annual Status Report (ASR), September 2021

2.3.4 As a result of the council's monitoring programme, exceedances of the national objective for NO_2 have been established at a total of three sites within the council's monitoring network over recent years. These exceedances led to the declaration of an Air Quality Management Area (AQMA) in Chapel Street Poulton, in August 2009. Shortly after, the council compiled an Air Quality Action Plan (AQAP), outlining its intentions to improve air quality in the area. This plan was formally approved by DEFRA in 2012.

2.3.5 Details of the Chapel Street AQMA, including a map illustrating the extent of its boundaries can be found in the main report. The Chapel Street AQMA incorporates two triplicate diffusion tube sites (Site R1-3 and Site R4-6), and is the council's only AQMA.

2.3.6 Whilst exceedances of the national objective for NO_2 have also been indicated in the past at Site 14 (just to the north of Chapel Street), no extension of the AQMA boundaries has ever been made. This is due to uncertainties in the data indicating those exceedances, and to the existence of active measures designed to tackle poor air quality within the area already. The original boundaries of the Chapel Street AQMA therefore remain.

Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD

Achieving Sustainable Minerals Production - POLICY CS5

2.3.7 Alternatives to the bulk transportation of minerals by road will be encouraged. Existing or potential transport, storage, handling or reprocessing facilities will be safeguarded where they offer the potential for the use of rail, water or other means to transport minerals.

2.3.8 Criteria will be developed for the site identification process, and also for considering other proposals brought forward outside the plan-making process, to ensure that:

(i) our natural resources including water, air, soil and biodiversity are protected from harm and opportunities are taken to enhance them;
(ii) features and landscapes of historic and cultural importance and their settings are protected from harm and opportunities are taken to enhance them;
(iii) workings will not adversely contribute to fluvial flood risks or surface water flooding;
(iv) proposals for mineral workings incorporate measures to conserve, enhance and protect the character of Lancashire's landscapes;
(v) the amenity, health, economic well-being and safety of the population are protected by the introduction of high operating standards, sensitive working practices and environmental management systems that minimise harm and nuisance to the environment and local communities throughout the life of the development;
(vi) essential infrastructure and services to the public will be protected;
(vii) sensitive environmental restoration and aftercare of sites takes place, appropriate to the landscape character of the locality and the delivery of national and local biodiversity action plans. Where appropriate, this will include improvements to public access to the former workings to realise their amenity value.

Joint Lancashire Minerals and Waste Local Plan. Site Allocation and Development Management Policies - Part One

Policy DM2 – Development Management

2.3.9 Development for minerals or waste management operations will be supported where it can be demonstrated to the satisfaction of the mineral and waste planning authority, by the provision of appropriate information, that all material, social, economic or environmental impacts that would cause demonstrable harm can be eliminated or reduced to acceptable levels. In assessing proposals account will be taken of the proposal's setting, baseline environmental conditions and neighbouring land uses, together with the extent to which its impacts can be controlled in accordance with current best practice and recognised standards.

2.3.10 In accordance with Policy CS5 and CS9 of the Core Strategy developments will be supported for minerals or waste developments where it can be demonstrated to the satisfaction of the mineral and waste planning authority, by the provision of appropriate information, that the proposals will, where appropriate, make a positive contribution to the:

- Local and wider economy.
- Historic environment.
- Biodiversity, geodiversity and landscape character.
- Residential amenity of those living nearby.
- Reduction of carbon emissions.
- Reduction in the length and number of journeys made.

2.3.11 This will be achieved through for example:

- The quality of design, layout, form, scale and appearance of buildings.
- The control of emissions from the proposal including dust, noise, light and water.
- Restoration within agreed time limits, to a beneficial after use and the management of landscaping and tree planting.
- The control of the numbers, frequency, timing and routing of transport related to the development.

2.4 Technical Guidance

Institute of Air Quality Management (IAQM), Guidance on the Assessment of Mineral Dust Impacts for Planning, May 2016

2.4.1 This IAQM document has been prepared to assist practitioners undertake dust assessments for mineral sites. It aims to provide advice on robust and consistent good-practice approaches that can be used to assess the operational phase dust impacts.

Institute of Air Quality Management (IAQM), Guidance on land-use planning and development control: Planning for air quality 2017

2.4.2 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have produced this guidance, which replaces the 2010 EPUK Guidance document, to ensure that air quality is adequately considered in the land-use planning and development control processes.

2.5 Health Impact Studies

2.5.1 The following studies are used to establish a history and background into the need for air quality assessment and the need to manage dust from mineral sites.

2.5.2 Medical studies have consistently failed to find any link between dust arising from mineral working and public health. A local doctor who claimed that a nearby site produced demonstrable adverse medical effects upon his patients presented evidence to the Derlwyn Public Inquiry in South Wales. However, that evidence has since been discredited and shown, as an epidemiological study to be fundamentally flawed (British Medical Journal 305, 1992).

2.5.3 In 1992 the Institute of Occupational Medicine (IOM) concluded a three-year epidemiological study of the respiratory health of some one thousand two hundred and forty-nine opencast mine employees working over nine sites selected by the IOM (Institute of Occupational Medicine Ltd 1992).

2.5.4 The main conclusions of that study were that dust exposures were low for most occupational occurrences and that neither asthma nor chronic bronchitis is related to exposure to dust in any part of opencast workings. It is only for those workers exposed for 10 years or more in the dustiest of opencast jobs that a small risk of pneumoconiosis was demonstrated.

2.5.5 The Health and Safety Executive have set the occupational exposure limit for dust at 10 mg/m³ as an 8-hour time weighted average. As previously mentioned, such a figure may have significance within a site if workers are immediately adjacent to a particular operation prone to high dust emissions. However, due to dilution and dispersion it is extremely unlikely that any residential property around a site would ever experience concentrations of dust as high as this, with environmental dust levels some 100 times less being the norm.

2.5.6 In 1999 the then DETR published the results of a relevant research project by the University of Newcastle upon Tyne under the title “Do particulates from opencast coal mining impair children’s respiratory health?”

2.5.7 The Committee on the Medical Effects of Air Pollutants considered the content of this study, finding that it was “…of a high standard”.

2.5.8 The Committee agreed with the findings of the authors of the report that:

I. Opencast coal mining was associated with a small increase in the mean concentration of airborne particle measured as PM_{10} in areas close to opencast sites. This was due to an increased concentration of shale.

II. The respiratory health of children living in communities close to opencast coal sites was very similar to that of children living in communities distant from such sites.

2.5.9 Overall, the number of consultations made to general practitioners was similar for children who lived close to opencast sites compared to those who did not.

2.5.10 The Committee noted that the increase in particle concentrations close to opencast sites was not due to the release of coal particles but was more likely due to earth moving and excavation. Such levels of exposure to these materials, as may occur in local communities as a result of any opencast mining, are most unlikely to have any detectable effects on health.

2.5.11 They concluded that from what is known of the long term effects of coal mining on the health of opencast coal miners, that it is most unlikely that opencast sites would have any long term effects on the health of local communities.

2.5.12 The study noted that the differences between opencast areas and the control communities studied during the research was some 2.0 µg/m³ in terms of the gravimetric mean of daily differences in measured PM_{10} values.

2.5.13 Of significance, however, was their finding that the differences between opencast and control communities were not found to be greater under conditions when the contribution of site related PM_{10} dust had been expected to be raised. In such circumstances as when the wind was blowing from the site to the community monitor or during permitted site working hours.

2.5.14 Further guidance with regard to the assessment of PM_{10} is given within the Planning Practice Guidance documentation to the National Planning Policy Framework.

2.5.15 The general basis of this guidance is that dust should as far as possible be controlled, mitigated or removed at source. The document further confirms, with minor refinements, the assessment methodology of the University of Newcastle upon Tyne study.

3.0 BASELINE CONDITIONS

3.1 Sensitive Receptors

3.1.1 Sensitive receptors are locations which might be affected by dust emissions during minerals activities. Human receptors include locations where people spend time and property which may be impacted by dust. Ecological receptors are habitats that might be sensitive to dust.

3.1.2 PM_{10} needs to be assessed if there are sensitive receptors within 1 km (to be consistent with the national PPG); however, for disamenity dust it is commonly accepted that adverse dust impacts from sand and gravel sites are uncommon beyond 250m from the nearest dust generating activities; similarly adverse dust impacts from hard rock quarries are uncommon beyond 400m.

Human

3.1.3 A 'human receptor' refers to any location where a person may experience the disamenity effects of dust, or the health effects from exposure to PM_{10}.

3.1.4 Locations sensitive to potential dust disamenity impacts were identified from a desk-top study of the area up to 250m from the proposed dust generating activities. These are shown in Figure 2.

Ecological

3.1.5 An 'ecological receptor' refers to any sensitive habitat with the potential to be affected by dust deposition.

3.1.6 There are no ecological receptors sensitive to dust deposition within 250m of the potential dust generating activities. As such, ecological impacts have not been considered further within this assessment.

3.2 Meteorology

Windspeed and Direction

3.2.1 The generation and dispersal of dust is highly dependent upon meteorological conditions prevalent at the time. Weathernet has advised that wind speed and direction data are recorded at Blackpool Squires Gate, Lancashire, approximately 16 km to the south of Preesall.

3.2.2 Weathernet considers that the data recorded at Blackpool Squires Gate, Lancashire over the period January 2012 to December 2021 would be representative of the conditions experienced in the vicinity of the new sand and gravel quarry proposals. Following a site inspection Vibrock consider that this data is not likely to be negatively affected by the site topography, with the majority of dust generating activities carried out within areas protected by screening bunds.

3.2.3 Observations of the wind speed and direction recorded over this ten-year period, comprising some 86,000 hourly observations, have been used to compile the relevant wind rose shown in Appendix 1.

Rainfall Data

3.2.4 In the guidance 'The Environmental Effects of Dust from Surface Mineral Workings' published in 1995 by the DoE (now part of DEFRA) together with guidance in the former MPS2, it is generally accepted that wind blow of dust does not occur on days when rainfall is above 0.2mm.

3.2.5 An indication of the proposed long term average annual number of dry days (i.e. less than 0.2 mm) for the quarry has been taken from the met data recorded at Blackpool Squires Gate, Lancashire. This dataset indicates that there is an average of 158 days per year with rainfall less than 0.2 mm, i.e. approximately 48% of the year.

Dry Windy Working Days

3.2.6 The frequency of use and the effectiveness of the control measures will largely depend upon climatic conditions together with the separation distances involved between any potential dust source and residential locations.

3.2.7 The highest potential for dust dispersal and deposition occurs on dry windy days and the risk of dust deposition at a particular location is determined by the frequency of these dry winds blowing towards them from a dust generating activity.

3.2.8 The meteorological data presented in Appendix 1 and 2 has been analysed in order to quantify the number of dry working days in which the wind direction is in a particular sector as shown in Table 2. The calculations have been based on 158 'dry' days per year (Appendix 2) and adapted to allow for working days only, i.e. 5½ days per week, 47 weeks per year, giving a total of 112 working days per year with rainfall less than 0.2mm.

Table 2. Number of Dry Working Days Per Year

Wind Direction	Frequency of Occurrence % (from Appendix 1)	No. of Dry Working Days Per Year
North	3.4	3.8
North North East	3.5	3.9
East North East	4.6	5.2
East	10.5	11.8
East South East	9.4	10.5
South South East	9.6	10.8
South	5.9	6.6
South South West	6.1	6.8
West South West	12.2	13.7
West	15.2	17.0
West North West	11.5	12.9
North North West	7.5	8.4
Calm/Variable	0.8	0.9

3.2.9 Dust is not likely to be carried by winds of less than 5.6 ms^{-1} (i.e. less than 11 knots). This value of 5.6 ms^{-1} derives from the Beaufort Wind Scale and is very much in line with the value of 5.4 ms^{-1} as used by the United States Environmental Protection Agency in their dust emission calculations. The value is also below the 5.8 ms^{-1} stated within guidance from MIRO and the Department of the Environment for the initiation of dust emission for disturbed pebbly soils.

3.2.10 An assessment of the likelihood of a dust occurrence is presented in Table 3 below:

Table 3. Likelihood of Dust Occurrence

Wind Direction	No. of Dry Windy Working Days	Dry Windy Working Days as % of the total Number of Dry Working Days per Year (112)
North	0.9	0.8
North North East	0.7	0.6
East North East	1.0	0.9
East	3.4	3
East South East	3.1	2.8
South South East	5.6	5
South	3.4	3
South South West	4.0	3.6
West South West	10.3	9.2
West	11.7	10.4
West North West	6.6	5.9
North North West	3.4	3

3.2.11 Based on the above analysis and with wind at the site predominantly originating from the west south west and west, the likelihood of dust occurrence is expected to be in the region of 22 days per year.

3.3 Existing Air Quality

Local Air Quality Management and Monitoring

3.3.1 As required by the Environment Act, Wyre Council has undertaken review and assessment of air quality within their area of jurisdiction. This process has indicated that there is one AQMA in the council boundary. AQMA Chapel St has been designated due to NO_2 exceedances. This is detailed within the 2021 Annual Status Report.

Background Pollutant Concentrations

3.3.2 Particulate matter is generally categorised on the basis of the size of the particles. PM_{10} particles are those with a mean aerodynamic diameter less than 10 micrometres (microns), with the smaller $PM_{2.5}$ particles being defined as those with a mean aerodynamic diameter less than 2.5 microns.

3.3.3 Particulate matter is made up of a wide range of materials and arises from a variety of sources. Concentrations of particulate matter comprise primary particles emitted directly into the atmosphere from combustion sources and secondary particles formed by chemical reactions in the air. Particulate matter derives from both human activity and natural sources (such as sea spray and Saharan dust). In the UK the biggest human activity sources are stationary fuel combustion and transport.

3.3.4 As an indication of the likely level of PM_{10} and $PM_{2.5}$ particulates at the site, data has been accessed for the relevant 1km squares of the Automatic Urban and Rural Network (AURN), by way of using the Local Air Quality Management Background Mapping Data Tool available on the DEFRA website under the UK Air Information Resources. This resource currently uses projections based on the 2018 AURN dataset.

3.3.5 The levels for the grid squares which contain the closest receptors to the quarry are detailed below. The data presented is for projected concentrations for years 2022, 2026 and 2030.

Table 4. Annual Average Background Concentrations

Location	Year	PM_{10} $\mu g/m^3$	$PM_{2.5}$ $\mu g/m^3$
Grid Square 337500, 447500 Containing: Bourbles Farm, Crossing Cottage	2023	8.71	5.52
	2026	8.51	5.36
	2030	8.46	5.32
Grid Square 337500, 446500 Containing: Greenacres, Lyndale Farm, Hillfield House/Pointer Farm, Mytax/New England Cottage	2023	8.70	5.53
	2026	8.50	5.38
	2030	8.46	5.34
Grid Square 336500, 446500 Containing: The Beeches	2023	8.56	5.54
	2026	8.37	5.39
	2030	8.32	5.35
Grid Square 336500, 447500 Containing: Ourome, Red Lea, Woodlands, Whinmore Fold, Old Nickson's Cottage	2023	8.89	5.68
	2026	8.69	5.52
	2030	8.64	5.48

3.3.6 The IAQM guidance states that if the long term background PM_{10} concentration is less than $17\mu g/m^3$ there is little risk that the contribution of a mineral site in terms of emissions would lead to exceedances of the annual mean objectives. The maximum predicted background PM_{10} concentration in the vicinity of the site is $8.89\mu g/m^3$ during 2023. This is below the relevant value. As such, the potential for emissions from the development to affect PM_{10} concentrations at human health receptors is predicted to be negligible.

3.4 Background Dust Deposition Monitoring

3.4.1 Dust in the community is normally perceived as an accumulated deposit on surfaces such as washing, window ledges, paintwork and other light coloured horizontal surfaces, e.g. car roofs. When the rate of accumulation is sufficiently rapid to cause noticeable fouling, discoloration or staining (and thus decrease the periods between cleaning) then the dust is generally considered to be a nuisance. The point at which an individual makes a complaint regarding dust is highly subjective.

3.4.2 Existing deposited dust levels were monitored around the site using sticky pad methods. The monitoring locations are displayed in Figure 2.

3.4.3 The samples were then analysed for dust soiling and expressed in percentage of effective area coverage per day (% EAC/day).

Table 5. Measured Dust Deposition

Location	Exposure Period	Dust Settlement (Approximation) EAC% per Day	Typical Classification (Low/Medium/High)
A	25/10/22 – 08/11/22	0.7	Medium
B	25/10/22 – 08/11/22	0.4	Low
C	25/10/22 – 08/11/22	0.4	Low
D	25/10/22 – 08/11/22	0.3	Low
E	25/10/22 – 08/11/22	0.3	Low

3.4.4 Existing dust levels are mainly influenced by road traffic and agricultural activity.

3.4.5 In general terms levels below 0.7% EAC/day would be regarded as ‘low’, deposition levels between 0.7 – 2.0% EAC/day would be regarded as ‘medium’ and levels in excess of 2.0% EAC/day would be regarded as ‘high’. It is common for dust monitoring programmes to use the 2.0% EAC per day threshold as a guideline limit.

3.4.6 The background dust soiling monitoring conducted in the surrounding area of the new quarry proposals suggests that dust soiling is low to medium and typical of the site setting.

4.0 POTENTIAL EMISSIONS

4.1 Introduction

4.1.1 The operations involved in the extraction, processing and movement of sand and restoration materials have the potential to generate dust emissions.

4.2 Mineral Extraction

4.2.1 The extraction of mineral will be undertaken on a campaign basis via hydraulic excavators and loaded into 3 to 4 dump trucks for transportation to the processing plant.

4.3 Internal Movement of Material

4.3.1 The major source of potential dust emissions on any minerals site is from the movement of heavy plant on haul roads. The surfacing of the quarry plant area will be a mix of concrete and road planings. Internal haul road surfacing within the extraction area will be made from compacted hardcore/road planning and lime stabilized clay topped with scalpings.

4.3.2 The following dust mitigation measures will be conducted. A site speed limit will be implemented of 20 mph in the extraction area. Dust suppression with the use of an on-site water bowser will be implemented to mitigate dust generation.

4.3.3 Mobile plant exhausts and cooling fans will be discharged away from the ground to prevent dust mobilisation.

4.3.4 All mobile plant to be regularly maintained.

4.4 Mineral and Inert Waste Processing

4.4.1 Mineral and inert waste processing will occur within a designated plant area which has the benefit of locating the activities away from residential properties and provides visual, acoustic and wind screening.

4.4.2 As the restored levels approach surrounding ground level, bunds around the site boundary will still provide screening.

4.5 Restoration Activities

4.5.1 Any soils handled as part of restoration activities will be managed in accordance with the site restoration scheme as soon as is practicable in order to minimise the potential for dust generation.

4.6 Potential Emission Magnitude

4.6.1 Guidance from the Institute of Air Quality Management "Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016" suggests that the magnitude of potential dust emission should be classified on a scale of impact as small, medium or large based upon the judgement of the assessor. In determining the potential emissions of importance to this application, the following sources are considered:

- Site Preparation and Restoration
- Mineral Extraction
- Materials Handling
- On-site Transportation
- Mineral Processing
- Stockpiles/Exposed Surfaces
- Off-site Transportation

Site Preparation and Restoration

4.6.2 Short term operations at the site will consist of soil stripping and material movement to prepare the proposed working area on a campaign basis. The proposed extraction area is 12.4ha in area. The restoration of this area will involve 250,000m^3 of inert material being imported over the life of the project. Site preparation will consist of an excavator and two dump trucks with screening bunds formed using a D6 Dozer.

4.6.3 The IAQM guidance suggests that overburden and soil movement for material across the proposed extraction area being less than 20,000 m^3 is deemed a small residual source emission. A working area of between 10ha and 2.5ha is categorised as a medium dust raising potential.

4.6.4 The restoration of the extraction area will involve importing <1,000,000m^3 which the IAQM details as a large residual source emission.

4.6.5 Taking into account the IAQM guidance, the site preparation and restoration is considered as having a **medium** dust raising potential based on and a low number of operational plant.

Mineral Extraction

4.6.6 The maximum size of the mineral extraction area to be worked at any one time is 12.5 ha, worked on a campaign basis, which is deemed a small extraction area; being significantly smaller than the threshold of less than 20ha for a small scale potential dust impact as suggested by the IAQM. Extraction of material will be conducted via excavator loading sand and gravel which contains high moisture content. The mineral extraction rate of 100,000tpa is deemed a small residual dust emission as this figure is less than the 200,000 tpa figure suggested by the IAQM. All mineral extraction activities will be conducted within a screened area as screening bunds will protect nearby sensitive receptors.

4.6.7 The relatively small mineral extraction area working mineral of a high mineral moisture content, the overall scale of potential emission is classed as **small** for mineral extraction.

Materials Handling

4.6.8 Using the IAQM guidance, less than 5 loading plant transferring material, with activities being conducted on compacted quarry flooring moving material of high moisture content is considered a **small** potential dust impact.

On-site Transportation

4.6.9 Material will be moved using dumpers. There are proposed to be approximately 100 HGV movements to and from the extraction area and processing plant per day. The furthest distance from the proposed extraction area of the processing plant is 180m, this activity is judged to be of **medium** dust raising impact.

Mineral Processing and Waste Recycling

4.6.10 A maximum of 100,000tpa is anticipated to be processed, however much of this virgin material may not require processing.

4.6.11 The IAQM classifies the processing of less than 200,000 tpa of material as a small dust impact; the processing of greater than 1,000,000tpa is deemed a large dust impact. Influenced mostly by the mineral processing taking place within the designated plant area utilising water as part of the process, in addition to the volume of material being processed this activity is judged to be of **small** residual source emission.

Stockpiles/Exposed Surfaces

4.6.12 Stockpiling will be open and not shielded, therefore susceptible to high winds. The quarry will produce material at a rate of 100,000tpa, with stockpiles being in frequent use. Considering this information against IAQM guidance, the overall impact of stockpiles/exposed surfaces is **medium**.

Off-site Transportation

4.6.13 IAQM advises a medium potential dust magnitude from off-site transportation could include total HGV up to 100 movements per day. The use of a paved access road with wheel wash facilities are factors which would generate a small residual source emission. The overall scale of dust impact from off-site transportation is considered to be **small**.

Summary

Table 6. Residual Source Emission Classification

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

5.0 ASSESSMENT OF DUST EFFECTS

5.1 Dust Events

5.1.1 A dust event will only occur if the necessary conditions are present. It is necessary to have a fine material available which is able to be picked up, carried and then deposited by the wind. Such materials are more readily available if dry and physically disturbed. Thus, not all site operations are dusty because of the lack of physical disturbance.

5.1.2 There must also be a wind of sufficient strength to transport fine particles, and for a particular property to be at risk the wind must blow in that particular direction from the source. The critical wind speed at which a particle becomes airborne depends on many factors including particle size, shape and density. For most mineral dusts the critical wind speed is about 5.6 ms^{-1} (12 mph - 11kts - Force 4 on Beaufort Scale).

5.1.3 For a dust event to occur there must also be a failure of dust control measures. Particles greater than 30µm make up the greatest proportion of dust emitted from mineral processing and largely deposit within 100m of sources. Particles between 10 and 30µm are likely to travel from 250 to 400m, while sub 10µm particles, which make up a small proportion of dust emitted from most mineral processing operations, may travel up to 1km from sources.

5.2 Frequency and Proximity

5.2.1 In considering the climatic conditions, it is clear the winds will predominate from the west quadrant with an analysis of the number of dry windy working days giving a maximum of some twelve such in any one year.

5.2.2 The IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning presents the following categorisation of frequency of potentially dusty winds and categorises receptor distance from source as distant, intermediate or close as displayed in Table 7 and 8 below.

Table 7. Categorisation of Frequency of Potentially Dusty Winds

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

Table 8. Categorisation of Receptor Distance from Dust Source

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

5.2.3 The assessment locations are identified on Figure 2.

Bourbles Farm

5.2.4 The property is located <100m northeast of the proposed Phase 4 at the closest approach of workings. Winds from the west-north-west, west, west-south-west, south-south-west, south, south-south-east, and east-south-east would blow from the proposed site towards the residential property for a total of 45 dry windy working days per annum.

5.2.5 The property is shielded from the site by screening bunds in Phase 2 and Phase 4.

5.2.6 Bourbles Farm is therefore classed as **close** from the source of dust and with the potential for dusty winds classed as **very frequent**.

Crossing Cottage

5.2.7 The property is located around 150m east of the proposed Phase 3 area at the closest approach. Winds from the west-north-west, west, and west-south-west would blow from the site towards the residential property for a maximum of 22 dry windy working days per annum.

5.2.8 Crossing Cottage is therefore classed as **intermediate** from the source of dust and with the potential for dusty winds classed as **very frequent**.

Greenacres

5.2.9 The property is located approximately 130m south of the proposed Phase 3 extraction area at the closest approach.

5.2.10 Winds from the north-north-west and west-north-west would blow from the site towards the residential property for a maximum of 10 dry windy working days per year.

5.2.11 Greenacres is therefore classed as **intermediate** from the source of dust and with the potential for dusty winds classed as **moderately frequent**.

Lyndale Farm

5.2.12 The property is located approximately 160m south of the proposed extraction area at the closest approach.

5.2.13 Winds from the north, north-north-east, north-north-west, and west-north-west would blow from the site towards the residential property for a calculated maximum of 11.6 dry windy working days per annum.

5.2.14 Lyndale Farm is therefore classed as **intermediate** distance from the source of dust and with the potential for dusty winds classed as **moderately frequent**.

Hillfield House/Pointer Farm

5.2.15 These properties are located approximately 140m east of the proposed site access road at the closest approach.

5.2.16 Winds from the east-north-east, north-north-east, north, north-north-west, and west-north-west would blow from the site towards the residential property for a calculated maximum of 12.6 dry windy working days per annum.

5.2.17 Hillfield House/Pointer Farm is therefore classed as an **intermediate** distance from the source of dust with the potential for dusty winds classed as **frequent**.

The Beeches

5.2.18 The property is located approximately 130m west of the proposed site access road at the closest approach.

5.2.19 Winds from the east-north-east, north-north-east, north, north-north-west, and west-north-west would blow from the site towards the residential property, totalling 6 dry windy working days per annum.

5.2.20 The Beeches is therefore classed as an **intermediate** distance from the closest potential source of dust, the site access road and with the potential for dusty winds classed as **moderately frequent**.

Ourome

5.2.21 The property is located approximately < 100m to the west of the proposed Phase 4 area at the closest approach.

5.2.22 Winds from the east-north-east, north-north-west, north, and north-north-east would blow from the site towards the residential property. The property is shielded from the site by a screening bund in Phase 4.

5.2.23 Ourome is therefore classed as **close** from the source of dust and with the potential for dusty winds classed as **moderately frequent**.

Red Lea

5.2.24 The property is located <100m east of the proposed Phase 1 extraction area at the closest approach.

5.2.25 Winds from the west-north-west, west, west-south-west, south-south-west, south, south-south-east, east-south-east, and east would blow from the site workings towards the residential property; giving a total number of 48 potential dry windy working days per annum. The property is shielded from Phase 1 by a screening bund.

5.2.26 Red Lea is therefore classed as a **close** distance from the source of dust and with the potential for dusty winds classed as **very frequent**.

Woodlands

5.2.27 The property is located <100m to the north of the closest of proposed Phase 1 extraction operations.

5.2.28 Winds from the west-south-west, south-south-west, south, south-south-east, and east-south-east would blow from the site towards the residential property for a worst case 26.5 dry windy working days per annum. The property is shielded from the site by a proposed screening bunds surrounding Phase 1.

5.2.29 Woodlands is therefore classed as **close** from the source of dust and with the potential for dusty winds classed as **very frequent**.

Whinmore Fold

5.2.30 The property is located <100m west of the proposed Phase 1 boundary at the closest approach.

5.2.31 Winds from the east-south-east, east, and east-north-east would blow from the site towards the residential property. The property is shielded from the site by a screening bunds proposed to constructed along the west boundary of Phase 1.

5.2.32 Whinmore Fold is therefore classed as a **close** distance from the source of dust and with the potential for dusty winds classed as **moderately frequent**.

Old Nickson's Cottage

5.2.33 The Warren is located approximately 130m south of the proposed Phase 1 extraction area at the closest approach.

5.2.34 Winds from the north, north-north-east, east-north-east, east, and east-south-east would blow from the site towards the residential property. The property is shielded from the site by a screening bund at Phase 1 and Phase 4.

5.2.35 Old Nickson's Cottage is therefore classed as an **intermediate** distance from the closest potential source of dust and with the potential for dusty winds classed as **moderately frequent**.

Mytax/New England Cottage

5.2.36 The property is located approximately <100m west of the proposed Phase 3 processing area at the closest approach.

5.2.37 Winds from the east-south-east, east, east-north-east, north-north-east, north, north-north-west, west-north-west, west, and west-south-west would blow from the proposed site areas towards the residential property. The property is shielded from the site by screening bunds along the southeast part of Phase 4.

5.2.38 Mytax/New England Cottage is therefore classed as **close** from the source of dust and with the potential for dusty winds classed as **very frequent**.

5.3 Pathway Effectiveness

5.3.1 The effectiveness of the pathway for dust propagation may be evaluated with reference to Table 9 below.

Table 9. Categorisation of 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

5.3.2 In order to determine pathway effectiveness from the IAQM Guidance, the receptor distance category and frequency of potentially dusty winds are combined, the results of which are presented for each receptor location below.

Table 10. Pathway Effectiveness

Receptor	Pathway Effectiveness
Bourbles Farm	Highly Effective
Crossing Cottage	Highly Effective
Greenacres	Moderately Effective
Lyndale Farm	Moderately Effective
Hillfield House/Pointer Farm	Moderately Effective
The Beeches	Moderately Effective
Ourome	Moderately Effective
Red Lea	Highly Effective
Woodlands	Highly Effective
Whinmore Fold	Moderately Effective
Old Nickson's Cottage	Moderately Effective
Mytax/New England Cottage	Highly Effective

5.4 Estimation of Dust Impact Risk

5.4.1 An estimation of dust risk is established for each location based on the pathway effectiveness of dust transmission and the worst-case categorisation of residual dust source emission (Table 6) with reference to Table 11 below.

Table 11. Estimation of Dust Impact Risk Categorisation

		Residual Source Emissions		
		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

Table 12. Estimation of Dust Impact Risk

Receptor	Estimation of Dust Impact Risk
Bourbles Farm	Medium Risk
Crossing Cottage	Medium Risk
Greenacres	Low Risk
Lyndale Farm	Low Risk
Hillfield House/Pointer Farm	Low Risk
The Beeches	Low Risk
Ourome	Low Risk
Red Lea	Medium Risk
Woodlands	Medium Risk
Whinmore Fold	Low Risk
Old Nickson's Cottage	Low Risk
Mytax/New England Cottage	Medium Risk

5.4.2 For the purpose of identifying receptor sensitivity, the IAQM 2016 Guidance suggests that residential dwellings should be classed as a high sensitivity receptor.

5.5 Magnitude of Dust Effects

5.5.1 The magnitude of dust impact is evaluated by combining the dust impact risk with the receptor sensitivity (noted above), as shown in Table 13.

Table 13. Magnitude Descriptors

		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

5.5.2 An assessment of the magnitude of dust effect is presented for each of the receptor locations presented in Table 14.

Table 14. Magnitude of Dust Effect

Receptor	Magnitude of Dust Effect
Bourbles Farm	Moderate Adverse Effect
Crossing Cottage	Moderate Adverse Effect
Greenacres	Slight Adverse Effect
Lyndale Farm	Slight Adverse Effect
Hillfield House/Pointer Farm	Slight Adverse Effect
The Beeches	Slight Adverse Effect
Ourome	Slight Adverse Effect
Red Lea	Moderate Adverse Effect
Woodlands	Moderate Adverse Effect
Whinmore Fold	Slight Adverse Effect
Old Nickson's Cottage	Slight Adverse Effect
Mytax/New England Cottage	Moderate Adverse Effect

5.6 Mitigation

5.6.1 When conditions for dry windy working days do occur, the implementation of the dust suppression measures discussed in Section 4 and Appendix 3 will ensure that dust emissions are minimised. The use of such best practice measures, which have been implemented at mineral extraction sites throughout the United Kingdom, suggest that such measures will be effective.

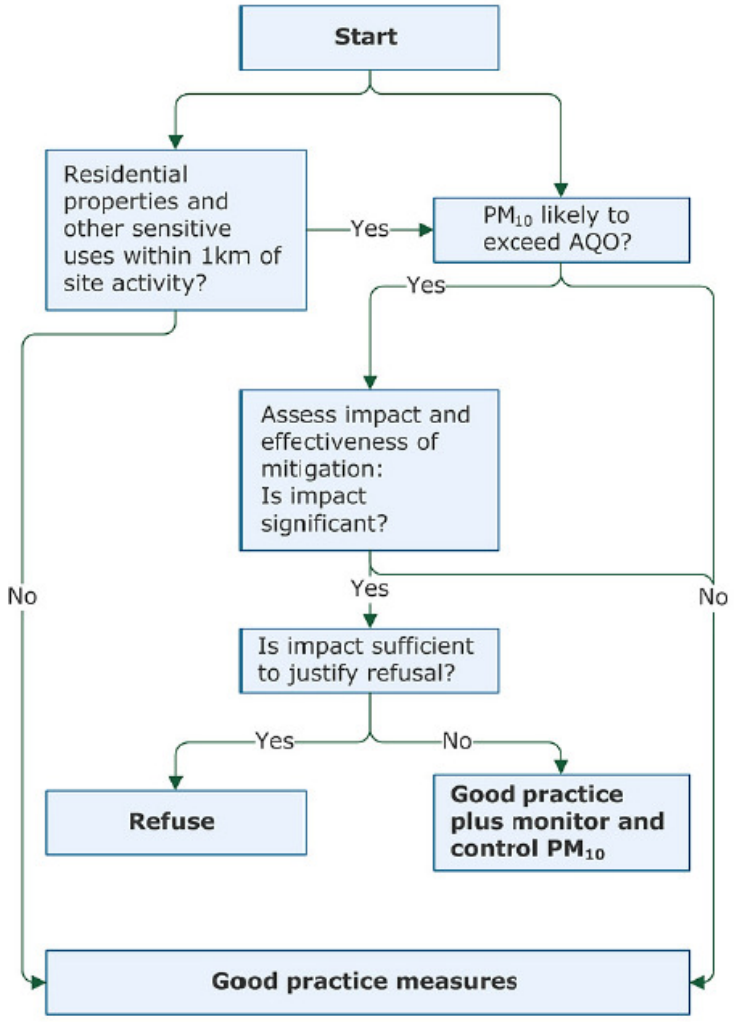
6.0 ASSESSMENT OF HUMAN HEALTH EFFECTS

6.1 PM_{10} Assessment

6.1.1 The 1999 DETR publication "Do particulates from opencast coal mining impair children's respiratory health?" recommends an assessment framework with respect to PM_{10} particulates.

6.1.2 The framework takes a step-by-step approach to PM_{10} looking at various factors in time via a scheme of straightforward questions set out in a "Proposed Site Assessment Flowchart". If the site is not likely to have a significant impact, then best practice measures are recommended. If, however, its impact is significant, either a refusal should follow or additional monitoring and control.

6.1.3 The Planning Practice Guidance to the National Planning Policy Framework contains an amended version of the assessment framework (shown below).



6.1.4 To follow the framework, the first step is to assess whether the site has a community or particularly sensitive users / premises within 1000m of the site boundary.

6.1.5 The second step is then to assess whether the extra burden of PM_{10} particulates from the site is likely to exceed the National Air Quality Objectives (AQO).

6.1.6 To undertake this assessment it is recommended that Automatic Urban and Rural Network (AURN) data be accessed.

6.1.7 If the AURN data indicates that the additional load attributable to site operations, would bring the area above the AQO, then this would indicate that there may be a need for monitoring and control mechanisms. These would be required to be put into place in order to reduce the potential to create PM_{10} dust from the site on those days that exceed the standard.

6.1.8 If the AURN data indicates that the additional load attributable to site operations alone would not cause any breach of the AQO, this would indicate that there would be no justification for any additional monitoring and controls over and above best practice measures.

6.1.9 This study has accessed air quality data from the DEFRA website for the relevant grid squares which contain the closest residential receptors. The website uses the AURN dataset from the 2018 baseline. The data has been predicted annually up until 2030.

6.1.10 The IAQM Guidance suggests that based on the currently available information 17 µg/m³ is considered to be a suitable screening value for an assessment of annual mean PM_{10} concentrations.

6.1.11 The highest PM_{10} concentration from all of the assessed receptors is the annual mean PM_{10} concentration at Ourome, Red Lea, Woodlands, Whinmore Fold and Old Nickson's Cottage for the year 2023, with a PM_{10} level of 8.89 µg/m³. This concentration level, as well as all other assessed receptors is less than 17 µg/m³ and based on IAQM Guidance can be screened out of this assessment and not considered further in regard to PM_{10} concentrations.

6.1.12 Hence the proposed mineral extraction operations at the proposed new quarry would satisfy the UK Air Quality Objectives for PM_{10} of no more than 35 exceedances per year of a 24 hour mean of 50µg/m³ and an annual mean of 40 µg/m³.

6.1.13 This procedure clearly indicates that the PM_{10} levels from this proposal are not likely to exceed the Air Quality Objectives and it is considered that the best practice measures proposed for dust control are appropriate and in proportion to the potential for dust emission.

6.1.14 As previously noted within this report, sub 10µm particles, which make up a small proportion of dust emitted from most mineral operations, may travel up to 1km from sources. Of the total PM_{10} dust fraction there will be a percentage of the smaller $PM_{2.5}$ particulate matter.

6.1.15 In the May 2016 publication by the Institute of Air Quality Management "Guidance on the Assessment of Mineral Dust Impacts for Planning" it is stated that:

"The other potential air quality impact is the increase in ambient suspended particulate matter (PM) concentrations local to the site. As noted earlier, the PM_{10} fraction is relevant to health outcomes. For quarries most of this suspended dust will be in the coarse sub-fraction ($PM_{2.5-10}$), rather than in the fine ($PM_{2.5}$) fraction."

6.1.16 On the basis of the above comment and the nationally derived ratio of $PM_{2.5}/PM_{10}$; 0.7, it is considered an additional burden of 0.5 μgm^{-3} $PM_{2.5}$ to the annual mean would represent a worst case.

6.1.17 The application of a 0.5 $\mu g/m^3$ loading to the highest $PM_{2.5}$ concentration considered in this assessment of 5.68 $\mu g/m^3$ for the year 2023 at Grid Square: 336500, 447500 give a projected $PM_{2.5}$ burden with the addition of quarry operations of 6.18 $\mu g/m^3$ for the Grid Square containing Ourome, Red Lea, Woodlands, Whinmore Fold and Old Nickson's Cottage. The worst-case projected concentration therefore complies with the $PM_{2.5}$ 2020 annual mean criterion of 20 $\mu g/m^3$.

6.1.18 If the development is permitted, an increase in the annual mean concentration of PM_{10} and $PM_{2.5}$ would not exceed the Air Quality Objectives.

6.2 Respirable Crystalline Silica (RCS) in the Environment

6.2.1 Crystalline Silica (otherwise known as quartz) is a natural compound which is found in almost all kinds of rocks, sands, clays, shale and gravel.

6.2.2 One of the health risks from working in the quarry industry is that of exposure to fine dust containing crystalline silica which can cause a type of lung disease known as 'silicosis'.

6.2.3 The Health and Safety Executive (HSE) state that silicosis is a disease that has only been seen in workers from industries where there is a significant exposure to silica dust, such as in quarries and foundries, however, it should be noted that no cases of silicosis have been documented among members of the general public in Great Britain, indicating that environmental exposures to silica dust are not sufficiently high to cause this occupational disease. There is no guideline or standard for the concentration of Crystalline Silica in ambient air.

6.2.4 Notwithstanding the above, the sand and gravel production proposed at Bourbles Farm would involve the processing of a damp raw material through a wet washing process to produce a finished material which is also inherently damp. This means that the potential for community exposure is low with minimal impact on air quality. Furthermore there is no requirement for drilling or blasting at Bourbles Farm which, if not managed properly, may result in significant dust generation.

6.2.5 The quarry operator will be required to routinely monitor the exposure of its employees to RCS through regular occupational health monitoring. Given that the levels of RCS will be controlled and monitored within the immediate working area of the quarry for its employees, any exposure to RCS outside the site boundary is considered unlikely as a result of the dilution and dispersion of particulates over increased separation distances.

6.2.6 The potential air quality and dust hazards from quarries are well known and understood and are addressed by stringent regulatory controls set to protect health along with the implementation of additional site specific dust control management measures.

7.0 TRAFFIC IMPACTS

7.1 EPUK and IAQM guidance suggests a two-stage approach to determining if an air quality assessment of traffic impact is required.

7.2 The first stage is intended to screen out smaller development and/or developments where impacts can be considered to have insignificant effects. The second stage relates to specific details regarding the proposed development and the likelihood of air quality impacts.

7.3 If none of the criteria are met, then there should be no requirements to carry out an air quality assessment for the impact of the development on the local area, and the impacts can be considered as having an insignificant effect.

7.4 Where an air quality assessment is identified as being required, then this may take the form of either a Simple Assessment or a Detailed Assessment.

7.5 The proposed quarry development at Misterton meets the Stage 1 criteria by virtue of the size of the application site and it is therefore considered appropriate to proceed to Stage 2.

7.6 The Stage 2 criteria provide a range of more specific guidance and includes the following criteria which may be relevant to the proposed development:

- Where the development will cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors of more than 100 AADT within adjacent to an AQMA or more than 500 AADT elsewhere;

- Where the development will cause a significant change in Heavy Duty Vehicle (HDV) traffic flows on local roads with relevant receptors of more than 25 AADT within adjacent to an AQMA or more than 100 AADT elsewhere;

- Where the development will introduce a new junction or remove an existing junction near to relevant receptors. This applies to junctions that cause traffic to accelerate/decelerate such as traffic lights and roundabouts.

7.7 It is understood that the proposed quarry development would not result in an increase in HDV flows of more than 100 AADT on Lancaster Road (E) and Lancaster Road (W) of the proposed site entrance. The site is not located within an AQMA.

7.8 The proposed scheme is therefore not expected to exceed the Stage 2 criteria and no further assessment is required. The potential air quality impacts from traffic associated with the quarry development are not considered to be significant.

8.0 DUST MANAGEMENT

8.1 The table below presents an assessment of dust effects in accordance with the guidance contained in the IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning.

Table 15. Summary of Dust Effects

Receptor	Location Relative to Dust Source	Worst Case Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effect	Magnitude of Dust Effect Mitigation Methods in Place
Bourbles Farm	<100m NE of Phase 4	Medium	Highly Effective	Medium Risk	High	Moderate Adverse Effect	Negligible Effect
Crossing Cottage	150m E of Phase 3	Medium	Highly Effective	Medium Risk	High	Moderate Adverse Effect	Negligible Effect
Greenacres	122m S of Phase 3	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect	Negligible Effect
Lyndale Farm	162m S of Phase 3	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect	Negligible Effect
Hillfield House/ Pointer Farm	140m E of Site Access	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect	Negligible Effect
The Beeches	133m W of Site Access	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect	Negligible Effect
Ourome	<100m W of Phase 4	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect	Negligible Effect
Red Lea	<100m E of Phase 1	Medium	Highly Effective	Medium Risk	High	Moderate Adverse Effect	Negligible Effect
Woodlands	<100m N of Phase 1	Medium	Highly Effective	Medium Risk	High	Moderate Adverse Effect	Negligible Effect
Whinmore Fold	<100m W of Phase 1	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect	Negligible Effect
Old Nickson's Cottage	135m S of Phase 1	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect	Negligible Effect

Receptor	Location Relative to Dust Source	Worst Case Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effect	Magnitude of Dust Effect Mitigation Methods in Place
Mytax/New England Cottage	<100m W of Phase 3	Medium	Highly Effective	Medium Risk	High	Moderate Adverse Effect	Negligible Effect

8.2 The above table details the potential impacts of the assessed receptors in a worst-case scenario – where the quarry is operating at its maximum capability, at the closest possible point to each receptor. Due to the phased operation of the workings, the amount of time site operations will be at the closest approach to each receptor will be minimal.

8.3 As shown above, the impact on air quality from potential dust emissions is expected to have a *Moderate Adverse Effect* on all applicable receptors except Greenacre, Lyndale, Hillhouse/Pointer Farm, The Beeches, Ourome, Whinmore Fold, and Old Nickson's Cottage, which have a *Slight Adverse Effect*.

8.4 Site Preparation/Restoration, On-site Transportation, and Stockpiles/Exposed Surfaces have been identified as the largest sources of dust from the proposed site.

8.5 The following actions (8.6 – 8.16) will be taken to ensure that the dust control measures identified in Section 4.0 and Appendix 3 are effectively implemented. The implementation of appropriate dust control will effectively mitigate any potential dust impact; resulting in a magnitude dust effect of *negligible effect* at each assessed receptor.

8.6 The quarry operator will comply with any conditions which may be specified in the planning conditions imposed by the Mineral Planning Authority relating to dust. The operator will refer to the planning conditions and determine an appropriate response, taking into account current and forecast weather conditions.

8.7 All site personnel will be trained as to the potential sources and effective mitigation of dust.

8.8 Regular visual inspections will be conducted within the site and on the local road network by the site personnel, as deemed necessary and especially during dry windy conditions to ensure that any dust sources are identified and dealt with promptly.

8.9 A complaints log will be held on site. In the event of receiving a dust complaint, the name and location of the complainant, the nature of the dust related complaint, the site activity and prevailing weather conditions at the time of the complaint will be noted. The site foreman will investigate the complaint and take any remedial action which is deemed appropriate.

8.10 In the event of a failure of dust mitigation measures, for example in extreme weather conditions, the dust generating activity will be temporarily suspended, until appropriate dust mitigation is implemented or until a change in weather condition occurs.

8.11 It is recommended that, prior to the commencement of operations at the site, a dust management plan should be prepared and submitted to the Mineral Planning Authority for approval. This could be secured via a planning condition should the proposed quarry development be permitted.

8.12 Screening bunds will be constructed to protect all moderately adverse effected (in a worst-case scenario) from wind blow from the proposed site towards the property.

8.13 A tractor and water bowser will be implemented on the site haul roads to minimise dust effects from vehicles using the roads. The water bowser will 'wet down' the haul roads supressing dust.

8.14 A road sweeper will be utilized along the site access road and the local road network near the site entrance to mitigate against any dust track out.

8.15 The designated plant area will benefit from wind screening, the screens needs to be inspected regularly to ensure it is an effective barrier preventing wind blow from the processing plant area.

8.16 Stockpiling activities will use shielded bays to prevent wind blow of exposed surfaces in the stockpiling areas.

8.17 It has been demonstrated that the occurrence of potential dust events will be limited, of short duration and will be minimised by implementation of the dust control recommendations detailed above, and in section 4.0 and Appendix 3 of this report.

9.0 CUMULATIVE IMPACT

9.1 Within 1,000m of the proposed Bourbles Farm Quarry site, according to the Wyre Council Planning Application Map Search function, there are very few outstanding planning applications within the last 2 years which have the potential to result in a cumulative impact on the surrounding area when considered alongside the Bourbles Farm Quarry proposals.

9.2 The surrounding area of the proposed sand and gravel operations is a sparsely populated rural area. There is unlikely to be cumulative impacts arising when considering the local area and the proposed new quarry.

9.3 Cumulative impacts in regard to the proposed Bourbles Farm Quarry operations are deemed to have a negligible effect on nearby sensitive receptors.

10.0 CONCLUSIONS

10.1 Vibrock Limited has been commissioned to undertake an air quality impact assessment in relation to a planning application for mineral extraction and restoration at land off Bourbles Lane near Preesall in Lancashire.

10.2 It has been demonstrated that the occurrence of potential dust events will be limited, of short duration and will be minimised by implementation of the dust control recommendations.

10.3 With regard to PM_{10} and $PM_{2.5}$ dust levels from the site, analysis has been made of the air quality data and it is concluded that the air quality objectives will not be exceeded. In addition, the potential air quality impacts from traffic associated with the quarry development do not meet the criteria for detailed assessment and are therefore not considered to be significant.

10.4 The proposed development meets the air quality and dust requirements of national and local policy and guidance. Overall the effect on air quality due to the proposed development, with the implementation of suitable dust mitigation measures, is not considered to be significant.

11.0 REFERENCES

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4. Clean Air Strategy. Department for Environment, Food & Rural Affairs, Ministry of Housing, Communities & Local Government, Department for Transport, Department of Health and Social Care, HM Treasury, and Department for Business, Energy & Industrial Strategy. January 2019
5. National Planning Policy Framework, Ministry of Housing, Communities & Local Government, July 2021.
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10. The Environment Act, 2021.
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12. Good Practice Guide: control and measurement of nuisance dust and PM_{10} from the extractive industries. Mineral Industry Research Organisation, February 2011.
13. Minerals Policy Statement 2. Controlling and mitigating the environmental effects of minerals extraction in England. Annex 1: Dust, Office of the Deputy Prime Minister, 2005.
14. Her Majesty's Inspectorate of Pollution, Technical Guidance Note (Dispersion) D1, HMSO, June 1993.
15. Guidance on the Assessment of Mineral Dust Impacts for Planning, IAQM, May 2016.
16. Local Air Quality Management Technical Guidance (TG16), DEFRA April 2021.
17. Wyre Council 2021 Annual Status Report (ASR), September 2021.
18. Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD, February 2009.
19. Joint Lancashire Minerals and Waste Local Plan. Site Allocation and Development Management Policies - Part One, September 2013.

FIGURE 1

Quarry Development Plan (Phase A)

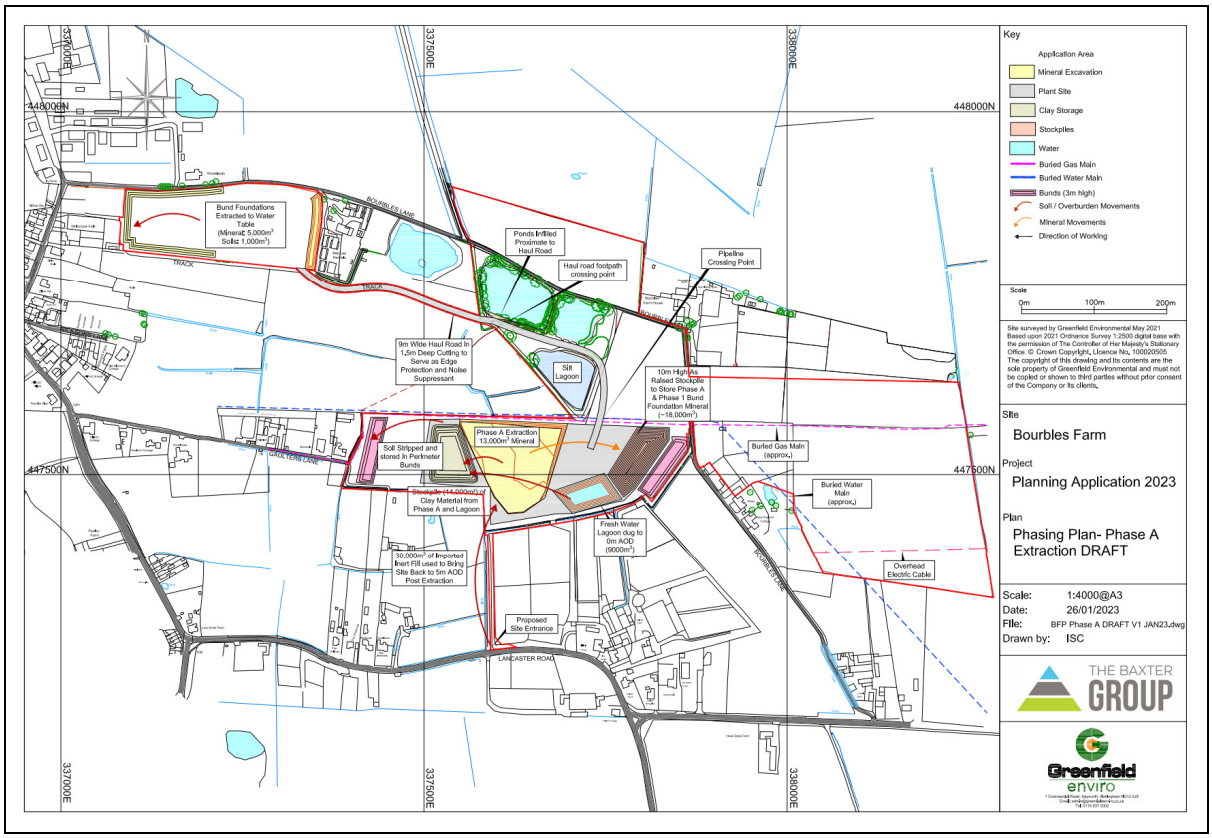
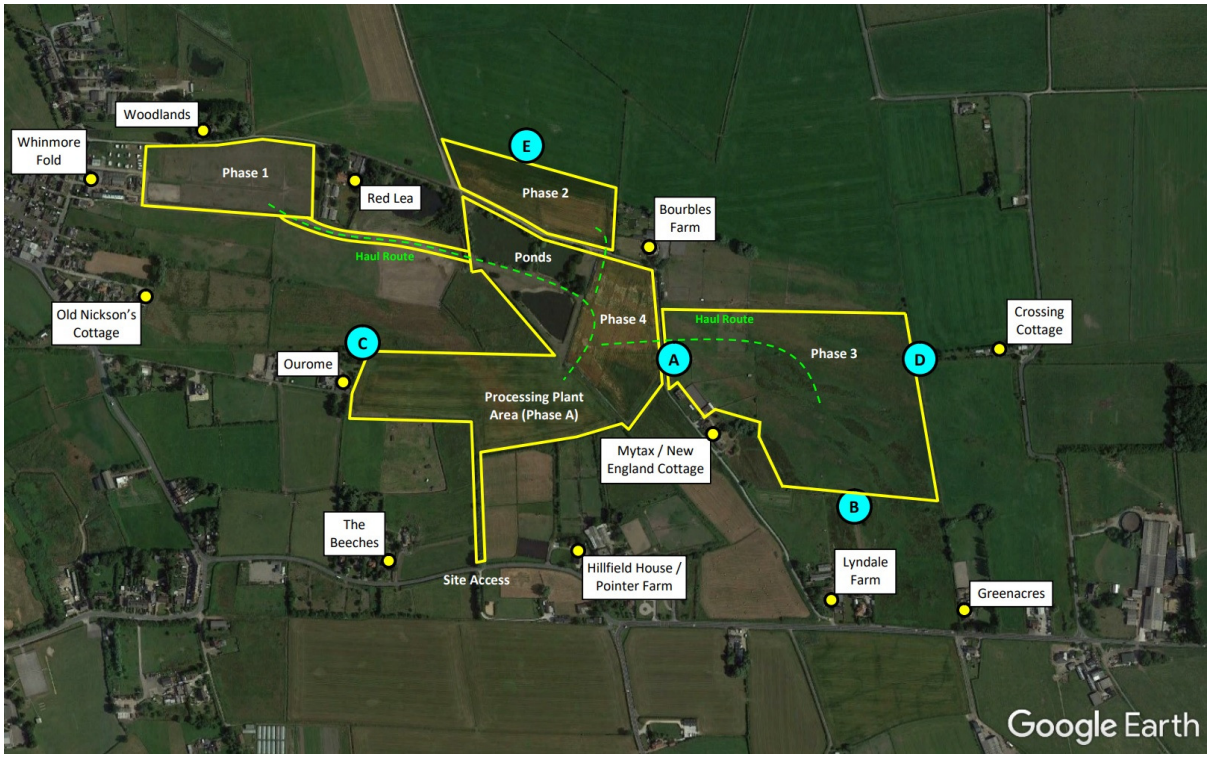


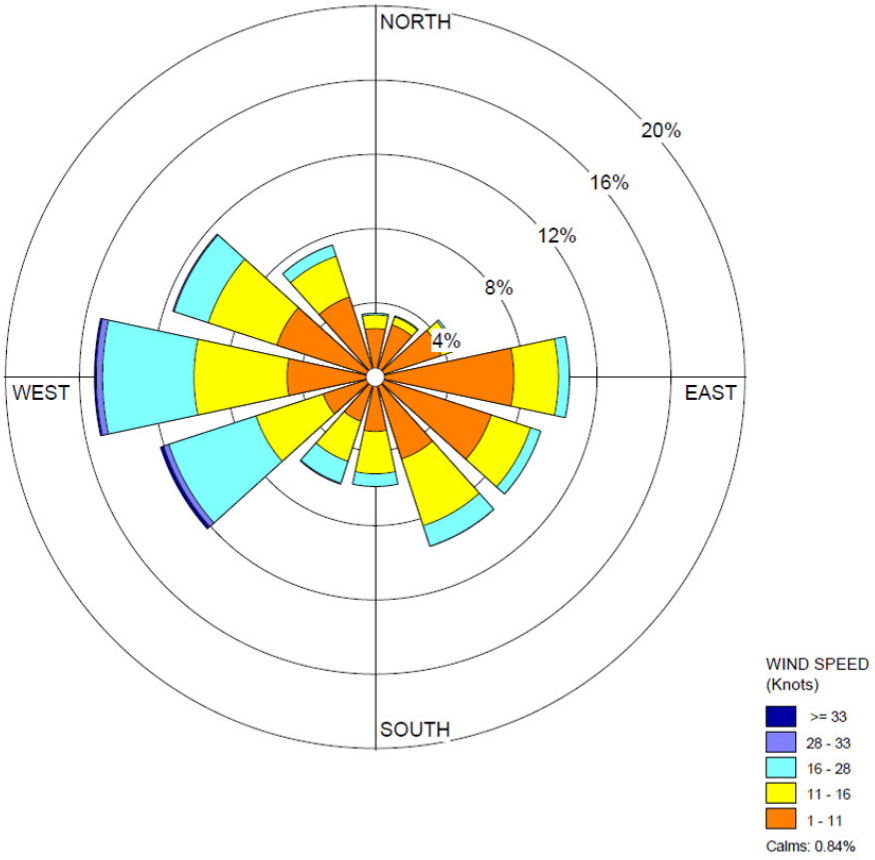
FIGURE 2

Receptor Locations and Dust Monitoring Locations (A - E)



APPENDIX 1

Wind Rose



APPENDIX 2

Mean Number of Days with Rainfall Less Than 0.2mm

Site: Blackpool Squires Gate, Lancashire
10 year period from January 2012 to December 2021

Month	No of days
January	7.6
February	11.3
March	14.9
April	17.8
May	18.5
June	17.0
July	15.0
August	13.2
September	14.8
October	11.4
November	8.5
December	8.3
Annual	**158.4**

APPENDIX 3

Summary of Dust Control Measures

Site Operation	Dust Control Measures
Site Preparation and Restoration Mineral Extraction Materials Handling On-site Transportation Mineral Processing Stockpiles/Exposed Surfaces Off-site Transportation	• Controlled use of fixed short haul routes • Haul routes to be regularly maintained by grading to minimise dust generation • Water to be used as required via site water bowser • Speed controls to be implemented on all haul routes 20 mph • Road sweeper to be utilised on local road network • Drop heights to be minimised • Mobile plant exhausts and cooling fans to point away from ground • All loaded HGVs exiting the site to be sheeted • All plant to be regularly maintained • Vehicle cleaning facilities to be used • Staff Training • Construction of screening bunds for all receptors that have a Moderate Adverse Effect

APPENDIX 4

IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning, May 2016

Describing Site Characteristics and Baseline Conditions

IAQM recommends that the site is visited at the beginning of the assessment to understand the site itself and its locality including local factors that can affect dust emissions and dispersion.

The proposed development and the surrounding area should be described. Factors that need to be taken into account are:

- Extent of site including site boundary;
- Existing site operations, including currently-consented workings;
- Scale and duration of operations, including phasing;
- Type and location of processing activities, including secondary processing
- Mineral type/characteristics (size, moisture content, friability, colour, opacity);
- Production rate;
- Method/s of working;
- Method/s of materials handling;
- Location/s of storage areas and stockpiles; and
- Location/s and number of access routes and haul roads.

The assessment should also take into account the principal existing dust sources (other than the application site) such as dust from existing mineral operations, agricultural activities and construction activities. The following information is likely to be required to understand the site characteristics and the baseline conditions:

- The main existing sources of dust in the area. This should include any available monitoring data;
- Background PM_{10} concentrations provided by Defra, and, if available, any existing relevant local monitoring data;
- The location and nature of dust sensitive receptors, shown on a map and/or in a table detailing the direction, and distance from the site boundary or relevant site activity;
- The location of likely sources of dust emission from within the site;
- Any natural or existing mitigating features such as topography and areas of vegetative screening; and
- Local wind roses showing the frequency of directions and speed, and possibly rainfall and ground moisture conditions.