

Report

Maes y Droell Quarry

Minerals Dust and Air Quality Assessment

For Stephenson Halliday Ltd

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1 Introduction

- 1.1 This chapter of the Environmental Statement (ES) describes the potential air quality and dust impacts associated with proposed recommencement and phased restoration of Maes Y Droell Quarry, located in Denbighshire, Northeast Wales. The site location is presented in Figure 1-1. Subject to planning approval, operations are anticipated to commence no earlier than 2026.
- 1.2 In accordance with the submitted Scoping Report (AQC, 2025) and formal Scoping Opinion (Denbighshire County Council, 2025) received from Denbighshire County Council (DCC), air quality has been scoped into the ES due to the potential for emissions to affect sensitive human receptors in the surrounding area.
- 1.3 This assessment considers emissions generated by quarry-related activities, including dust emissions from mineral extraction, handling, processing, restoration and internal haulage, as well as road traffic emissions associated with vehicle movements to and from the site. The main pollutants of concern related to road traffic are nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}) while mineral extraction operations may give rise to disamenity dust emissions that may affect amenity at nearby sensitive receptors and particulate matter (PM₁₀ and PM_{2.5}) related to health effects. The proposed development will extract silica sand and fine clay.
- 1.4 This chapter considers both nuisance dust and health-related impacts from fine particulate matter. Where appropriate, it also identifies mitigation measures to prevent, minimise or control likely adverse effects arising from the proposed operations, and outlines the anticipated residual impacts based on a cumulative assessment of all phases.

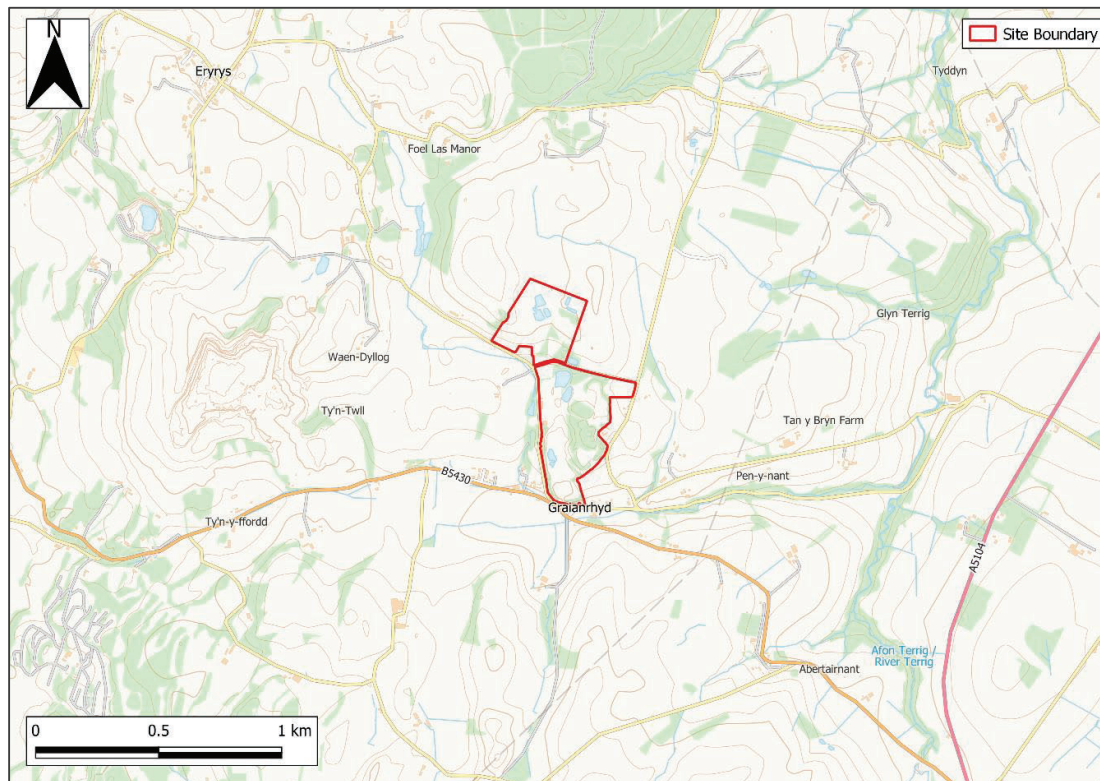


Figure 1-1: Site Location

2 Legislation and Policy

- 2.1 The following national and local planning policy and guidance is of relevance to the assessment of dust and air quality effects.
- 2.2 All European legislation referred to is written into UK law and remains in place.

Air Quality Strategy 2007

- 2.3 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Air Quality Strategy 2023

- 2.4 The Air Quality Strategy: Framework for Local Authority Delivery 2023 (Defra, 2023) sets out the strategic air quality framework for local authorities and other Air Quality Partners in England. It sets out their powers and responsibilities, and actions the government expects them to take. It does not replace other air quality guidance documents relevant to local authorities.

Clean Air Strategy 2019

- 2.5 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government, in partnership with the Governments of Scotland, Wales and Northern Ireland, will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

The Clean Air Plan for Wales

- 2.6 In August 2020, the Welsh Government published the Clean Air Plan for Wales (Welsh Government, 2020), which aims to *"improve air quality and reduce the impacts of air pollution on human health, biodiversity, the natural environment and our economy"*. The Plan sets out the following four themes, around which the plan is structured, with actions in order to enable collaborative approaches to reducing air pollution:
- People: Protecting the health and well-being of current and future generations;
 - Environment: Taking action to support our natural environment, ecosystems and biodiversity;
 - Prosperity: Working with industry to reduce emissions, supporting a cleaner and more prosperous Wales; and
 - Place: Creating sustainable places through better planning, infrastructure and transport.

- 2.7 The Plan includes plans to “introduce LAQM policy changes by 2023 to ensure the regime is public health focused and proactively finding and tackling areas of pollution”. These changes include a focus on the human health impacts of PM_{2.5}, stating “In the current regime, monitoring of PM_{2.5} is encouraged but not mandatory. In the context of the known health impacts associated with PM_{2.5}, we propose to investigate the extent to which Local Authorities can support monitoring, reporting and action on PM_{2.5} as part of their existing LAQM functions”.
- 2.8 The Plan states that the Welsh Government will “publish and consult on a White Paper on a Clean Air Act for Wales before the end of this Senedd Term”, which will include:
- “New powers for smoke control linked to tackling air pollution from domestic burning (PM_{2.5})
 - A requirement for a Clean Air Plan / Strategy to be published / reviewed every 5 years
 - Potential new air quality targets (for example, taking account of WHO guidelines for air quality)
 - Clarified and strengthened local air quality management legislation
 - Strengthened powers to address road vehicle idling
 - Consolidated powers to implement Clean Air Zones / Low Emission Zones
 - Focused powers to protect vulnerable groups from the effects of air pollution
 - Enhanced air quality monitoring and modelling
 - A potential new duty on public bodies to adhere to guidance encouraging different ways of working and actions to reduce air pollution and support decarbonisation.”

Environment Act 2021

- 2.9 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets.

National Policies

- 2.10 Land-use planning policy in Wales is established within the policy document Planning Policy Wales (PPW) (Welsh Government, 2021), which provides the strategic policy framework for the effective preparation of local planning authority development plans. With regard to pollution and health effects, it states:

“Planning authorities have a role to play in the prevention of physical and mental illnesses caused, or exacerbated, by pollution, disconnection of people from social activities (which contributes to loneliness) as well as the promotion of travel patterns which facilitate active lifestyles. Health impacts should be minimised in all instances, and particularly where new development could have an adverse impact on health, amenity and well-being. In such circumstances, where health or amenity impacts cannot be overcome satisfactorily, development should be refused”.

“Green infrastructure can be an effective means of enhancing health and well-being, through linking dwellings, workplaces and community facilities and providing high quality, accessible green spaces.

Planning Policy Wales

- 2.11 Planning Policy Wales (Edition 12) (Welsh Government, 2024) sets out the Welsh Government's approach to mineral planning, emphasising the need to balance the sustainable supply of essential

raw minerals with the protection of communities and the environment. Minerals are recognised as a finite resource of strategic importance, and their extraction must be managed to ensure long-term benefits for Wales. The policy promotes a plan-led approach to mineral development, underpinned by the principles of sustainable development and the Well-being of Future Generations (Wales) Act (Future Generations Commissioner for Wales, 2015). It requires planning authorities to safeguard mineral resources, minimise environmental impacts, and ensure that mineral operations do not result in unacceptable harm to human health, biodiversity, or local amenity. The policy also highlights the importance of restoration and aftercare, ensuring that mineral sites are returned to beneficial use following extraction.

- 2.12 PPW is supported by a series of Technical Advice Notes (TANs) and National Assembly for Wales Circulars.
- 2.13 With respect to planning policy guidance, TAN 18 on transport (Welsh Government, 2007) makes reference to local air quality and the need for Air Quality Action Plans to be prepared for any Air Quality Management Areas declared. The need for compliance with any statutory air quality limit values and objectives is stressed, and the presence of AQMAs must be accounted for in terms of the cumulative impacts on air quality from individual sites in local areas. New developments in AQMAs should be consistent with local air quality action plans.
- 2.14 Minerals Technical Advice Note (MTAN) 1: Aggregates (Welsh Government, 2004) provides detailed guidance to support the implementation of national minerals planning policy in Wales. It outlines the Welsh Government's approach to ensuring a sustainable supply of aggregates while minimising environmental and community impacts. The document covers key areas including forecasting future demand, safeguarding resources, and promoting the use of secondary and recycled materials. It emphasises the importance of protecting sensitive areas such as National Parks, Areas of Outstanding Natural Beauty, and designated ecological sites. MTAN 1 also sets out expectations for managing environmental effects, such as dust, through appropriate buffer zones, monitoring, and mitigation.

Local Policies

- 2.15 The DCC Local Development Plan (2006-2021) (Denbighshire County Council, 2013) was adopted in June 2013. It sets out the Council's objectives, spatial strategy and vision up to 2021. Policy PSE 17 - future mineral extraction is relevant to the assessment and states::
 - i) *Application for the working of minerals within the Area of Outstanding Natural Beauty will not be permitted unless exceptional circumstances can be demonstrated.*
 - ii) *Applications for the extraction of aggregate minerals will only be permitted where it is necessary to maintain stocks of permitted reserves having regard to the Regional Aggregate Working Party apportionment figures, or, where no figure exists, the demonstrated need of the industry concerned.*
 - iii) *Applications for the extraction of up to 1 million tonnes of sand and gravel will be permitted in Preferred Areas (identified on the proposals maps); taking into account the above criteria.*
 - iv) *Applications that accord with the above criteria will be permitted provided that all the following criteria are met:*
 - a. *An appropriate buffer is included, within which no mineral working or sensitive development will be allowed; and*
 - b. *Suitable access and transport routes are identified; and*

- c. Final reinstatement of public rights of way should be close to their original alignment with intermediate reinstatements where possible; and*
- d. Noise is kept to an acceptable level; and*
- e. Measures to reduce the impact of dust, smoke and fumes are implemented; and*
- f. Suitable blasting controls are implemented; and*
- g. Impacts on groundwater and water supplies are found to be acceptable; and*
- h. An appropriate restoration scheme and after use is identified for the site.*

3 Assessment Criteria

Health Criteria

- 3.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are based on assessment of the effects of each pollutant on human health, including the effects on sensitive sub-groups. The 'objectives' set out the extent to which the Government expects the standards to be achieved *taking account of practical considerations*. The objectives for use by local authorities are prescribed within the Air Quality (Wales) Regulations (2000) and the Air Quality (Amendment) (Wales) Regulations (2002).
- 3.2 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2022). The annual mean objectives for nitrogen dioxide and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.
- 3.3 The relevant air quality criteria for this assessment are provided in Table 3-1.

Table 3-1: Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Value
Nitrogen Dioxide	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³
PM ₁₀	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³ ^a
PM _{2.5}	Annual Mean	20 µg/m ³ ^b

^a A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible (Defra, 2022).

^b There is no numerical PM_{2.5} objective for local authorities (see Paragraph 3.6). Convention is to assess against the UK limit value which is currently 20 µg/m³.

Dust Criteria

- 3.4 Dust is categorised into two size classifications: 'suspended dust' with diameters below 10 µm and 2.5 µm (PM₁₀ and PM_{2.5}) and 'disamenity' dust with diameters between 10 µm to 75 µm.
- 3.5 Suspended dusts remain in the air for long periods and are fine enough to be inhaled, potentially causing health effects. Disamenity dusts have a larger particle size, which deposit on surfaces more easily, may be visible to the naked eye, and can cause loss of amenity through soiling and staining, being generally associated with nuisance impacts. Dust also has the potential to impact on ecological receptors through deposition/accumulation.

- 3.6 The assessment criteria for suspended dust are the air quality objectives for PM₁₀ and PM_{2.5}, which are presented in Table 3-1. There are currently no statutory standards in the UK covering the release and subsequent impacts of disamenity dust, or limit values for dust deposition above which 'nuisance' is deemed to exist. This is due to the inherently subjective nature of nuisance, and is highly dependent upon the existing conditions. Determination of whether or not disamenity dust constitutes a statutory nuisance in these cases is usually the responsibility of the Local Planning Authority or the Natural Resources Wales.
- 3.7 The IAQM has produced guidance on the Assessment of Mineral Dust Impacts for Planning (Institute of Air Quality Management, 2016) Full details of this approach are provided in Appendix A2.

Screening Criteria

Dust Assessment

- 3.8 The IAQM Guidance on the assessment of Mineral Dust Impacts for Planning (Institute of Air Quality Management, 2016) details screening criteria to determine whether dust emissions have the potential for significant air quality impacts. The screening criteria are based on the distance of receptors to dust-generating activities.
- 3.9 The screening criteria are as follows:
- if there are no relevant receptors within 1 km of the operations, then a detailed dust assessment can be screened out. In such a case, it is considered that, irrespective of the nature, size and operation of the site, the risk of an impact is likely to be "negligible" and any resulting effects are likely to be 'not significant';
 - in cases whereby receptors are located between 400 m (for hard rock quarries)/250 m (for sand and gravel quarries) and 1 km of operations, it would normally be assumed that a detailed disamenity dust impact assessment is not required. However, the decision on whether to assess should be made and justified on a site-specific basis; and
 - if there are relevant human and/or ecological receptors within 250 m or 400 m (depending on the rock type) then a disamenity dust impact assessment will almost always be required.
- 3.10 Where the potential dust impact of a mineral site cannot be 'screened out', a more detailed dust assessment will be required, which is necessary for this development.

Road Traffic Assessment

- 3.11 Environmental Protection UK (EPUK) and the IAQM (Moorcroft and Barrowcliffe et al, 2017) recommend a two-stage screening approach to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A1, relevant to the assessment compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A1) inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day; outside of an AQMA the thresholds are 100 heavy duty vehicles or 500 light duty vehicles. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance advises that "the criteria provided are precautionary and should be treated as indicative", and "it may be appropriate to amend them on the basis of professional judgement".
- 3.12 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment.

Where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link.

4 Assessment Approach

Consultation

- 4.1 The assessment follows a methodology presented to DCC via email correspondence between Brychan ap Geraint (Environmental Health Officer at DCC) and Emily Portergill (Air Quality Consultants) on 13th October 2025. Separately it has been agreed with DCC that air quality be scoped into the ES chapter. The subsequent consultation confirmed the approach set out in the Scoping Opinion, and no deviations were required, Scoping Opinion agreed the following scope:
- the impacts of the quarry recommencement and operation on dust soiling, and PM₁₀ and PM_{2.5} concentrations during the restoration works;
 - the impacts of traffic emissions generated by the proposed scheme on concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} during the quarry operation;
 - any cumulative effects upon air quality with operation of the Graig Quarry, located west of the proposed development;
 - any mitigation measures required to address significant air quality or dust effects.
- 4.2 The scoping opinion recommended impacts upon nearby ancient woodlands are considered. The closest ancient woodland is approximately 700 m to the west of the site, and NRW noted the site is more than 250m from any designated nature conservation site, and therefore the assessment of impacts on ecological sites is not included within this assessment.
- 4.3 A dust management scheme was also requested. It is judged that it is appropriate for this to be undertaken once the proposed scheme is subject to planning approval and secured via planning condition.
- 4.4 Respirable crystalline silica was scoped out in the Scoping Report (AQC, 2025) and will not be assessed. The Health and Safety Executive (Health and Safety Executive, 2025) states:
- "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."*
- 4.5 Additionally, demolition and construction phase impacts were scoped out in the Scoping Report (AQC, 2025), as there is no requirement for construction on site. Four metal sheds located at the western boundary will be demolished; these are approximately 170 m east of the nearest sensitive receptor. Impacts from demolition dust and associated traffic generation are considered insignificant and therefore no further assessment is required.

Extent of the Study Area

- 4.6 The study area for the assessment has been identified using professional judgement, focussing on the areas where impacts are anticipated to be greatest. The IAQM minerals guidance (Institute of Air Quality Management, 2016) notes that *"adverse dust impacts from sand and gravel sites are uncommon beyond 250 m and beyond 400 m from hard rock quarries measured from the nearest dust generating activities"*. The quarry will extract silica sand and fine clay and therefore the focus on this assessment has been on the closest receptors within 250 m of on-site dust generating activities to ensure a worst-case assessment.

- 4.7 For road traffic emissions, the study area is limited to the proposed HGV route between the site access and the A5104 via Ffordd Lanarmon, as all vehicle movements will use this route.

Method of Baseline Data Collection

- 4.8 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:
- industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register;
 - local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;
 - information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority;
 - background concentrations have been defined using Defra's 2021-based background maps. These cover the whole of the UK on a 1x1 km grid. Background annual mean nitrogen dioxide maps for 2024 and 2026 (the earliest anticipated year of operations). Mapped background concentrations of PM₁₀ and PM_{2.5} have not been adjusted;
 - whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra. These are the maps used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to the required data quality standards, to identify and report exceedances of the limit value. The national maps of roadside PM₁₀ and PM_{2.5} concentrations (Defra, 2024c), which are available for the years 2009 to 2024, show no exceedances of the limit values anywhere in the UK in 2024; and
 - Existing baseline dust levels have been determined through review of dust complaints.

Method of Assessment

Dust Assessment Methodology

- 4.9 The transportation and handling of inert material on the site have the potential to generate dust emissions.
- 4.10 The assessment of dust emissions is undertaken using a qualitative approach based on IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning (Institute of Air Quality Management, 2016).
- 4.11 The dust assessment considers the potential for impacts within a certain distance of the site boundary. The first stage of the assessment is to consider the location of dust generating sources within the site boundary and the distance to nearby receptors (see paragraph 3.9). The closest receptors are less than 20 m from the site boundary, the distance to receptors from the main operational activities will be greater. The assessment presented in Section 6 is based on the distance from these operational activities. Dust emissions are assessed qualitatively using a risk-based approach based on a Source-Pathway-Receptor approach.
- 4.12 The assessment approach for both suspended (human health) and disamenity dust is summarised below and described in detail in Appendix A2.

Disamenity Dust Assessment Approach

- 4.13 The primary potential impact from disamenity dust is annoyance due to dust deposited on surfaces. The assessment of disamenity dust includes three principal steps:
- Step 1 – Describe the site characteristics and baseline conditions. This involves a review of the processes taking place on the site, and identification of sensitive receptors;
 - Step 2 – Estimate dust impact risk. This takes into account the proposed activities and their potential to generate dust (including the sizes of materials handled), the size of the site, the duration and frequency of the activities, the likely effectiveness of any mitigation included by design, and local meteorological conditions; and
 - Step 3 – Estimate the likely magnitude of effect. The dust impact risk is compared with the sensitivity of the receptor, to derive the likely magnitude of effect.
- 4.14 The assessment of dust impact risk (Step 2) and likely magnitude of effect (Step 3) is based on the concept that, in order for a dust impact (such as annoyance or nuisance) to occur, there must be a source of dust, a pathway to transport the dust to an off-site location, and a receptor (e.g. people) to be affected by the dust (i.e. Source-Pathway-Receptor).
- 4.15 The key factors that will influence the impacts of dusts are the dust emission magnitude of the sources, the effectiveness of the pathway for transporting dust and the sensitivity of the receptor. The methodology set out in the IAQM guidance document describes in detail the Source-Pathway-Receptor approach to dust risk assessment, and includes tables and matrices to assist in determining the likely risk of dust effects. It includes an element of professional judgement and the experience of the consultants preparing the Chapter is set out in Appendix A3.

Suspended Dust Assessment Approach

- 4.16 The assessment of suspended dust effects includes the following steps:
- Determine the existing background ambient concentrations of PM₁₀. If baseline concentrations are below 17 µg/m³ then the impacts of the site on annual mean PM₁₀ concentrations can be screened out and no further assessment is required;
 - Estimate the expected process contribution (PC) of PM₁₀ at each sensitive receptor;
 - Estimate the total predicted environmental concentrations (PEC) by adding the PC and background PM₁₀ concentrations;
 - Compare the PEC with the annual mean objective for PM₁₀; and
 - Determine the overall PM₁₀ impact on the surrounding area.
- 4.17 The assessment of suspended particulate matter focuses on the annual mean concentration, as recommended by the IAQM guidance:
- "There may be a number of days per year with particularly intense operations which increase the number of days with concentrations greater than 50 µg/m³ but do not have a significant impact on annual mean concentrations (...) the IAQM recommends the focus in assessment should be on the annual mean objective."*

Assumptions and Limitations

- 4.18 The IAQM guidance also states that for quarries most of suspended dust will be in the coarse sub-fraction (PM_{2.5-10}), rather than in the fine (PM_{2.5}) fraction.
- 4.19 The approach to the dust assessment is based on the IAQM minerals guidance, which was designed for quarries and minerals workings.
- 4.20 The approach to the dust assessment relies on elements of professional judgement, which the IAQM guidance recognises is necessary. Several assumptions have been made in carrying out the assessment. The aim is to assess a realistic worst case, but where there is greater uncertainty, a conservative assumption may be necessary, applying professional judgement. The experience of the consultants preparing the chapter is set out in Appendix A3.
- 4.21 The assessment is also limited by the methodology prescribed by the IAQM guidance. The Residual Source Emission must be categorised into one of three categories, which then informs the overall impacts. Greater flexibility in defining the Residual Source Emission would have enabled a clearer distinction between scenarios and to quantify the changes in impacts with greater resolution.
- 4.22 The assessment is also based on the distance to closest dust generating source. In reality, some sources with a greater potential for dust emissions maybe undertaken further away from receptors than considered. Furthermore, the phased nature of extraction will mean only parts of the site represent a potential dust source. The frequency of exposure is based on the whole site being a source of dust resulting in a conservative assessment.
- 4.23 The assessment assumes that the site will be restored as described in this chapter, and in accordance with the site's management plans.
- 4.24 Annual meteorological variation introduces uncertainty into any assessment based on dispersion by wind. To minimise the uncertainty, five years' of data from a representative nearby site with good data capture have been used in the assessment to account for variability.

Road Traffic Assessment Approach

- 4.25 The predicted level of traffic generated by the proposed scheme has been screened against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) as described in paragraph 3.11. Where impacts can be screened out there is no need to progress to a more detailed assessment.

Significance Criteria

- 4.26 It is important to differentiate between the terms 'impact' and 'effect' with respect to the assessment of air quality and dust.
 - The term 'impact' is used to describe a change in pollutant concentration at a specific location.
 - The term 'effect' is used to describe an environmental response resulting from an impact, or series of impacts.

Dust Assessment Significance

- 4.27 In the absence of formal criteria, the significance of the impacts has been judged based on professional experience of the consultants preparing the report, and taking account of the IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning (Institute of Air Quality Management, 2016). This includes defining impact descriptors at individual receptors, which take

account of the dust generation potential of the sources and the distance and direction of receptors from these sources. Full details of the IAQM approach are provided in Appendix A2. The approach includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix A3.

Road Traffic Assessment Significance

- 4.28 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach developed jointly by the EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors; the experience of the consultants preparing the report is set out in Appendix A3. Full details of the EPUK/IAQM approach are provided in Appendix A1.

5 Baseline Conditions

- 5.1 The site is located approximately 6 km south of Mold. The site is bounded by Graianrhyd Road to the south and open fields to the north, east and west. Graig Quarry, a limestone quarry, is located approximately 1 km to the west.
- 5.2 There are existing residential properties located along Graianrhyd Road, with additional isolated properties along roads to the east and west.
- 5.3 Maes y Droell has historically been an established quarry producing high-grade silica sand and fine clay. The quarry covers an area of approximately 22 hectares, with extraction activities having taken place on the site for over 100 years.

Industrial and Other Sources

- 5.4 A search of the UK Pollutant Release and Transfer Register (Defra, 2024a) has not identified any significant industrial or waste management sources that are likely to affect existing air quality.
- 5.5 Graig Quarry is approximately 1 km to the west of the site. The potential for cumulative effects of the concurrent operation of Graig Quarry and Maes y Droell is considered in section 7.

Local Air Quality Monitoring

- 5.6 DCC operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Socotec. The site is approximately 300 m from the Flintshire County Council (FCC) boundary; neither DCC or FCC operate any diffusion tubes close to the site. The closest monitoring is operated by DCC and is a roadside site in Ruthin, approximately 8.8 km northwest of the site. In 2023, the most recent year of publicly available monitoring data, the annual mean NO₂ concentration at this site was 20 µg/m³, which is below the national objective of 40 µg/m³.
- 5.7 Neither DCC or FCC undertake any monitoring of PM₁₀ or PM_{2.5} concentrations.

Exceedances of Limit Value

- 5.8 There are no AURN monitoring sites (Defra, 2024b) within the study area with which to identify exceedances of the annual mean nitrogen dioxide limit value. According to Defra's compliance data (Defra, 2025), which reports concentrations and exceedances based on monitoring and modelling across the UK, there are no exceedances of the annual mean NO₂, PM₁₀ or PM_{2.5} limit values within the study area.

Background Concentrations

- 5.9 Estimated background concentrations at the site are set out in Table 5-1 for 2026 (the earliest anticipated year of opening). A range of values is presented as the site covers multiple 1x1 km grid squares.

Table 5-1: Estimated Annual Mean Background Pollutant Concentrations in 2026

Year	NO ₂	PM ₁₀	PM _{2.5}
2026	3.1 – 3.2	8.4 – 9.7	4.8 – 4.9
Objective	40	40	20

- 5.10 Estimated background concentrations are well below the air quality objectives for NO₂, PM₁₀ and PM_{2.5}.

Existing Baseline Dust Levels

Existing Operations

- 5.11 The quarry has not been actively worked for at least 10 years. Graig Quarry to the west of the site has been operational but recently mothballed. The authors are not aware of any complaints in the area, or any baseline dust monitoring results. During the operation of Graig Quarry baseline dust levels may be marginally higher; the cumulative effects are considered within section 7.

Meteorological Data

The nearest representative weather station to the site is Shawbury, 47 km to the northeast of the site. The IAQM minerals guidance (Institute of Air Quality Management, 2016) classes 'potentially dusty winds' as those where wind speed is >5 m/s from the direction of the dust source on 'dry' days (<0.2 mm). Table 5-2 presents rainfall data for the Shawbury site. A 5-year average windrose for Shawbury Airport is also presented in Figure 5-1, showing wind directions and speeds, which have been taken into account when determining the frequency of potentially dust winds in the dust impact assessment in Section 6.

Table 5-2: Rainfall Data for Shawbury (2020 – 2024)

Year	% Hours of Precipitation ≥ 0.2 mm ^a
2020	11
2021	10
2022	9
2023	12
2024	12
Average	11

^a Rainfall threshold taken from IAQM guidance (Institute of Air Quality Management, 2016)

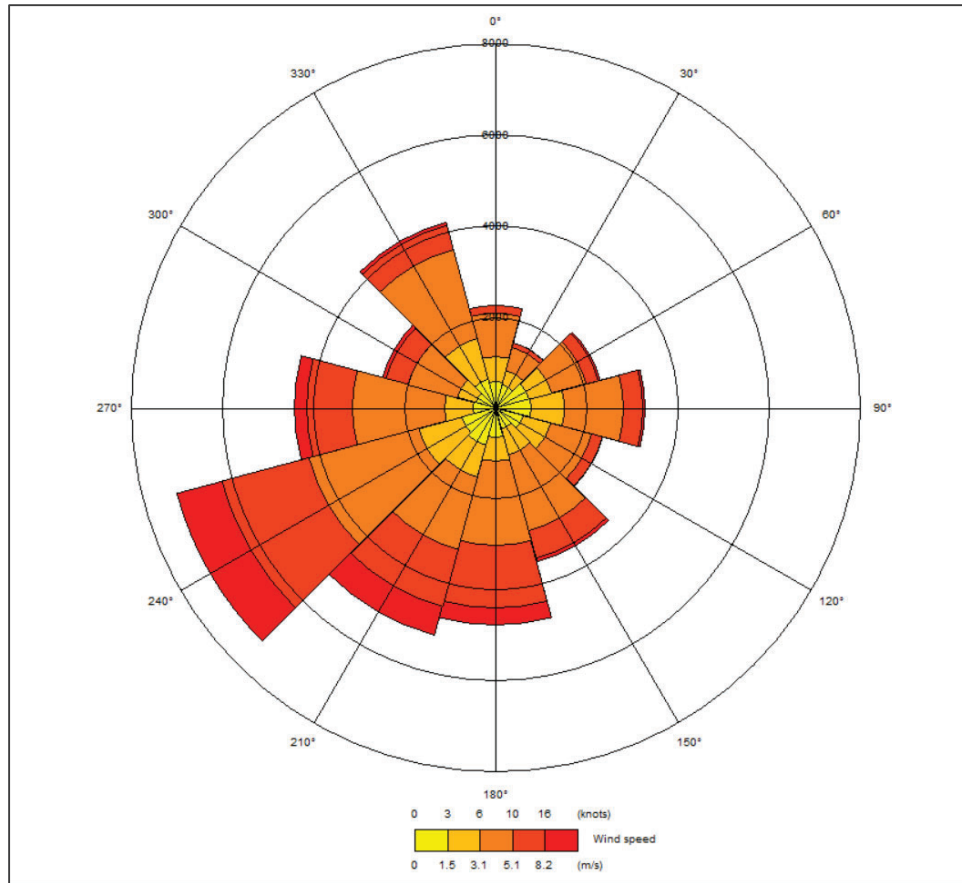


Figure 5-1: Shawbury Airport Windrose (2020 – 2024)

6 Assessment

Proposed Operations

- 6.1 The proposed scheme at Maes y Droell quarry comprises the extraction of high-grade silica sand and fine clay followed by the progressive restoration of the site. Restoration will be achieved through the placement of residual materials into worked-out voids introducing a more structured and phased restoration profile. Extraction and restoration will be undertaken in four conceptual phases, commencing in the southern area (Phase 1) and progressing northward through Phases, 2, 3 and 4, as illustrated in Figure 6-1.
- 6.2 The site is anticipated to operate for up to 50 weeks per year, with a two-week shutdown period. Access to the site will be via the existing entrance on the minor road to the west. A central haul road with an appropriate gradient will be constructed to maintain internal connectivity across the site. Sand and clay will be extracted using front-loading shovels and transported by dump trucks to the wash plant located in Phase 2. Here oversized material will be crushed where necessary and material washed and separated to different size fractions at a rate of 120 tph. Fines not retained by the filter press will be directed to on-site settlement lagoons. Product will be stored in stockpiles in Phase 3 close to the site entrance to minimise the distance HGVs need to travel onsite. Internal haul roads will connect extraction areas to the processing and restoration zones.
- 6.3 Phase 1 will take place in the southern area of the site and involves the reworking of previously disturbed ground, including the removal of stockpiles and tip material. Excavation will extend down to approximately 300 m above ordnance datum (AOD). Works include constructing a new internal access ramp and progressively backfilling voids with residual material. Restoration will be completed in sub-phases and will include grading, seeding and planting along sensitive boundaries. Planting will focus on native woodland and acid grassland areas to improve biodiversity and provide screening. The existing waterbody at the southern end of the site will be retained, undisturbed and incorporated into the final design.
- 6.4 Phase 2 focuses on the central area of the site and involves the deepening of the excavation area from approximately 335 m AOD down to 325 m AOD. Partial restoration will follow, with material placed back into the void. Once material is extracted the processing plant will be located in this area.
- 6.5 Phase 3 includes a series of excavations to progressively lower the ground level from 330 m to 315 m AOD. This phase also includes the construction of new access ramps and the excavation of the previous access road. Materials extracted include both high-quality sand and silt, and restoration will be carried out progressively as areas become available.
- 6.6 Phase 4 is the final extraction phase and takes place in the northernmost part of the site. It involves the removal of sand and silt. Restoration will follow immediately after extraction, using residual materials. The final landform will include water bodies and marginal vegetation, designed to support biodiversity and integrate with the surrounding landscape, particularly in relation to the nearby Clwydian and Dee Valley AONB. Planting will include native woodland and acid grassland, alongside wetland scrapes to improve hydrology and ecological resilience.

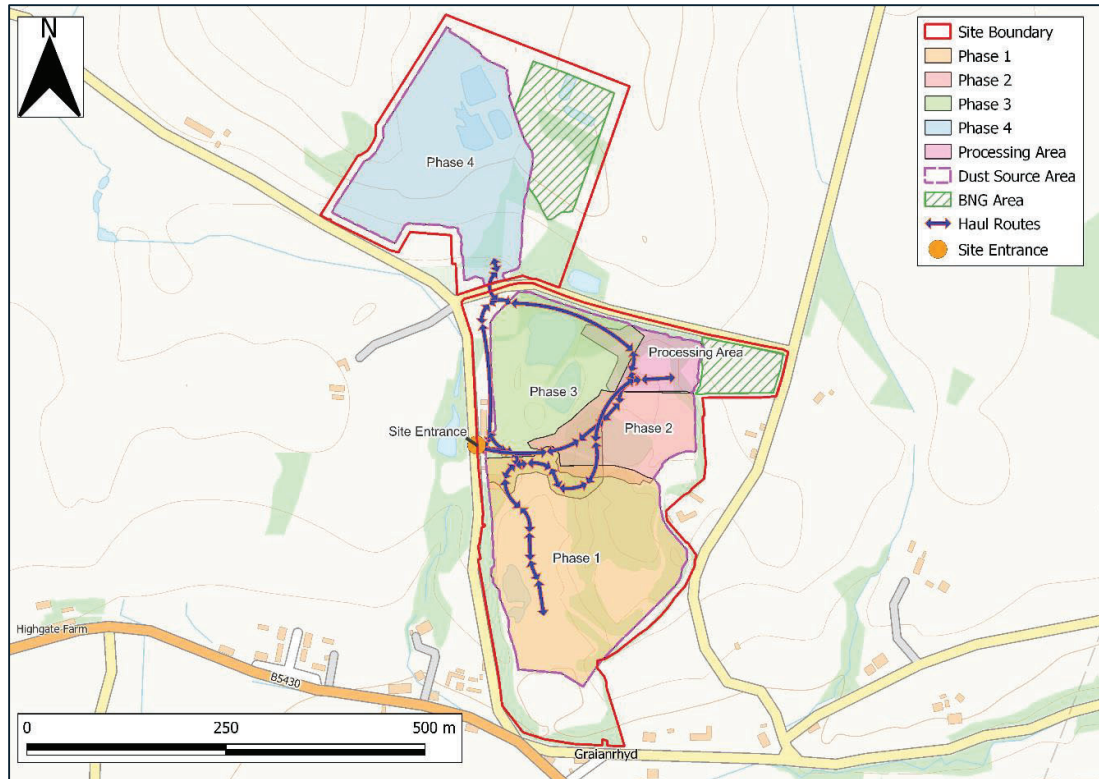


Figure 6-1: Phasing Boundaries and Haul Routes

Potential Dust Sources

6.7 The activities with the potential to generate dust are considered to be:

- Extraction of silica sand and clay using front end loader;
- Handling of topsoil and overburden through removal and placement in restoration;
- On-site transportation of minerals via internal haul roads using dump trucks; and
- Processing operations including crushing and stockpiling of materials.

Receptors

6.8 Locations sensitive to dust emitted during site operations are places where members of the public are regularly present. The sensitivity of a location will be dependent on the land use, the frequency and length of time members of the public would be present there, and the expected level of amenity in each given location. Guidance on defining receptor sensitivity is provided in Appendix A2.

6.9 A number of receptors are located relatively close to the site. These include residential properties to the south and southeast along Graianrhyd Road, as well as properties to the west and northwest of the site. The closest residential property is Pen-Y-Foel farm, located adjacent to the eastern site boundary. Residential receptors are considered highly sensitive to the effects of dust soiling.

6.10 Receptors have been identified to represent worst-case exposure. These locations are described in Table 6-1 and shown in Figure 6-2.

Table 6-1: Description of Receptor Locations

Receptor	Description	Dust Sensitivity
HR1	Pen-Y-Foel farm - Residential property	High
HR2	Residential property - Graianrhyd Road	High
HR3	Ty Isa - Residential Property	High
HR4	Residential property - Graianrhyd Road	High
HR5	Maes-Y-Droell Farm - Residential Property	High
HR6	Castell - Residential Property	High
HR7	Pen-Y-Foel Cottage - Residential Property	High
HR8	Llys Onnen - Holiday Home	High

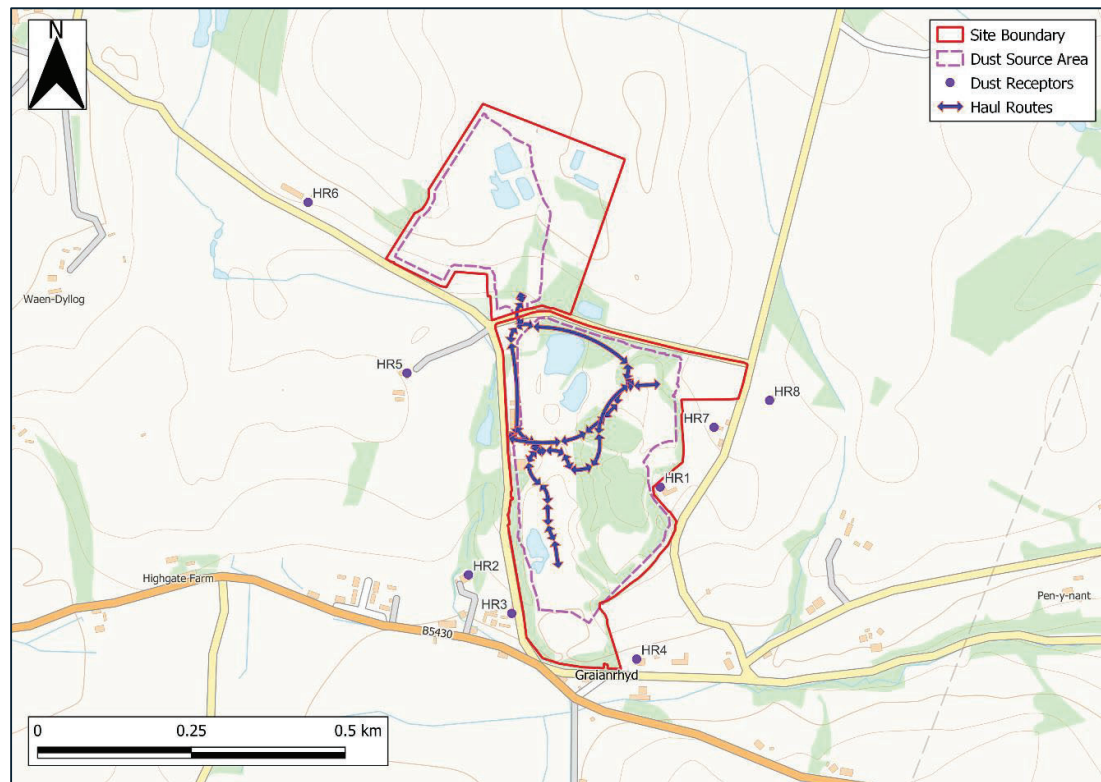


Figure 6-2: Dust Sensitive Receptor Locations

Disamenity Dust Assessment

- 6.11 The approach to the dust risk assessment considers the residual source emissions, pathway effectiveness and receptor sensitivity to determine an overall magnitude of effect in accordance with the methodology detailed within Appendix A2.

Residual Source Emissions

- 6.12 The residual source emissions for each of the activities undertaken on-site, considering the factors detailed in Table A2-1, Appendix A2 are presented in Table 6-2. Overall, the quarry is judged to result in a 'medium' residual source emission.

Table 6-2: Residual Source Emissions

Site Activity	Process	Residual Emission Considering all Factors
Site Preparation / Restoration	- Low bunds will be constructed in some locations around phase 4 to enhance screening - The site will operate over a large working area (>10 ha) - High volumes of material (1,250,000m³) will be moved during restoration - A small number of heavy plant such as dump trucks and front end loaders will be used - Materials handled during restoration such as topsoil are expected to be moderately dusty.	Medium
Mineral Extraction	- Extraction will occur within a small working area (<20 ha) - Low energy extraction methods using front end loaders will be used - Extracted materials will have a high moisture content - Extraction rate up to 300,000 tonnes per annum (tpa)	Small
Materials Handling	- Dump trucks will be used to transfer product from the extraction area to the processing plant and then product from the process plant to storage area. Material for restoration will also be handled. A maximum of approximately 15 heavy plant will be used for handling - Loading will take place within 50 m of the site boundary - The surface will not be hardstanding	Medium
On-Site Transportation	- Material will be transported on-site using dump trucks from the extraction area to processing area to product storage area, as well as restoration - Total length of haul roads is approximately 400 m <100 movements of vehicles per day	Medium
Mineral Processing	- Raw materials have a low dust potential - Processing will be limited to <200,000 tpa - Processing undertaken within quarry void 27 m below ground level. - Material has a high water content and water added during processing	Small
Stockpiles/Exposed Surfaces	Small product stockpiles are expected next to the processing plant in the quarry void as well as in Phase 3	Small

Site Activity	Process	Residual Emission Considering all Factors
	- Waste material will be directly placed into voids for restoration - Three sided storage bays used where practicable	
Off-Site Transportation	- Offsite heavy-duty vehicle movements will be up to 60 per day - Access will be via a paved road - A wheel wash will be installed and consistently used	Medium

Pathway Effectiveness

- 6.13 In order to consider the effectiveness of the pathway, it is important to consider the proposed receptor locations in terms of its proximity to dust sources and the prevailing wind direction. The closest receptor locations are shown in Figure 6-2 and meteorological conditions are shown in Figure 5-1.
- 6.14 The effectiveness of the pathway between the quarry and nearby sensitive receptors is summarised in Table 6-3. The assessment has considered the cumulative impact of all four phases of the proposed operations of the Maes Y Droell Quarry, and the distances have been taken from to the nearest boundary of the phase or haul road, whichever is closest and direction has been taken from the whole 'Dust Source Area' as shown in Figure 6-1. In reality, the whole of the site will not be a continuous source of dust and therefore the assessment is judged to be conservative. The frequency of exposure is based on the average of five years considered.

Table 6-3: Effectiveness of Dust Pathway

Receptor ID	Distance from Nearest Dust Source (m)	Categorisation of Receptor from Source (m)	Direction from Source (°)	% Winds from Source on Dry Days >5m/s	Frequency of Potentially Dusty Winds	Pathway Effectiveness
HR1	20	Close	155-30	11.0	Moderately Frequent	Moderately Effective
HR2	100	Close	30-145	2.5	Infrequent	Ineffective
HR3	45	Close	330-140	3.5	Infrequent	Ineffective
HR4	100	Close	240-20	6.3	Moderately Frequent	Moderately Effective
HR5	180	Intermediate	0-150	2.7	Infrequent	Ineffective
HR6	165	Intermediate	60-150	2.2	Infrequent	Ineffective
HR7	60	Close	200-330	8.1	Moderately Frequent	Moderately Effective
HR8	150	Intermediate	220-330	7.1	Moderately Frequent	Moderately Effective

- 6.15 The pathway effectiveness varies across receptors due to differences in proximity to dust sources, prevailing wind directions, and frequency of dry, windy conditions. Receptors located closer to the source and frequently downwind on dry days are more likely to experience effective dust pathways.
- 6.16 Receptors HR1, HR2, HR3, HR4 and HR7 are classified as 'close' under IAQM guidance, being within 100 m of the dust source. HR1, HR4, HR7 and HR8 experience moderately frequent dusty winds (6.3-11%) and are therefore considered to have moderately effective pathways. HR2 and HR3, although close to the source, are subject to infrequent dusty winds (2.5-3.5%) and is therefore considered ineffective.
- 6.17 Receptors HR5 and HR6 are classified as 'intermediate', due to their greater distance from the source. HR5 (2.7%) and HR6 (2.2%) are subject to infrequent dusty winds and are therefore considered ineffective.
- 6.18 The location of the operations within the quarry void and the presence of tree screening around the whole of the site will in reality reduce the effectiveness of the pathway from that assessed.
- 6.19 The potential dust effects at the sensitive receptors are presented in Table 6-4. This brings together the residual source emission potential from Table 6-2 and pathway effectiveness from Table 6-3, using criteria described in Appendix A2.

Table 6-4: Summary of Risk Impacts

Receptor	Risk of Dust Effects			Receptor Sensitivity	Likely Dust Effect
	Source Dust Potential	Effectiveness of Pathway	Risk of Dust Impact		
HR1	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect
HR2	Medium	Ineffective	Negligible Risk	High	Negligible Effect
HR3	Medium	Ineffective	Negligible Risk	High	Negligible Effect
HR4	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect
HR5	Medium	Ineffective	Negligible Risk	High	Negligible Effect
HR6	Medium	Ineffective	Negligible Risk	High	Negligible Effect
HR7	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect
HR8	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect

- 6.20 The predicted dust effects range from negligible to slight adverse. Slight adverse effects are predicted at four receptors: HR1, HR4, HR7 and HR8, which are all located close or intermediate to the dust

sources in the prevailing wind direction. Other receptors, either positioned further from dust sources or upwind of the prevailing wind direction, are predicted to experience negligible effects.

- 6.21 The final stage of the dust risk assessment is to make an overall judgement on the likely significance of effects. The Maes y Droell Quarry is currently inactive, and the proposed development involves the recommencement of mineral extraction and progressive restoration across four phases. The assessment has considered the cumulative impact of all phases, using worst-case assumptions for distance, direction, and wind frequency.
- 6.22 The potential for dust effects varies depending on receptor location and the phase of activity. HR4, situated to the south of the site, is primarily affected during Phase 1, when extraction occurs in the southern section closest to this receptor. This receptor is therefore only likely to experience slight adverse effects during operations in Phase 1 and negligible impacts for the remainder of operations. HR1, HR7 and HR8 located near the eastern boundary, will be most affected during operations in Phase 1 and Phase 2. As processing is adjacent to Phase 2 these receptors will be relatively close to sources of dust for the duration of the operations, with the greatest impacts because of material handling and onsite transport operations within Phase 1 and 2. At all of the other locations the impacts are anticipated to be negligible.
- 6.23 Embedded mitigation measures include locating processing and extraction within the quarry void, implementing progressive restoration, providing wheel wash facilities to prevent trackout, establishing planting along site boundaries to reduce visual impacts and impede dust dispersion, and designing internal haul roads to minimize dust and noise through appropriate alignment (to the west of the site away from nearest properties) and surfacing. The pathway effectiveness between the site and nearby sensitive receptors has been evaluated in accordance with the IAQM guidance (Institute of Air Quality Management, 2016), considering both proximity and the frequency of potentially dusty winds. The assessment has demonstrated that the proposed operations would result in effects ranging from negligible to slight adverse. With the embedded mitigation on place, the overall significance of nuisance dust impacts from the quarry on nearby sensitive receptors is judged to be 'not significant'.

Suspended Dust Assessment

- 6.24 The assessment of the impact of suspended dust requires the baseline PM₁₀ concentrations to be taken into account. The background PM₁₀ concentrations at the site are presented in Table 5-1, which shows a maximum concentration of 9.9 µg/m³ in 2024. This is well below the objective and below the screening criteria requiring a detailed suspended dust assessment as outlined within the IAQM guidance which states (Institute of Air Quality Management, 2016) that if background PM₁₀ concentrations are less than 17 µg/m³ there is little risk of the process contribution from the site leading to an exceedance of the objective.
- 6.25 Background concentrations at the site are well below the screening threshold and therefore the impacts on human health are considered to be 'negligible'.

Road Traffic Assessment

- 6.26 The proposed scheme is expected to generate a total of 120 heavy goods vehicle (HGV) movements per working day which correspond to 94 HGVs per day as an annual average. All vehicles will be routed to and from the A5104 via Ffordd Llanarmon to the east. These daily trip rates are below the screening threshold of 100 HDVs recommended for use outside of an AQMA in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). As such, it is judged that the relevant screening thresholds will not be exceeded and there is no requirement for a detailed assessment of road traffic impacts at existing receptors; it can be concluded that the proposed scheme will have insignificant effects on local roadside air quality.

7 Cumulative Assessment

- 7.1 There are no specific cumulative schemes which have been identified that require specific assessment of cumulative effects. However the proposed development is located in proximity to Graig Quarry, which is a limestone quarry located 800m to the west of the site.

Dust

- 7.2 Graig Quarry is not currently operational but could recommence at any time and therefore the cumulative impacts from the operation of Maes y Droell concurrently with Graig Quarry have been considered.
- 7.3 In terms of disamenity dust there are no receptors which are within the screening distances of 400m from Graig Quarry (given it is a hard rock quarry) and 250m of Maes y Droell quarry. The impacts at receptors to the west of Maes y Droell are all negligible and therefore there is unlikely to be any significant cumulative effects.
- 7.4 In terms of suspended dust impacts there are a number of properties which are within 1km of both quarries. The IAQM guidance provides example annual mean process contributions of mineral sites to baseline PM₁₀ concentrations as set out in Appendix 5 of the IAQM's Guidance (Institute of Air Quality Management, 2016), which range from 2 µg/m³ up to 5 µg/m³. Assuming both quarries contribute the maximum in this range (which is judged to be unlikely, particularly for Maes y Droell which is handling sand), the maximum increase in PM₁₀ concentrations would be anticipated to be 10 µg/m³. When taking into the background concentrations in the area of 9.7 µg/m³ in 2026, the earliest anticipated year of opening, the maximum total concentration at receptors is judged to be 19.7 µg/m³ which is below the objectives. Therefore, the cumulative impacts of the scheme with Graig Quarry are judged to be 'not significant'.

Road Traffic

- 7.5 Road traffic is expected to increase in the future due to general growth in traffic volumes and specific cumulative developments. No specific developments have been identified that will result in exceptional increases in traffic beyond those included in general forecasts. In Section 6.26, it was concluded that the proposed scheme would not result in significant impacts on air quality at existing sensitive receptors; thus, cumulative impacts from road traffic are considered to be 'not significant'.

8 Further Mitigation and Enhancement

- 8.1 The assessment has demonstrated that the overall air quality effect of the proposed scheme will be 'not significant'; dust emissions will not have a significant effect on amenity or human health and the development-generated traffic emissions will not have a significant effect on local air quality. Nevertheless, it is good practice for measures to be implemented to ensure dust emissions are minimised, particularly during adverse (dry and windy) weather conditions.
- 8.2 The IAQM guidance advises that good design and best practice measures should be considered whether or not more specific mitigation is required. The proposed scheme incorporates the following good design and best practice measures:
- Phased extraction and restoration to minimise the area of exposed ground and reduce the potential for dust emissions.
 - Progressive seeding and planting of restored areas to stabilise surfaces and minimise entrainment of dust by the wind.
 - Mineral extraction and processing undertaken within the quarry void which is 27 m below ground level reducing wind speeds and providing a physical barrier to the transportation of dust.
 - Use of wheel wash facilities for all HGVs entering and leaving the site to prevent dust trackout onto public roads.
 - Construction of internal haul roads with appropriate gradients and enforcement of speed limits to reduce vehicle speeds and dust entrainment. These are located to the west of the site away from the closest residential properties.
 - Retention and enhancement of vegetative screening along sensitive boundaries to act as a physical barrier and reduce wind speeds. A large area of woodland is proposed on the eastern boundary close to H1 and H7, which will help reduce impacts at these properties.
 - Fines not retained by the filter press will be settled out in lagoons to prevent them from drying and becoming airborne.
 - Implementation of a Dust Management Plan (DMP) (secured via condition) including visual dust monitoring and responsive control measures to minimise environmental impacts, as well as operational measures such as:
 - use of water bowser to dampen down haul roads in dry weather;
 - road sweeper to clean access roads if required;
 - regular clearing, grading and maintenance of haul routes;
 - sheeting or covering HGVs leaving site;
 - minimisation of drop heights during loading and unloading to reduce dust generation;
 - avoiding double handling of material where possible; and
 - vehicles not tracking over the base of stockpiles.

9 Residual Effects

- 9.1 The residual effects will be the same as those identified in Section 6. The overall effects of the proposed scheme will be 'not significant'.

10 Summary and Conclusion

- 10.1 The assessment has considered the potential impacts of the proposed recommencement of extraction and phased restoration of Maes y Droell Quarry on local air quality, focusing on dust and particulate matter emissions from site operations and associated traffic.
- 10.2 The assessment has demonstrated that pollutant concentrations will remain well below relevant air quality objectives at all existing receptors, and that additional traffic generated by the proposed scheme will have a negligible impact on air quality conditions along the local road network.
- 10.3 Emissions of dust from onsite activities have been assessed using a worst-case, cumulative approach across all four phases. With embedded mitigation measures in place, the impacts on amenity and human health are judged to be 'not significant'.
- 10.4 Therefore, the overall operational air quality effects of the proposed scheme are judged to be 'not significant'.

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12 Glossary

AADT	Annual Average Daily Traffic
AONB	Area of Natural Beauty
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LGV	Light Goods Vehicle
µg/m ³	Microgrammes per cubic metre
NO ₂	Nitrogen dioxide
NPPF	National Planning Policy Framework
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PM ₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM _{2.5}	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPW	Planning Policy Wales
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TAN	Technical Advice Note

13 Appendices

A1 EPUK & IAQM Planning for Air Quality Guidance

A1.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations".*

Recommended Best Practice

A1.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

A1.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m² of commercial floorspace;
- are carried out on land of 1 ha or more.

A1.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;

- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m² of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
 - Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
 - All gas-fired boilers to meet a minimum standard of <40 mgNO_x/kWh;
 - Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
 - Spark ignition engine: 250 mgNO_x/Nm³;
 - Compression ignition engine: 400 mgNO_x/Nm³;
 - Gas turbine: 50 mgNO_x/Nm³.
- A1.5 A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNO_x/Nm³ and 25 mgPM/Nm³.
- A1.6 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:
- "It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".*
- A1.7 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:
- Support and promotion of car clubs;
 - Contributions to low emission vehicle refuelling infrastructure;
 - Provision of incentives for the uptake of low emission vehicles;
 - Financial support to low emission public transport options; and
 - Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;
- the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;
- the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and
- the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".

Impacts of the Development on the Local Area

A1.8 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m² of floor space for all other uses or a site area greater than 1 ha.

A1.9 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A1.10 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;

- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
 - the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.
- A1.11 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.
- A1.12 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:
- "Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NO_x gas boiler or a 30kW CHP unit operating at <95mg/Nm³.*
- In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.*
- Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".*
- A1.13 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:
- "The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive 'trigger' for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".*
- A1.14 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:
- "The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".*
- A1.15 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this chapter.

Assessment of Significance

- A1.16 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:
- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
 - a judgement on the overall significance of the effects of any impacts.
- A1.17 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:
- the existing and future air quality in the absence of the development;
 - the extent of current and future population exposure to the impacts;
 - the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
 - the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
 - the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.
- A1.18 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.
- A1.19 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A3.

A2 Mineral Dust Assessment Procedure

- A2.1 The guidance developed by the IAQM on the Assessment of Mineral Dust Impacts for Planning (Institute of Air Quality Management, 2016), provides criteria to screen the need for a detailed assessed, and, if required, a suggested approach to the detailed assessment of mineral developments.

Screening Assessment

- A2.2 The guidance sets out screening criteria that can be used to determine whether a detailed air quality assessment is required.
- A2.3 If there are no relevant receptors within 1 km of the operations, then a detailed dust assessment can be screened out. In such a case, it is considered that irrespective of the nature, size and operation of the site, the risk of an impact is likely to be "negligible" and any resulting effects are likely to be 'not significant'.
- A2.4 In cases whereby receptors are located between 400 m, or 250 m (depending on the rock type) and 1 km of operations, it would normally be assumed that a detailed disamenity dust impact assessment is not required. However, the decision on whether to assess should be made and justified on a site-specific basis by a suitably experienced air quality professional taking into account local factors.
- A2.5 If there are relevant human and / or ecological receptors within 250 m or 400 m (depending on the rock type) then a disamenity dust impact assessment will almost always be required. This step is deliberately chosen to be conservative (and will in practice result in assessments being required for most minerals development schemes).

Detailed Assessment

- A2.6 If a detailed assessment is required the guidance describes the assessment approach in three steps, which are described in detail in the sections below.

Table A2-1: Detailed Assessment Steps

Step	Action	Consideration
Step 1	Describe Site Characteristics and Baseline Conditions	Such as extent of site boundary, operations, mineral type, production rate, working method, scale and duration of works, consideration of existing baseline conditions and dust sources
Step 2	Estimate Dust Risk	Consideration of pathway effectiveness and residual source emissions
Step 3	Estimate Likely Magnitude of Effect	Consideration of dust impact risk and receptor sensitivity

Step 2

Determination of Residual Source Emissions

- A2.7 The residual source emission is determined considering site characteristics and the potential for emissions from each source, taking in account designed in mitigation measures.
- A2.8 As stated within the guidance the following factors should be considered:

- the activities being undertaken (blasting, crushing, screening, methods of handling and storage etc.);
- the types and properties of the materials involved;
- the size of the site and, specifically, the area of land being worked (and hence the quantities of materials involved and the number of vehicles and plant etc.);
- the durations and frequencies of the activities;
- the likely effectiveness of the dust control measures incorporated into the design of the submitted development scheme, including design features, management controls (ideally formalised within a Dust Management Plan) and, where appropriate, engineering controls;
- other mitigation measures applied to reduce or eliminate dust; and
- the meteorological conditions that can promote or inhibit the raising of dust at the source (high winds and rainfall, respectively).

A2.9 The guidance provides examples illustrating factors that need to be considered when making a professional judgement as to the residual source emissions.

Table A2-1: Factors to Consider When Determining Residual Source Emissions

Source Activity	Factor Consideration
Site Preparation/Restoration	Size of working area
	Height of bunds
	Volume of Material movement
	No. of heavy plant
	Whether bunds are seeded or sealed
	Potential of material for dust generation
Mineral Extraction	Size of working area
	Extraction method (low or high energy)
	Potential of material for dust generation
Materials Handling	No. of heavy plant
	Type of surface (paved or unconsolidated)
	Distance of activities to site boundary (or in void)
	Potential of material for dust generation
On-site Transportation	Transport method (un-consolidated haul road or use of conveyors)
	Type of haul road (unpaved or paved)
	Dust potential of road surface
	No. of heavy vehicle movements

Source Activity	Factor Consideration
	Length of haul roads
	Vehicle speed (controlled or uncontrolled)
Mineral Processing	Potential of raw material for dust generation
	Potential of end product for dust generation
	Complexity of process
	Volume of material processed
Stockpiles/exposed surfaces	Length of stockpile storage
	Frequency of material transfer
	Potential of raw material for dust generation
	Type of surface (paved or unconsolidated)
	Distance of stockpiles to site boundary (or in void)
	Area of exposed surfaces
	Wind speed and dust threshold
Off-site Transportation	No. of HGV movements
	Type of Access Road (unpaved or paved)
	Vehicle cleaning facility provision
	Length of access road

Estimation of Pathway Effectiveness

A2.10 The effectiveness of pathway is determined based on site-specific factors considering the distance and direction of each receptor relative to the prevailing wind direction. The frequencies of wind in each direction are calculated based on meteorological data for five years from a nearby meteorological station. The frequency of exposure of receptors to moderate to high winds from the direction of the source is categorised as follows in Table A 2-1 and the distance of the receptor to source as detailed within Table A 2-2. Consideration of topography and physical features is also required.

Table A 2-1: Categorisation of Frequency of Potentially Dust Winds

Frequency Category	Criteria
Infrequent	Frequency of winds (>5m/s) from the direction of the dust source on all 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 (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%

Frequency Category	Criteria
Very frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Table A 2-2: Categorisation of Receptor Distance from Source

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

A2.11 The resulting pathway effectiveness for each receptor is identified using the criteria in Table A 2-1 and Table A 2-2 as shown in Table A 2-3.

Table A 2-3: 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

A2.12 The risk ratings for residual source emissions and pathway effectiveness (for each receptor) identified using the criteria in Table A 2-1 and Table A 2-3 are then combined using the matrix shown in Table A2-4 to estimate an overall risk of dust impact at each specific receptor location.

Table A2-4: Estimation of Dust Impact Risk

		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

Step 3

A2.13 The next stage of the risk assessment is to identify the potential dust effect at each receptor location. This is done using the matrix presented in Table A2-5, which combines the overall dust impact risk descriptor for each receptor with the receptor sensitivity.

Table A2-5: Assessment of Dust Magnitude of 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

A2.14 As a final stage of assessment, an overall significance of dust effects is determined, based on professional judgment and taking into account the significance of effect at each specific receptor location for each activity.

A3 Professional Experience

Penny Wilson, BSc (Hons) CSci MEnvSc MIAQM

Ms Wilson is a Technical Director with AQC, with more than 20 years' relevant experience in the field of air quality. She has been responsible for numerous assessments for a range of infrastructure developments including power stations, road schemes, ports, airports and residential/commercial developments. The assessments have covered operational and construction impacts, including dust and odour nuisance. She also provides services to local authorities in support of their LAQM duties, including the preparation of Review and Assessment and Action Plan reports, as well as audits of Air Quality Assessments submitted with planning and DCO applications. She has provided expert evidence to a number of Public Inquiries and civil court, and is a Member of the Institute of Air Quality Management and a Chartered Scientist.

Lucy Hodgins, BSc (Hons) CSci MEnvSc MIAQM

Lucy is a Principal Consultant with AQC with fifteen years' experience in the field of air quality. She has extensive experience in the assessment of air quality impacts for a range of industrial, commercial and residential projects, using qualitative and quantitative methods to assess road traffic and point source emissions utilising a variety of models, including ADMS-Roads, Breeze Roads, ADMS-5 and Breeze Aermol. She has prepared assessments for energy from waste, anaerobic digestion and waste biomass facilities for a range of air pollutants, along with nuisance dust and odour assessments. Lucy has also been involved in air quality management and assessment work for local authorities, including air quality modelling for Clean Air Zones as well as microsimulation modelling for junction improvement schemes. She has also undertaken numerous operational dust assessments for mineral and waste facilities, as well as assessments of construction dust emissions. She is a Chartered Scientist and a Member of the Institute of Air Quality Management and the Institution of Environmental Sciences.

Emily Portergill, MChem (Hons)

Emily is a Senior Consultant with 6 years' experience in the air quality field. Prior to this, Emily completed a master's degree in chemistry from Cardiff University and spent a year undertaking research at the University of Wollongong, Australia. Emily has extensive experience undertaking air quality assessments across different sectors including industrial, energy, transport and mixed-use developments. These assessments have included detailed dispersion modelling and analysis of effects on human health and ecological habitats.



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