



**STEPHENSON
HALLIDAY**

Planning, Landscape & Environment
an **RSK** company

MAES Y DROELL QUARRY EXTRACTION OF INDUSTRIAL SAND

Environmental Statement
Volume II

Chapter 07: Air Quality

Silica Sand Mold Limited

Prepared by Air Quality Consultants

Chapter 07: Air Quality

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7 AIR QUALITY

7.1 Introduction

- 7.1.1 This Chapter of the Environmental Statement (ES) assesses the potential impact of dust emissions from the Proposed Development upon adjacent sensitive receptors.
- 7.1.2 This assessment has been undertaken by Air Quality Consultants as part of Logika Group. Air Quality Consultants are a national, independent environmental consultancy with considerable experience in preparing air quality assessments and advising clients involved in potentially dust-generating activities on best-practice control methods. The full assessment is located in **ES Volume III, Appendix 7.1: Minerals Dust and Air Quality Assessment**.
- 7.1.3 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.

7.2 Methodology

- 7.2.1 Baseline data to inform the assessment have been collected from multiple sources. The full details are set out in **ES Volume III, Appendix 7.1: Minerals Dust and Air Quality Assessment**. In summary, this includes;
- Industrial and waste sources were identified using Defra's Pollutant Release and Transfer Register. Local sources were reviewed from the Council's Air Quality Review and Assessment reports;
 - Existing air quality was based on local authority monitoring data;
 - Background concentrations were taken from Defra's 2021-based maps (NO₂ adjusted for 2024/2026; PM₁₀ and PM_{2.5} unadjusted);
 - Potential exceedances of NO₂ were identified using Defra roadside maps and AURN data; no UK exceedances of PM₁₀ or PM_{2.5} were reported for 2024; and,
 - Baseline dust levels were determined from recorded dust complaints.
- 7.2.2 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).
- 7.2.3 The approach to the dust risk assessment considers the residual source emissions, pathway effectiveness and receptor sensitivity to determine an overall magnitude of effect
- 7.2.4 Having predicted the likely magnitude of dust effects for representative receptors, the final step in the assessment is to estimate the predicted overall effect on the surrounding area and to reach an overall conclusion on the likely significance of air quality effects arising from the Proposed Development.

- 7.2.5 The assessment considers background PM10 concentrations and traffic flows on nearby roads in accordance with the screening threshold from IAQM.

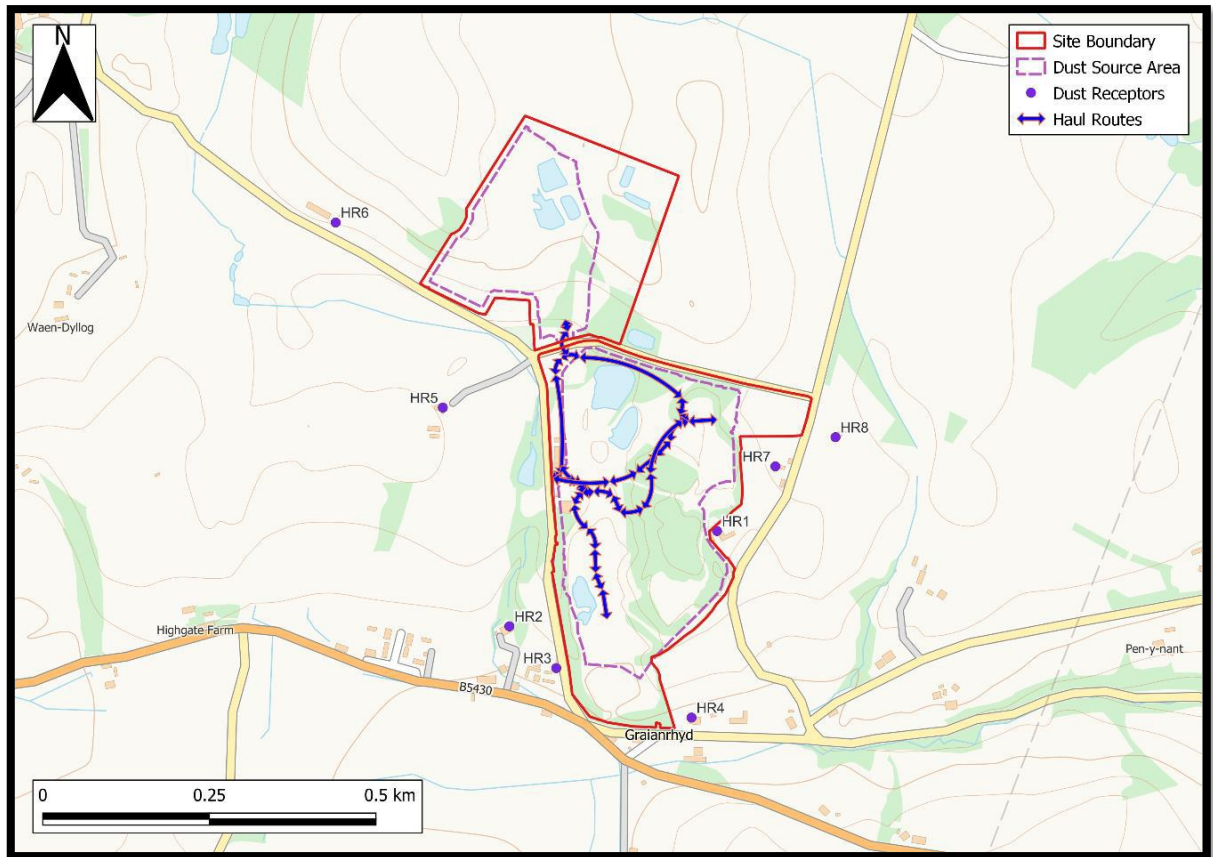
Study Area

- 7.2.6 The study area for the assessment has been identified using professional judgement, with a focus on areas where impacts are anticipated to be greatest. In this case, this assessment focuses on the closest receptors within 250 m of on-site dust-generating activities to ensure a worst-case assessment.
- 7.2.7 For road traffic emissions, the study area is limited to the proposed HGV route between the Site access and the A5104 via Ffordd Lanarmon.
- 7.2.8 Receptors have been identified to represent worst-case exposure. These locations are described in Table 7-1 and shown in **Plate 7-1**.

Table 7-1: 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

Plate 7-1: Location of Dust Receptors



7.3 Baseline Conditions

- 7.3.1 This section provides a review of the existing air quality in the vicinity of the Site and the study areas in order to provide a benchmark against which to assess potential air quality impacts of the Proposed Development.

Local Meteorological Conditions

- 7.3.2 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) classifies '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). The wind rose shows that winds predominantly originate from the south-west to the west, with the highest frequency in these sectors. Wind speeds are generally low to moderate, with occasional higher-speed events. Rainfall data indicate that precipitation exceeding 0.2 mm occurred on average 11% of the time. This suggests that conditions conducive to dust suppression are present for a proportion of the year.

Existing sources of air pollution

- 7.3.3 There are no significant industrial or waste management sources that are likely to affect existing air quality.
- 7.3.4 Graig Quarry is approximately 1 km to the west of the Site.

- 7.3.5 The closest local air quality 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.
- 7.3.6 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. There are no exceedances of the annual mean NO₂, PM₁₀ or PM_{2.5} limit values within the study area.

Background Pollutant Concentrations

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

7.4 Assessment Methodology

Scope of Assessment

- 7.4.1 The assessment concerns the potential effects of on-site dust emissions from the Proposed Development and road traffic emissions, including the impact of quarry recommencement and operation on dust soiling, and PM₁₀ and PM_{2.5} concentrations during the restoration works and the impacts of traffic emissions generated by the Proposed Development on concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} during the quarry operation;
- 7.4.2 The assessment also considers existing air quality and key site-specific factors likely to affect air quality, including wind speed and direction, as well as rainfall data.
- 7.4.3 Additionally, cumulative effects upon air quality with the operation of the Graig Quarry, located west of the Proposed Development, have been considered.
- 7.4.4 There are no designated ecological sites within 250 m of the Site boundary, and the closest ancient woodland is approximately 700 m to the west of the Site; therefore, the assessment does not consider impacts on the ancient woodland designations.

7.5 Significance Criteria

- 7.5.1 Impacts from road traffic emissions and suspended particulate matter do not exceed the relevant screening criteria and are therefore not considered further through detailed quantitative assessment. Disamenity dust is assessed qualitatively using the methodology set out below.

For the disamenity dust assessment, the following is required.

Detailed Assessment Steps

- 7.5.2 The guidance below sets out the requirements for completing the assessment in three steps, set out below.

Table 7-2: 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.

Determination of Residual Source Emissions

7.5.3 The residual source emission is determined considering Site characteristics and the potential for emissions from each source, taking into account the designed mitigation measures.

7.5.4 The table presents the residual source emissions for each of the activities undertaken on-site. Overall, the quarry is judged to result in a 'medium' residual source emission.

Table 7-3: Residual Source Emissions

Site Activity	Process	Residual Emissions 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.	Medium

Site Activity	Process	Residual Emissions Considering all factors
	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	
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
Off-Site Transportation	• Off-site 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

Dust Sensitive Receptors

7.5.5 Typical Sensitivity Categories for Dust are identified into three categories. These are set out below in **Table 7-4**. All sensitive receptors relevant to the assessment are dwellings and as such are High Sensitivity.

Table 7-4: Criteria for Assessing the Dust Sensitive Receptors

Sensitivity	Descriptor	Examples of receptor
High	Receptors where people or operations are particularly susceptible to dust.	Residential, including private gardens.
Medium	Receptors moderately sensitive to dust, where it may cause some distraction or disturbance.	Public Houses/Cafes/Restaurants where external noise may be intrusive.

Sensitivity	Descriptor	Examples of receptor
Low	Receptors where distraction or disturbance from dust is minimal.	Buildings not occupied during working hours Factories and working environments with existing high noise levels.

Estimation of Pathway Effectiveness

- 7.5.6 The effectiveness of pathway is determined based on site-specific factors; including 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 the table below, the distance of the receptor to the source as detailed within **Table 7-5**. Consideration of topography and physical features is also required.

Table 7-5: Categorisation of the 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%
Very frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Table 7-6: Categorisation of Receptor Distance from Source

Frequency 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

Pathway Effectiveness

- 7.5.7 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.

Table 7-7: Pathway Effectiveness

		Frequency of potentially dusty winds			
Receptor Distance	Close	Ineffective	Moderately Effective	Highly Effective	Highly Effective
	Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
	Distance	Ineffective	Ineffective	Moderately Effective	Moderately Effective

Table 7-8: Estimation of Dust Impact Risk

		Residual Source Emissions		
		Small	Medium	Large
Pathway Effectiveness	Highway effective pathway	Low Risk	Medium Risk	High Risk
	Moderate effective pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective pathway	Negligible Risk	Negligible Risk	Low Risk

- 7.5.8 The risk ratings for residual source emissions and pathway effectiveness (for each receptor) identified using the criteria in **Table 7-6** and **Table 7-7** are then combined using the matrix shown in **Table 7-8** to estimate an overall risk of dust impact at each specific receptor location.

Assessment of Dust Magnitude of Effects

- 7.5.9 In the final stage of the assessment, the overall significance of dust effects is determined, based on professional judgment and taking into account the significance of the effect at each specific receptor location for each activity.

Table 7-9: 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

Table 7-10: Air Quality Assessment – Summary Assessment Matrix

Where there are multiple receptors, a worst-case representative receptor location is considered, and the highest risk applicable is allocated.

Receptor	Receptor Sensitivity	Source Dust Potential	Effectiveness of the pathway	Risk of Dust impact	Magnitude of Impact	Significance of effects	Proposed mitigation measures	Residual Effect after mitigation
NSR	High	Medium	Moderately Effective	Low Risk	Slight Adverse Effect	Not Significant	Processing of material in quarry void, wheel washing facilities and boundary planting	Slight Adverse (Not Significant)

7.6 Assessment of Direct Impacts of the Proposed Development

Pathway Effectiveness

- 7.6.1 The potential for dust effects varies by receptor location and activity phase. HR4 Residential property Graianrhyd Road) (south) is mainly affected during Phase 1, with slight adverse effects then and negligible impacts thereafter. HR1 (Pen-Y-Foel farm - Residential property), HR7 (Pen-Y-Foel Cottage), and HR8 (Llys Onnen) (east) are most affected during Phases 1 and 2 due to their proximity to processing and material handling, although impacts remain limited. Impacts at all other receptors are expected to be negligible.
- 7.6.2 Embedded mitigation includes locating processing and extraction within the quarry void, progressive restoration, wheel washing to prevent track out, boundary planting to reduce visual and dust impacts, and haul roads designed to minimise dust and noise (aligned to the west and appropriately surfaced).
- 7.6.3 A summary of risk impacts can be seen in the dust assessment (**Table 7-10: Air Quality Assessment – Summary Assessment Matrix**).

Suspended Dust Assessment

- 7.6.4 The assessment has concluded that background PM₁₀ levels at the Site are low (maximum 9.9 µg/m³ in 2024), well below both the objective and IAQM screening threshold (17 µg/m³). Therefore, 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

- 7.6.5 The predicted number of heavy-duty vehicle movements is below the EPUK/IAQM screening threshold of 100 annual average daily movements for locations outside an AQMA. Accordingly, the screening threshold for a detailed road traffic assessment is not exceeded, and the Proposed Development is expected to have a negligible effect on local roadside air quality.

7.7 Further Mitigation and Enhancement

- 7.7.1 The assessment concludes that the Proposed Development would result in an overall air quality impact that is not significant. Dust emissions are not expected to have significant effects on amenity or human health, and emissions from development traffic would not materially affect local air quality.
- 7.7.2 Nevertheless, the Proposed Development proposes a number of good designs and best practice measures:
- Phased extraction and restoration to limit exposed ground and reduce dust.
 - Progressive seeding and planting to stabilise surfaces.
 - Extraction within the quarry void (27m below ground) to reduce wind and dust spread.

- Wheel wash facilities to prevent dust on public roads.
- Well-designed haul roads, speed limits, and routing away from nearby properties.
- Retained and enhanced vegetation, including woodland screening near sensitive receptors. Use of lagoons for fines to prevent drying and airborne dust.
- Dust Management Plan with monitoring and mitigation, including water suppression, road sweeping, haul road maintenance, covered HGVs, reduced drop heights, minimal handling, and good stockpile management.

7.8 Residual Effects

- 7.8.1 The overall effects of the Proposed Development will not be significant.

7.9 Cumulative Effect

- 7.9.1 No cumulative projects / developments have been identified that require a specific assessment of cumulative effects. However, given the proximity of Graig Quarry this has been considered.

Disamenity dust

- 7.9.2 There are no receptors within the screening distances of 400 m from Graig Quarry (given it is a hard rock quarry) and 250 m from Maes y Droell quarry. The impacts on receptors to the west of Maes y Droell are all negligible, and therefore, there is unlikely to be any significant cumulative effects.

Suspended dust

- 7.9.3 A number of properties are within 1 km of both quarries. Assuming both quarries operate at the maximum output assessed, the combined increase in PM10 is predicted to be 10 µg/m³. When added to the predicted 2026 background concentration of 9.7 µg/m³, the maximum total concentration at receptors would be 19.7 µg/m³, which remains below the relevant air quality objective. The cumulative effect in relation to suspended particulate matter is therefore judged to be not significant.

Road Traffic

- 7.9.4 It is concluded that the Proposed Development would not give rise to significant air quality effects at sensitive receptors, and cumulative traffic impacts are therefore considered not significant.

7.10 Summary and Conclusion

- 7.10.1 The assessment concludes that pollutant concentrations would remain well below relevant air quality objectives at all receptors, and that traffic associated with the Proposed Development would have a negligible effect on local air quality.

- 7.10.2 Dust emissions have been assessed on a worst-case, cumulative basis across all phases. With mitigation in place, effects on amenity and human health would not be significant.
- 7.10.3 Overall, the operational air quality effects of the Proposed Development are therefore judged to be not significant.