

VAYNOR QUARRY

Chapter 12 Air Quality – Technical Appendices

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APPENDIX 12.1: Road Traffic Emissions Assessment Methodology

Traffic Inputs

The ADMS-Roads assessment incorporates numbers of road traffic vehicles, vehicle speeds on the local roads and the composition of the traffic fleet. Traffic data was provided by The Hurlstone Partnership Limited – the appointed transport consultant, in addition to being sourced from the Department for Transport (DfT) traffic count website.

The spatial extent and inclusion of road links within the ADMS-Roads dispersion model has principally been informed by the potential routes available to the HDVs travelling to and from the Quarry to the A465 Head of Valleys Road. As a worst-case, it has been assumed that routes to and from the A465 will experience 100% of development-generated trips i.e. +138 HDV AADT in the DS scenario, to ensure all worst-case impacts are assessed, however this scenario is considered unlikely. This is in consideration of the A465 highways project and the subsequent closure of Grawen Lane as a direct access to the A465. On reflection, this approach is considered to be conservative as it assumes no reduction in vehicle trips is achieved via distribution.

Traffic speeds were modelled at the relevant speed limit for each road. However, where appropriate, vehicle speeds have been reduced to simulate queues at junctions, traffic lights and other locations where queues or slower traffic are known to be an issue in accordance with LAQM.TG(16). Traffic speeds have been assumed to be consistent across all the modelled scenarios.

The Emissions Factors Toolkit (EFT) version 11.0 developed by Defra¹ has been used to determine vehicle emission factors for input into the ADMS-Roads dispersion model.

The 2019 and 2023 traffic data used within the assessment is detailed below in Table 12.A-1 and Table 12.A-2, whilst the modelled road links used within the assessment are presented in Figure 12.A-4.

Table 12.A-1
2019 Traffic Data Used Within the Assessment – Verification Only

Link	2019 BC		Speed (kph) ^b
	AADT	% HDV ^a	
A4102 Bethesda Street / Pontmorlais West	10,186	3.3	48
A4054 Avenue de Clichy	6,208	7.4	32 / 48
A4054 Avenue de Clichy (one-way)	7,556	6.7	32
A4054 Avenue de Clichy	13,813	3.3	32 / 48
A4054 River Taff Central Link Gyratory / Penry Street	13,960	4.6	32
A4054 Plymouth Street	12,338	3.5	48 / 64
A4102 Penyardarren Road	10,287	3.3	48
Table notes: ^a HDV denotes HGVs and Buses/Coaches with a total unladen weight ≥3.5 tonnes. ^b Speeds based upon National Speed Limits. Traffic speeds have been adjusted to take into account queues and congestion in accordance with LAQM.TG(16).			

¹ Defra, EFT v11.0 (2021). <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>.

Table 12.A-2
2023 Traffic Data Used Within the Assessment

Link	2023 DM		2023 DS		Speed (kph) ^b
	AADT	% HDV ^a	AADT	% HDV ^a	
Vaynor Road (north of access)	1,718	0.9	1,718	0.9	97
Vaynor Road (south of access)	4,391	1.7	4,529	4.7	48
A4054 Upper High Street	755	2.8	893	17.8	48 / 97
A4054 High Street / Brecon Road / Cyfarthfa Road	5,504	3.7	5,642	6.0	48
A470 North	7,380	4.9	7,518	6.6	97
A4102 Swansea Road	12,140	1.4	12,278	2.5	48
A470 South	24,413	3.5	24,551	4.0	97
A465 Head of Valleys Road – west of A4054 High Street Bridge	26,766	4.3	26,904	4.8	97
A465 Head of Valleys Road – east of A4054 High Street Bridge	26,766	4.3	26,904	4.8	97
A4054 Swansea Road / Avenue de Clichy	6,551	1.4	6,551	1.4	48

Table notes:
^a HDV denotes HGVs and Buses/Coaches with a total unladen weight ≥3.5 tonnes.
^b Speeds based upon National Speed Limits. Traffic speeds have been adjusted to take into account queues and congestion in accordance with LAQM.TG(16).

Meteorological Data

To calculate pollutant concentrations at identified sensitive receptor locations the dispersion model uses sequential hourly meteorological data, including wind direction, wind speed, temperature, cloud cover and stability, which exert significant influence over atmospheric dispersion.

The dispersion modelling has been undertaken using data from Sennybridge meteorological station, located approximately 35km north-west of the Quarry. Sennybridge station is the closest operational station to the Quarry, and its elevated setting is considered comparable to the outskirts of Merthyr Tydfil town centre. Use of this station was agreed in consultation with the MTCBC EHO.

LAQM.TG(16) recommends that meteorological data should have a percentage of usable hours greater than 85%. 2019 meteorological data from Sennybridge meteorological station includes 8,760 lines of usable hourly data out of the total 8,760 for the year, i.e. 100% usable data. This is therefore suitable for the dispersion modelling exercise.

A windrose is presented in Figure 12.A-1.

Other Advanced Inputs

Surface Roughness

A roughness length z_0 of 0.5m was used to represent the surface roughness of the principal study area. This value relates to 'parkland and open suburbia' and is reflective of the principal study area.

A roughness length z_0 of 0.2m was used to represent the surface roughness of Sennybridge meteorological station. This value relates to 'agricultural areas (min)' and was considered representative given the rural setting, featuring woodland areas.

Minimum Monin-Obukhov Length (LMOmin)

A LMOmin value of 30m was used for the principal study area. This value is applicable for 'mixed urban/industrial' locations, as well as 'cities/large towns' and is reflective of the principal study area.

A LMOmin value of 10m was used to represent the Sennybridge meteorological station. This value is applicable for 'small towns <50,000' and is reflective of the meteorological station setting.

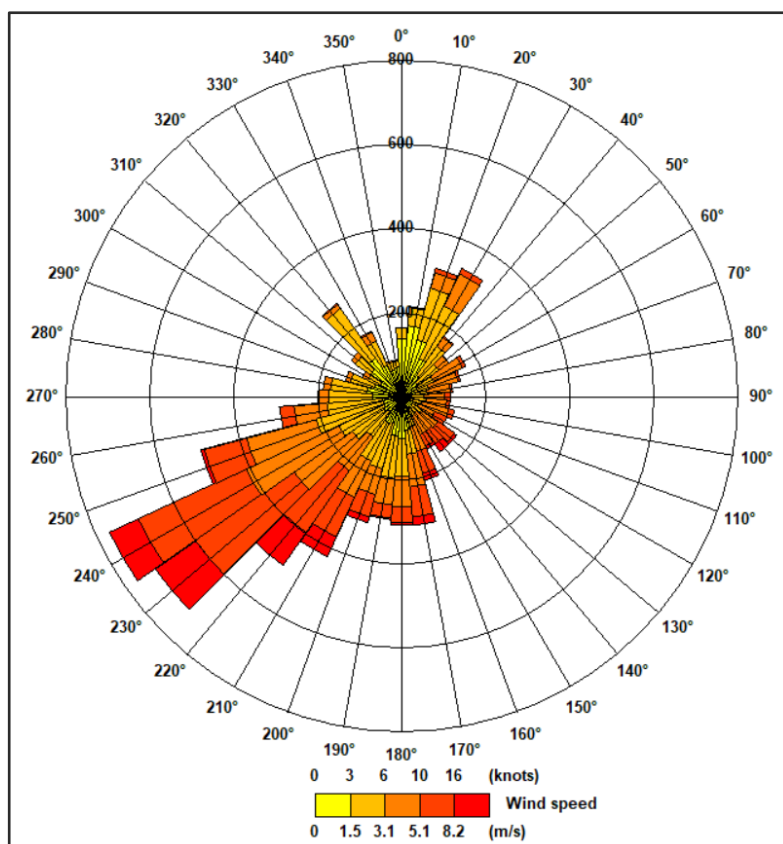


Figure 12.A-1
Windrose for Sennybridge Meteorological Station (2019)

Background Datasets

In the absence of locally representative background monitoring sites, annual mean background concentrations used for the purposes of the assessment have been obtained from the Defra supplied background maps (2018 reference year)², based on the 1km grid squares which cover the modelled area. Further detail on these datasets can be found in the Air Quality ES Chapter.

To avoid double counting of potential source contributions already contained within the ADMS-Roads dispersion model, 'Primary A Road in' was removed from each grid square in relation to the verification domain, and 'Primary A Road in' and 'Trunk A Road in' were removed from each grid square in relation to the DM/DS modelled domain.

² Background mapping data for local authorities – <http://uk-air.defra.gov.uk/data/laqm-background-home> accessed October 2020.

As the relationship between NO₂ and NO_x is not linear, the NO₂ Adjustment for NO_x Sector Removal Tool³ has been used – in accordance with LAQM.TG(16). No adjustment for background concentration variability with height has been made, where applicable.

Model Outputs

The background ambient pollutant concentrations discussed in the Air Quality ES Chapter have been used in conjunction with the concentrations predicted by the ADMS-Roads model to calculate total predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} for each respective scenario.

For the prediction of annual mean NO₂ concentrations for all modelled scenarios at receptor locations, the road (adjusted as per Appendix 12.2) NO_x contributions have been converted to total NO₂ following the methodology in in LAQM.TG(16) using the latest version of Defra's NO_x to NO₂ conversion tool (v8.1)⁴. The modelled NO₂ road contribution was then added to the appropriate NO₂ background concentration value to obtain an overall total annual mean NO₂ concentration.

For the prediction of short term NO₂ impacts, LAQM.TG(16) advises that it is valid to assume that exceedances of the 1-hour mean AQAL for NO₂ are unlikely to occur where the annual mean NO₂ concentration is <60µg/m³. This approach has thus been adopted for the purposes of this assessment.

For the prediction of short term PM₁₀, LAQM.TG(16) provides an empirical relationship between the annual mean and the number of exceedances of the 24-hour mean AQAL for PM₁₀ that can be calculated as follows:

$$\text{No. 24-hour mean exceedances} = -18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$$

This relationship has thus been adopted to determine whether exceedances of the short-term PM₁₀ AQAL are likely in this assessment.

Verification of the ADMS-Roads assessment has been undertaken, as per Appendix 12.2. All results presented in the assessment are those calculated following the process of model verification, using an adjustment factor of 2.323 for NO₂, PM₁₀ and PM_{2.5}.

³ Defra NO₂ Adjustment for NO_x Sector Removal Tool version 8.0 (2020), available at <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxsector>.

⁴ Defra NO_x to NO₂ Calculator v8.1 (2020), available at <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>

APPENDIX 12.2: Model Verification

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is specifically listed in the Defra's LAQM.TG(16) as an accepted dispersion model.

Model validation undertaken by the software developer (CERC) will not have included validation in the vicinity of the Quarry. It is therefore necessary to perform a comparison of modelled results with local monitoring data at relevant locations. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results.

Prior to undertaking model verification, model setup parameters and input data were reviewed to maximise the performance of the dispersion model in relation to the real-world conditions.

For model verification, 2019 LAQM MTCBC monitoring data has been used (Table 12.A-3).

Table 12.A-3
Local Monitoring Data Available for Model Verification

Monitoring Location	X	Y	2019 Monitored NO ₂ Concentration (µg/m ³)	2019 Data Capture (%)
6	305426	205144	25.3	75.0
10	305180	206744	30.7	100
31	304782	205886	22.1	42.0

NO_x/NO₂ Verification Calculations

NO_x/NO₂ verification, relates to the comparison and adjustment of modelled road-NO_x (as output from the ADMS-Roads dispersion model), relative to monitored road-NO_x.

As NO₂ concentrations are solely reported using diffusion tubes, NO_x was back calculated using the latest version of Defra's NO_x to NO₂ Calculator (v8.1)⁴. The NO_x to NO₂ Calculator was also used to facilitate the conversion of modelled road-NO_x (as output from the ADMS-Roads dispersion model) into road-NO₂.

Verification was completed using the 2019 Defra background mapped concentrations (2018 reference year)² for the relevant 1km x 1km grid squares (i.e. those within which the model verification locations are located), with those already modelled sources removed to avoid duplication.

Comparison of the modelled vs. monitored road NO_x contribution at all relevant verification locations outlined in Table 12.A-3 is provided in Table 12.A-4. An adjustment factor of 2.323 has been derived, based on a linear regression forced through zero, as shown in Figure 12.A-2.

Table 12.A-4
NO_x/NO₂ Model Verification – (2.323)

Monitoring Location	Monitored Road NO _x (µg/m ³)	Modelled Road NO _x (µg/m ³)	Ratio (Monitored vs. Modelled Road NO _x)	Adjustment Factor	Adjusted Modelled Total NO ₂ (µg/m ³)	Monitored Total NO ₂ (µg/m ³)	% Difference (Adjusted Modelled NO ₂ vs Monitored NO ₂)
6	32.7	16.6	2.0	2.323	28.2	25.3	11.3
10	44.9	14.4	3.1		25.3	30.7	-17.7
31	26.7	13.6	2.0		24.5	22.1	11.0

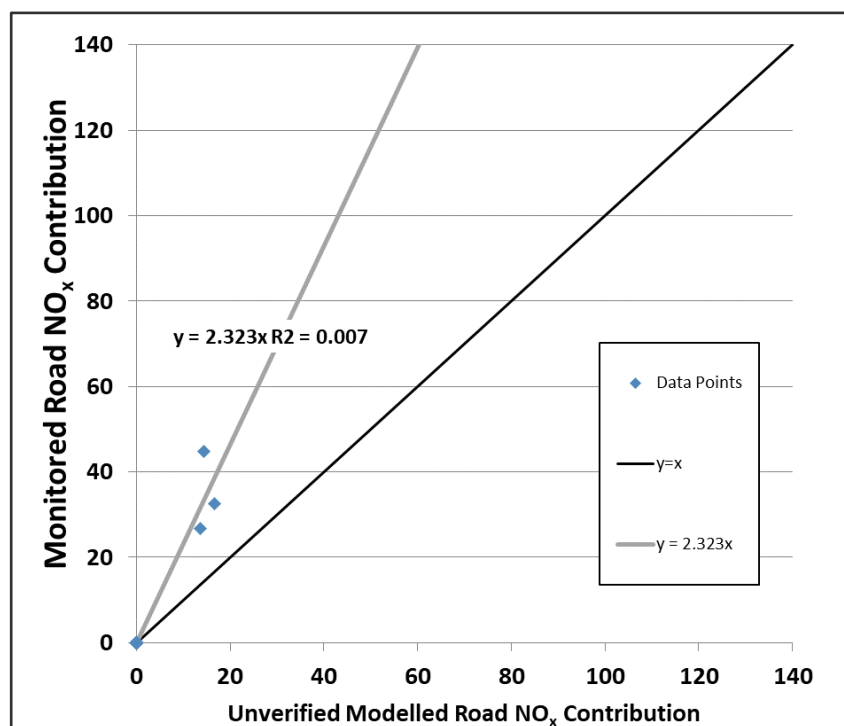


Figure 12.A-2
Comparison of Modelled vs. Monitored Road NO_x Contribution – (2.323)

LAQM.TG(16) states that:

“In order to provide more confidence in the model predictions and the decisions based on these, the majority of results should be within 25% of the monitored concentrations as a minimum, preferably within 10%”.

The derived verification factor (2.323) resulted in the difference between adjusted modelled and monitored NO₂ concentrations being within $\pm 25\%$ at all three locations, and near to $\pm 10\%$ at two of the three locations.

Whilst it is acknowledged that data capture is $< 75\%$ at monitoring location 31, annualisation has subsequently been performed to derive an annual mean estimate with use of local background concentrations – considered sufficient for verification purposes, as per LAQM.TG16. Furthermore, the model performance at location 31 shows consistency with the remainder of the tubes and is within the applied tolerances. As such, preference was to utilise location 31 given the above, and to increase the spatial certainty of adjusted modelled concentrations

Application of the adjustment factor of 2.323 reduced the Root Mean Square Error (RMSE) from $10.7 \mu\text{g}/\text{m}^3$ to $3.8 \mu\text{g}/\text{m}^3$ and therefore within the LAQM.TG(16) ideal range of $4 \mu\text{g}/\text{m}^3$ i.e. 10% of the annual mean AQAL ($40 \mu\text{g}/\text{m}^3$). The adjustment factor of 2.323 was applied to all road-NO_x concentrations (as output of the ADMS Roads dispersion model).

PM₁₀/PM_{2.5} Model Verification

The final adjustment factor of 2.323 was also applied to road-PM₁₀ and PM_{2.5} concentrations (as output of the ADMS Roads dispersion model), following the recommendations of LAQM.TG(16).

APPENDIX 12.3: Road Traffic Emissions Assessment – Results

NO₂ Modelling Results

Table 12.A-5 presents the annual mean NO₂ concentrations predicted at all assessed receptor locations for the 2023 DM and 2023 DS scenarios.

Table 12.A-5
Predicted Annual Mean NO₂ Concentrations – 2023 Development Opening Year

Receptor	Predicted Annual Mean NO ₂ Concentration (µg/m ³)		% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2023 DM	2023 DS			
HR1	7.9	8.2	0.7	20.5	Negligible
HR2	7.5	7.7	0.4	19.3	Negligible
HR3	8.6	8.8	0.5	22.0	Negligible
HR4	9.9	10.2	0.6	25.5	Negligible
HR5	12.6	12.9	0.6	32.3	Negligible
HR6	5.7	5.9	0.6	14.8	Negligible
HR7	5.8	6.0	0.6	15.0	Negligible
HR8	12.0	12.4	0.9	31.0	Negligible
HR9	17.0	17.3	0.6	43.3	Negligible
HR10	13.7	14.0	0.8	35.0	Negligible
HR11	10.7	10.9	0.5	27.3	Negligible
HR12	11.0	11.3	0.7	28.3	Negligible
HR13	9.7	9.9	0.5	24.8	Negligible
HR14	9.4	9.6	0.5	24.0	Negligible
HR15	9.6	9.8	0.5	24.5	Negligible
HR16	10.9	11.1	0.6	27.8	Negligible
HR17	12.6	12.8	0.4	32.0	Negligible

PM₁₀ Modelling Results

Table 12.A-6 presents the annual mean PM₁₀ concentrations predicted at all assessed receptor locations for the 2023 DM and 2023 DS scenarios.

Table 12.A-6
Predicted Annual Mean PM₁₀ Concentrations – 2023 Development Opening Year

Receptor	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2023 DM	2023 DS			
HR1	14.2	14.3	0.2	35.8	Negligible
HR2	11.8	11.8	0.1	29.5	Negligible
HR3	12.1	12.2	0.2	30.5	Negligible
HR4	12.4	12.5	0.2	31.3	Negligible
HR5	13.1	13.2	0.2	33.0	Negligible

Receptor	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2023 DM	2023 DS			
HR6	10.8	10.9	0.2	27.3	Negligible
HR7	10.8	10.9	0.2	27.3	Negligible
HR8	13.0	13.1	0.3	32.8	Negligible
HR9	14.3	14.4	0.3	36.0	Negligible
HR10	13.4	13.5	0.3	33.8	Negligible
HR11	12.5	12.5	0.2	31.3	Negligible
HR12	12.6	12.7	0.2	31.8	Negligible
HR13	12.2	12.3	0.2	30.8	Negligible
HR14	12.1	12.1	0.1	30.3	Negligible
HR15	12.3	12.4	0.2	31.0	Negligible
HR16	12.5	12.5	0.2	31.3	Negligible
HR17	12.9	13.0	0.2	32.5	Negligible

PM_{2.5} Modelling Results

Table 12.A-7 presents the annual mean PM_{2.5} concentrations predicted at all assessed receptor locations for the 2023 DM and 2023 DS scenarios.

Table 12.A-7
Predicted Annual Mean PM_{2.5} Concentrations – 2023 Development Opening Year

Receptor	Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)		% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2023 DM	2023 DS			
HR1	7.5	7.5	0.2	30.0	Negligible
HR2	7.4	7.4	0.1	29.6	Negligible
HR3	7.5	7.6	0.2	30.4	Negligible
HR4	7.7	7.8	0.2	31.2	Negligible
HR5	8.1	8.2	0.2	32.8	Negligible
HR6	6.8	6.8	0.2	27.2	Negligible
HR7	6.8	6.8	0.2	27.2	Negligible
HR8	8.0	8.1	0.3	32.4	Negligible
HR9	8.8	8.9	0.2	35.6	Negligible
HR10	8.3	8.4	0.2	33.6	Negligible
HR11	8.0	8.0	0.2	32.0	Negligible
HR12	8.0	8.1	0.2	32.4	Negligible
HR13	7.8	7.8	0.1	31.2	Negligible
HR14	7.7	7.8	0.1	31.2	Negligible
HR15	7.9	7.9	0.2	31.6	Negligible
HR16	8.2	8.2	0.2	32.8	Negligible
HR17	8.4	8.5	0.1	34.0	Negligible

APPENDIX 12.4: Additional Model for Assessment of New A465 Road Network

A465 Highways Project

In recognition of the A465 Highways Project (specifically section 5 and 6 Dowlais Top to Hirwaun) and given the uncertainty around the completion dates of the project and the proposed development opening year, in terms of the future road network development-generated vehicles would use, an additional set of future year model scenarios (2023 DM/DS) were considered in the assessment. These scenarios accounted for the future proposed road network and traffic flows (where available) in relation to the A465 project, in addition to the existing road network – presented within the Air Quality ES Chapter. This effectively brings forward the anticipated completion of the A465 highways project to 2023, which is considered conservative given the forecast improvements in air quality in future years.

Traffic Data

Traffic data used within the additional assessment was sourced from publicly available data sources, where available, including the A465 ES⁵ and ES Supplement⁶. The DS scenario presented within the A465 ES i.e. the situation upon completion of the A465 project is effectively the DM scenario of the additional assessment. As per the main assessment, the DS scenario of the additional assessment is then the DM scenario with 100% of development-generated vehicle trips added to the viable routes to/from the Quarry to the A465.

Where traffic flows reflective of the new road network (following completion of the A465 project) were not publicly available, the traffic flows utilised in the additional assessment were supplemented by the data utilised in the main assessment – presented within the Air Quality ES Chapter.

The traffic data utilised in the additional assessment is summarised in Table 12.A-8, and the spatial extent presented in Figure 12.A-5.

Table 12.A-8
2023 Traffic Data Used Within the Additional Assessment

Link	2023 DM ^c		2023 DS		Speed (kph) ^b
	AADT	% HDV ^a	AADT	% HDV ^a	
Vaynor Road (north of access)	1,718	0.9	1,718	0.9	97
Vaynor Road (south of access)	4,391	1.7	4,529	4.7	48
A4054 Upper High Street	2,621	2.8	2,759	7.6	48 / 97
A4054 High Street / Brecon Road / Cyfarthfa Road	6,613	3.7	6,751	5.6	48
A470 North	7,560	4.9	7,698	6.6	97
A4102 Swansea Road	10,483	1.4	10,621	2.6	48
A470 South	26,882	2.6	27,020	3.1	97
A465 Head of Valleys Road – new link from A470 Roundabout through Cefn Coed	28,173	4.7	28,311	5.2	113
A4054 Swansea Road / Avenue de Clichy	6,551	1.4	6,551	1.4	48

⁵ Welsh Government, A465 Heads of the Valleys Sections 5 and 6: Dowlais Top to Hirwaun, Environmental Statement Volume 1: Main Text – July 2017.

⁶ Welsh Government, A465 Heads of the Valleys Sections 5 and 6: Dowlais Top to Hirwaun, Environmental Statement Supplement Volume 1: Main Text – March 2018.

Link	2023 DM ^c		2023 DS		Speed (kph) ^b
	AADT	% HDV ^a	AADT	% HDV ^a	
Table notes:					
^a HDV denotes HGVs and Buses/Coaches with a total unladen weight ≥3.5 tonnes.					
^b Speeds based upon National Speed Limits. Traffic speeds have been adjusted to take into account queues and congestion in accordance with LAQM.TG(16).					
^c Where applicable, the 2022 DM flows presented within the A465 ES were projected to 2023 using a TEMPro growth factor.					

Background Concentrations

In relation to background concentrations utilised in the additional assessment, no sectors were removed. This is in recognition of the fact that the Defra background maps are specific to the current road network (prior to the project), rather than the future road network (once the A465 project is completed). On reflection, this is believed to be conservative, as theoretically assumes that the existing road network and associated pollutant contributions are accounted for within the prediction of resultant concentrations.

All of the remaining methodology and model inputs remain as per the main assessment.

Results

NO₂ Modelling Results

Table 12.A-9 presents the annual mean NO₂ concentrations predicted at all assessed receptor locations for the 2023 DM and 2023 DS scenarios of the additional assessment.

Table 12.A-9
Predicted Annual Mean NO₂ Concentrations – Additional Assessment

Receptor	Predicted Annual Mean NO ₂ Concentration (µg/m ³)		% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2023 DM	2023 DS			
HR1	7.8	8.1	0.7	20.3	Negligible
HR2	8.0	8.2	0.4	20.5	Negligible
HR3	9.6	9.8	0.5	24.5	Negligible
HR4	11.4	11.6	0.6	29.0	Negligible
HR5	15.3	15.5	0.6	38.8	Negligible
HR6	7.2	7.4	0.6	18.5	Negligible
HR7	7.3	7.5	0.6	18.8	Negligible
HR8	17.0	17.3	0.9	43.3	Negligible
HR9	20.0	20.2	0.5	50.5	Negligible
HR10	15.9	16.2	0.7	40.5	Negligible
HR11	12.1	12.3	0.5	30.8	Negligible
HR12	12.5	12.8	0.6	32.0	Negligible
HR13	10.9	11.1	0.4	27.8	Negligible
HR14	10.6	10.8	0.5	27.0	Negligible
HR15	10.2	10.4	0.6	26.0	Negligible
HR16	12.2	12.4	0.6	31.0	Negligible
HR17	12.6	12.8	0.5	32.0	Negligible

As shown in Table 12.A-9, the annual mean NO₂ concentrations predicted in the 2023 DS scenario of the additional assessment are found to be ‘well below’ (i.e. <75% of the AQAL) at all assessed receptor locations.

In accordance with EPUK and IAQM guidance, the impact of the development on annual mean NO₂ concentrations at all assessed receptors is considered to be ‘negligible’.

PM₁₀ Modelling Results

Table 12.A-10 presents the annual mean PM₁₀ concentrations predicted at all assessed receptor for the 2023 DM and 2023 DS scenarios of the additional assessment.

Table 12.A-10
Predicted Annual Mean PM₁₀ Concentrations – Additional Assessment

Receptor	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2023 DM	2023 DS			
HR1	14.1	14.2	0.2	35.5	Negligible
HR2	11.7	11.8	0.1	29.5	Negligible
HR3	12.1	12.2	0.2	30.5	Negligible
HR4	12.5	12.6	0.2	31.5	Negligible
HR5	13.3	13.4	0.2	33.5	Negligible
HR6	11.1	11.2	0.2	28.0	Negligible
HR7	11.1	11.2	0.2	28.0	Negligible
HR8	13.7	13.9	0.3	34.8	Negligible
HR9	14.4	14.5	0.2	36.3	Negligible
HR10	13.6	13.7	0.3	34.3	Negligible
HR11	12.6	12.7	0.2	31.8	Negligible
HR12	12.7	12.8	0.2	32.0	Negligible
HR13	12.3	12.4	0.2	31.0	Negligible
HR14	12.2	12.2	0.1	30.5	Negligible
HR15	12.4	12.5	0.2	31.3	Negligible
HR16	12.6	12.7	0.2	31.8	Negligible
HR17	12.7	12.8	0.2	32.0	Negligible

As shown in Table 12.A-10, the annual mean PM₁₀ concentrations predicted in the 2023 DS scenario of the additional assessment are found to be ‘well below’ (i.e. <75% of the AQAL) at all assessed receptor locations.

In accordance with EPUK and IAQM guidance, the impact of the development on annual mean PM₁₀ concentrations at all assessed receptors is considered to be ‘negligible’.

PM_{2.5} Modelling Results

Table 12.A-11 presents the annual mean PM_{2.5} concentrations predicted at all assessed receptor locations for the 2023 DM and 2023 DS scenarios of the additional assessment.

Table 12.A-11
Predicted Annual Mean PM_{2.5} Concentrations – Additional Assessment

Receptor	Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)		% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2023 DM	2023 DS			
HR1	7.5	7.5	0.2	30.0	Negligible
HR2	7.3	7.4	0.1	29.6	Negligible
HR3	7.6	7.6	0.2	30.4	Negligible
HR4	7.8	7.8	0.2	31.2	Negligible
HR5	8.2	8.3	0.2	33.2	Negligible
HR6	7.0	7.0	0.2	28.0	Negligible
HR7	7.0	7.0	0.2	28.0	Negligible
HR8	8.5	8.5	0.3	34.0	Negligible
HR9	8.9	8.9	0.2	35.6	Negligible
HR10	8.4	8.4	0.2	33.6	Negligible
HR11	8.0	8.1	0.2	32.4	Negligible
HR12	8.1	8.2	0.2	32.8	Negligible
HR13	7.9	7.9	0.1	31.6	Negligible
HR14	7.8	7.8	0.1	31.2	Negligible
HR15	8.0	8.0	0.1	32.0	Negligible
HR16	8.3	8.3	0.2	33.2	Negligible
HR17	8.3	8.4	0.1	33.6	Negligible

As shown in Table 12.A-11, the annual mean PM_{2.5} concentrations predicted in the 2023 DS scenario of the additional assessment are found to be ‘well below’ (i.e. <75% of the AQAL) at all assessed receptor locations.

In accordance with EPUK and IAQM guidance, the impact of the development on annual mean PM_{2.5} concentrations at all assessed receptors is considered to be ‘negligible’.

Summary

The outcomes and predicted impacts of the additional assessment remain as per the main assessment, which utilised the current road network and traffic data.

The overall conclusion of the additional assessment remains as per the main assessment; and unmitigated effects associated with annual mean NO₂, PM₁₀ and PM_{2.5} concentrations at all assessed receptor locations are considered to be ‘not significant’.

APPENDIX 12.5: Minerals Dust Assessment – Results

Table 12.A-12
Summary of Pathway Effectiveness

Ref.	Area	Approx. Distance to Area Boundary (m)	Distance Category	Frequency of Potentially Dusty Winds (%)	Frequency Category	Pathway Effectiveness
DR1	OMS	165	Intermediate	7.4	Moderately Frequent	Moderately Effective
DR2	OMS	320	Distant	6.7	Moderately Frequent	Ineffective
DR3	OMS	20	Close	7.9	Moderately Frequent	Moderately Effective
DR4	OMS	20	Close	7.4	Moderately Frequent	Moderately Effective
	Quarry area south of OMS	230	Distant	6.5	Moderately Frequent	Ineffective
DR5	OMS	300	Distant	5.1	Moderately Frequent	Ineffective
DR6	OMS	325	Distant	1.9	Infrequent	Ineffective
DR7	OMS	320	Distant	0.6	Infrequent	Ineffective
DR8	OMS	150	Intermediate	1.9	Infrequent	Ineffective
	Quarry area south of OMS	360	Distant	3.6	Infrequent	Ineffective
DR9	Quarry area south of OMS	115	Intermediate	0.0	Infrequent	Ineffective
	OMS	245	Distant	0.0	Infrequent	Ineffective
DR10	Quarry area south of OMS	45	Close	0.1	Infrequent	Ineffective
	OMS	225	Distant	0.1	Infrequent	Ineffective
DR11	Quarry area south of OMS	170	Intermediate	0.0	Infrequent	Ineffective
	OMS	370	Distant	0.0	Infrequent	Ineffective
DR12	Quarry area south of OMS	135	Intermediate	0.1	Infrequent	Ineffective
	OMS	370	Distant	0.1	Infrequent	Ineffective
DR13	Quarry area south of OMS	225	Distant	0.0	Infrequent	Ineffective
DR14	Quarry area south of OMS	295	Distant	0.1	Infrequent	Ineffective
DR15	Quarry area south of OMS	170	Intermediate	0.1	Infrequent	Ineffective
	OMS	385	Distant	0.0	Infrequent	Ineffective

Ref.	Area	Approx. Distance to Area Boundary (m)	Distance Category	Frequency of Potentially Dusty Winds (%)	Frequency Category	Pathway Effectiveness
DR16	Quarry area south of OMS	90	Close	0.4	Infrequent	Ineffective
	OMS	260	Distant	0.0	Infrequent	Ineffective
DR17	Quarry area south of OMS	185	Intermediate	0.4	Infrequent	Ineffective
	OMS	210	Distant	0.0	Infrequent	Ineffective
DR18	OMS	20	Close	1.5	Infrequent	Ineffective
	Quarry area south of OMS	135	Intermediate	1.0	Infrequent	Ineffective
DR19	OMS	45	Close	1.2	Infrequent	Ineffective
	Quarry area south of OMS	295	Distant	0.5	Infrequent	Ineffective
ER1	OMS	300	Distant	5.8	Moderately Frequent	Ineffective
ER2	OMS	160	Intermediate	7.7	Moderately Frequent	Moderately Effective
ER3	OMS	180	Intermediate	7.4	Moderately Frequent	Moderately Effective
ER4	OMS	140	Intermediate	7.0	Moderately Frequent	Moderately Effective
ER5	OMS	125	Intermediate	6.8	Moderately Frequent	Moderately Effective
ER6	OMS	120	Intermediate	6.5	Moderately Frequent	Moderately Effective
ER7	OMS	245	Distant	5.1	Moderately Frequent	Ineffective
ER8	OMS	180	Intermediate	1.9	Infrequent	Ineffective
	Quarry area south of OMS	395	Distant	1.3	Infrequent	Ineffective
ER9	OMS	190	Intermediate	0.1	Infrequent	Ineffective
	Quarry area south of OMS	300	Distant	1.9	Infrequent	Ineffective
ER10	OMS	240	Distant	0.0	Infrequent	Ineffective
	Quarry area south of OMS	250	Distant	0.1	Infrequent	Ineffective
ER11	OMS	250	Distant	0.0	Infrequent	Ineffective
	Quarry area south of OMS	190	Intermediate	0.0	Infrequent	Ineffective
ER12	Quarry area south of OMS	280	Distant	0.0	Infrequent	Ineffective

Ref.	Area	Approx. Distance to Area Boundary (m)	Distance Category	Frequency of Potentially Dusty Winds (%)	Frequency Category	Pathway Effectiveness
ER13	OMS	390	Distant	0.1	Infrequent	Ineffective
	Quarry area south of OMS	370	Distant	0.2	Infrequent	Ineffective

Table 12.A-13
Summary of Dust Effects

Ref.	Area	Receptor Sensitivity	Pathway Effectiveness	Dust Impact Risk	Magnitude of Effect
DR1	OMS	High	Moderately Effective	Low Risk	Slight Adverse Effect
DR2	OMS	Low	Ineffective	Negligible Risk	Negligible Effect
DR3	OMS	Low	Moderately Effective	Low Risk	Negligible Effect
DR4	OMS	Low	Moderately Effective	Low Risk	Negligible Effect
	Quarry area south of OMS	Low	Ineffective	Negligible Risk	Negligible Effect
DR5	OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR6	OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR7	OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR8	OMS	Low	Ineffective	Negligible Risk	Negligible Effect
	Quarry area south of OMS	Low	Ineffective	Negligible Risk	Negligible Effect
DR9	Quarry area south of OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
	OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
DR10	Quarry area south of OMS	Low	Ineffective	Negligible Risk	Negligible Effect
	OMS	Low	Ineffective	Negligible Risk	Negligible Effect
DR11	Quarry area south of OMS	High	Ineffective	Negligible Risk	Negligible Effect
	OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR12	Quarry area south of OMS	High	Ineffective	Negligible Risk	Negligible Effect
	OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR13	Quarry area south of OMS	High	Ineffective	Negligible Risk	Negligible Effect

Ref.	Area	Receptor Sensitivity	Pathway Effectiveness	Dust Impact Risk	Magnitude of Effect
DR14	Quarry area south of OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR15	Quarry area south of OMS	High	Ineffective	Negligible Risk	Negligible Effect
	OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR16	Quarry area south of OMS	High	Ineffective	Negligible Risk	Negligible Effect
	OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR17	Quarry area south of OMS	High	Ineffective	Negligible Risk	Negligible Effect
	OMS	High	Ineffective	Negligible Risk	Negligible Effect
DR18	OMS	Low	Ineffective	Negligible Risk	Negligible Effect
	Quarry area south of OMS	Low	Ineffective	Negligible Risk	Negligible Effect
DR19	OMS	Low	Ineffective	Negligible Risk	Negligible Effect
	Quarry area south of OMS	Low	Ineffective	Negligible Risk	Negligible Effect
ER1	OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
ER2	OMS	Medium	Moderately Effective	Low Risk	Negligible Effect
ER3	OMS	Medium	Moderately Effective	Low Risk	Negligible Effect
ER4	OMS	Medium	Moderately Effective	Low Risk	Negligible Effect
ER5	OMS	Medium	Moderately Effective	Low Risk	Negligible Effect
ER6	OMS	Medium	Moderately Effective	Low Risk	Negligible Effect
ER7	OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
ER8	OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
	Quarry area south of OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
ER9	OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
	Quarry area south of OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
ER10	OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
	Quarry area south of OMS	Medium	Ineffective	Negligible Risk	Negligible Effect

Ref.	Area	Receptor Sensitivity	Pathway Effectiveness	Dust Impact Risk	Magnitude of Effect
ER11	OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
	Quarry area south of OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
ER12	Quarry area south of OMS	Medium	Ineffective	Negligible Risk	Negligible Effect
ER13	OMS	Low	Ineffective	Negligible Risk	Negligible Effect
	Quarry area south of OMS	Low	Ineffective	Negligible Risk	Negligible Effect

APPENDIX 12.6: Figures

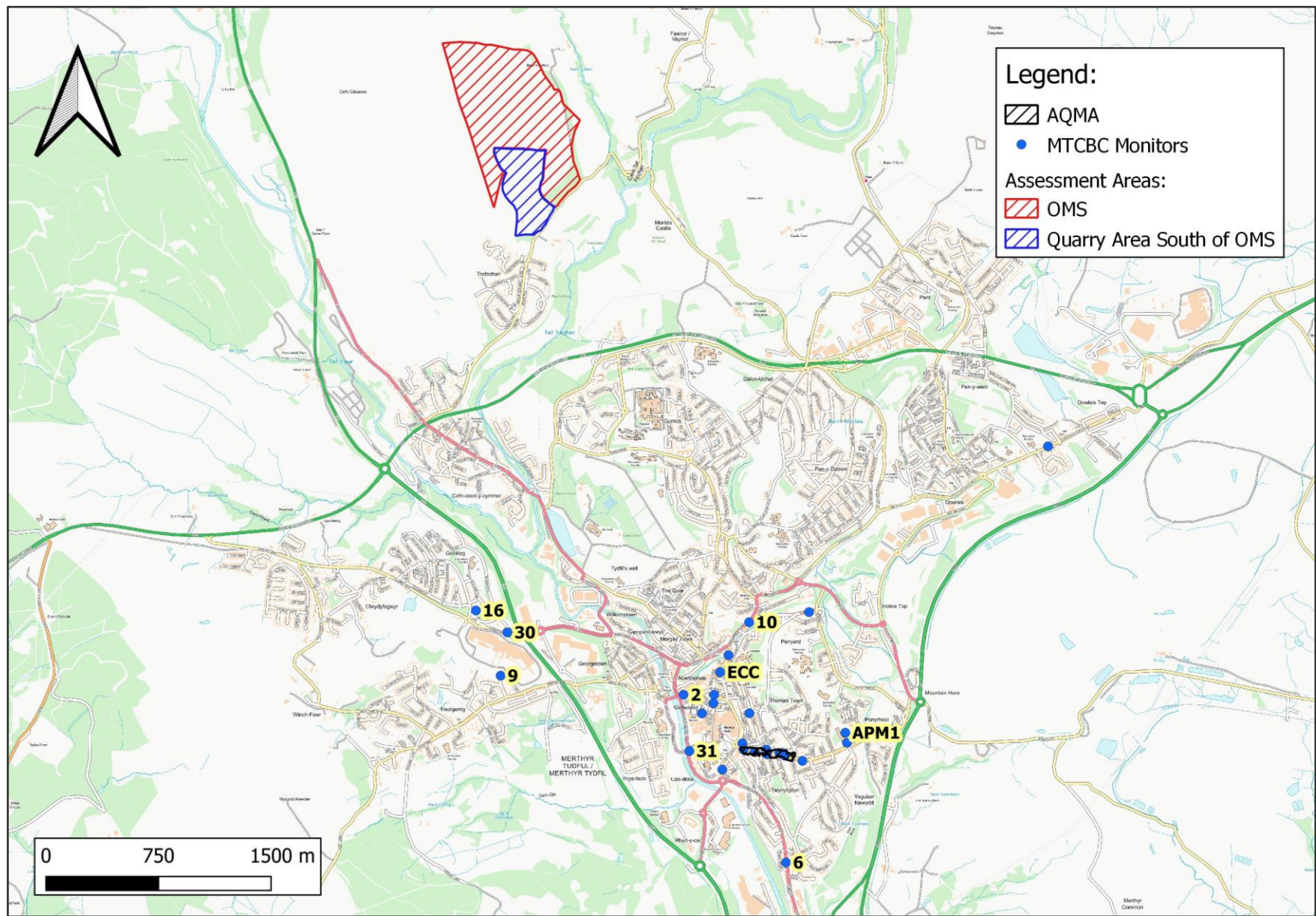


Figure 12.A-3
Local Monitoring Locations and AQMA Relative to the Quarry

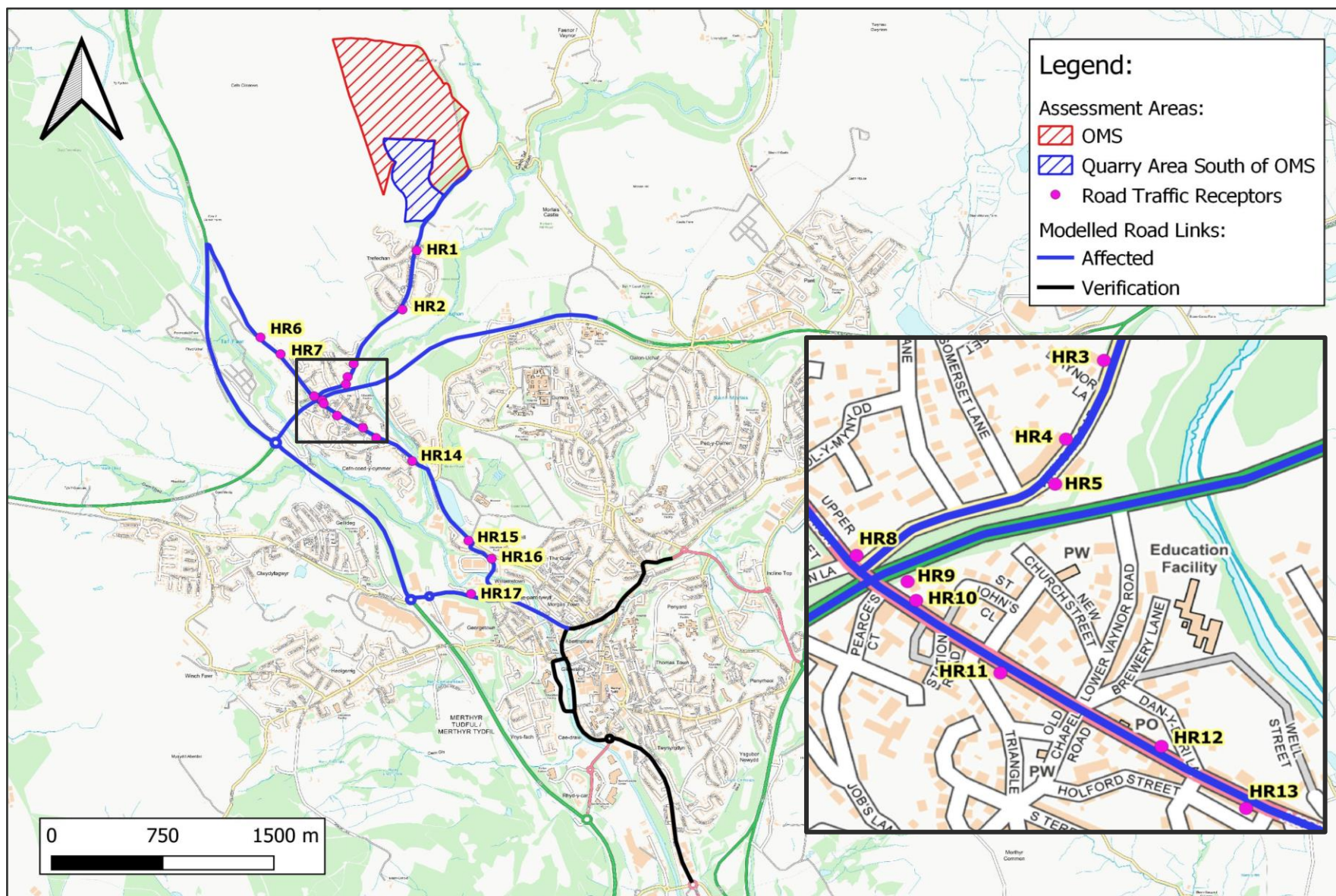


Figure 12.A-4
Modelled Human Receptor Locations and Road Links (Main Assessment)

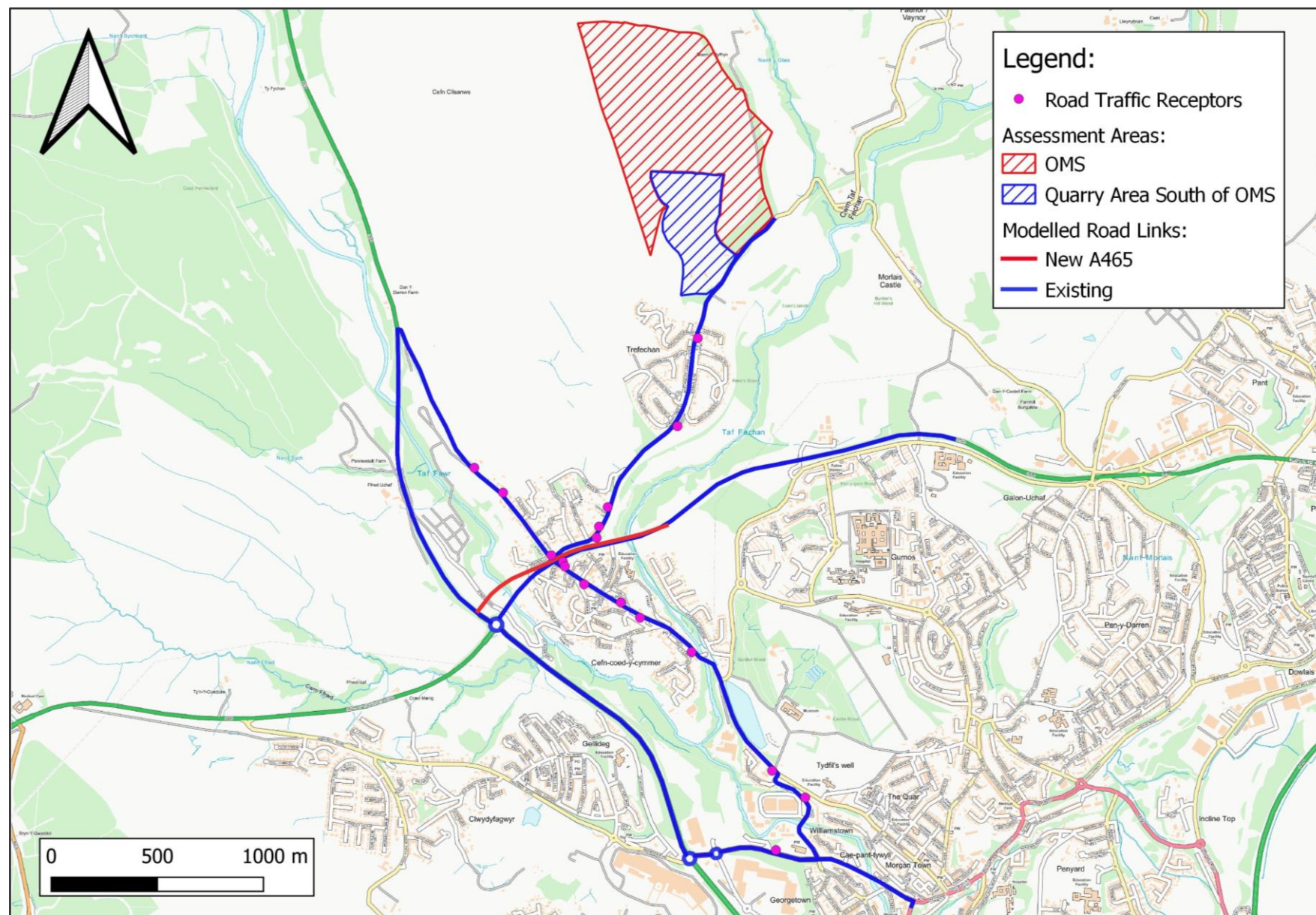


Figure 12.A-5
Modelled Human Receptor Locations and Road Links (Additional Assessment)

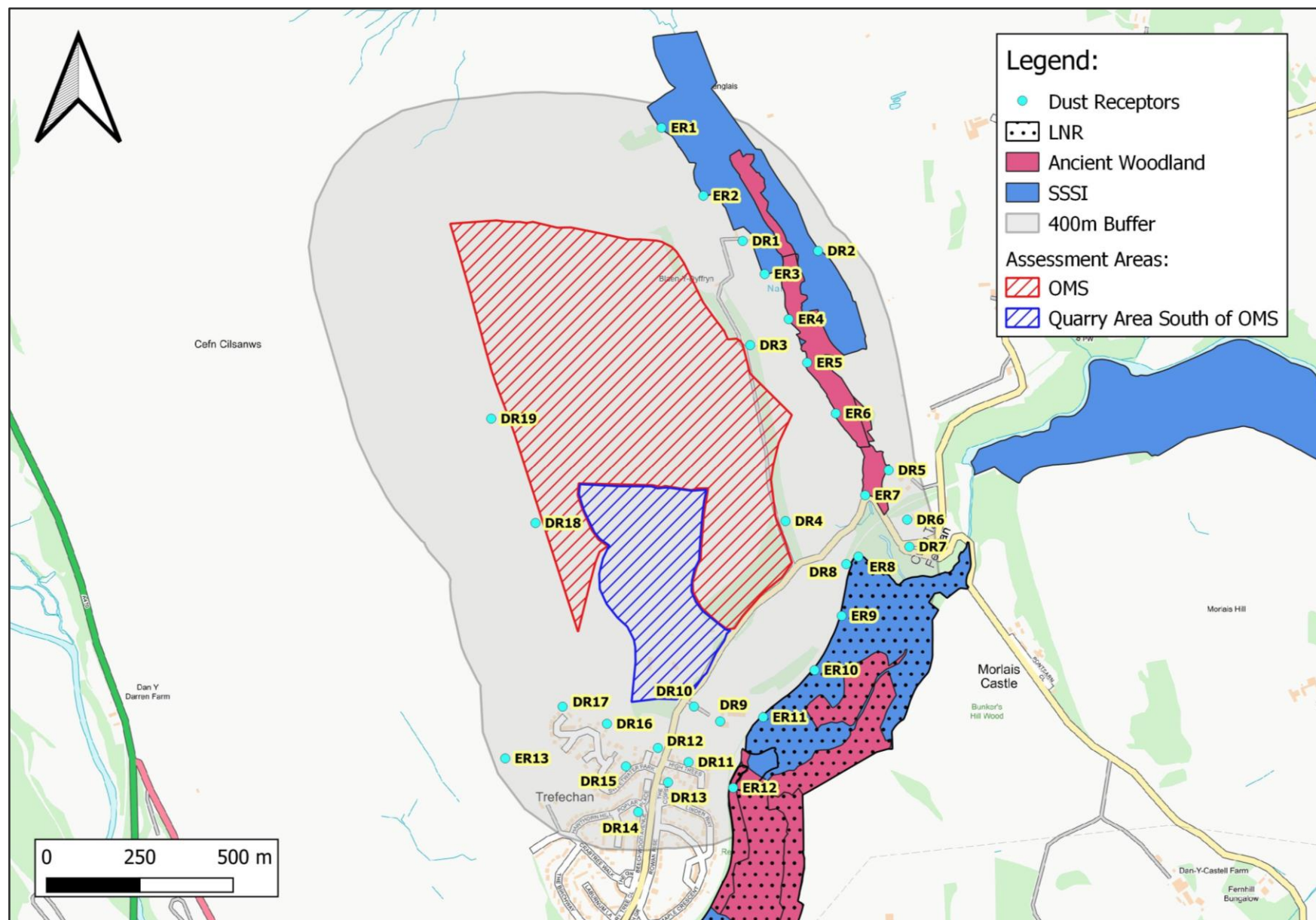


Figure 12.A-6
Minerals Dust Assessment Buffers

APPENDIX 12.7: Dust Management Plan

Introduction

Hanson are due to re-commence quarrying operations at Vaynor Quarry (the 'Site'), located approximately 3.5km north of Merthyr Tydfil town centre, Wales. The quarrying operations, i.e. mineral extraction, processing and storage, transportation and restoration, have the potential to result in dust emissions.

Dust emissions may result in potential impacts arising as a result of dust deposition with effects on amenity; and human health impacts arising as a result of suspended airborne dust with an aerodynamic diameter of less than 10 microns (referred to as PM₁₀) for which national standards exist for the protection of air quality⁷. As such, control measures are implemented at the Site with the objective of ensuring impacts are below benchmarks for the protection of human health and the environment.

This document sets out the Dust Management Plan (DMP) for the Site that incorporates a review of potential dust sources, the measures to control dust generation, and the management actions that will be taken with respect to dust and in response to a specific dust event.

The DMP forms a Technical Appendix to the Air Quality Chapter (Chapter 12) of the Environmental Statement that supports the ROMP application for the re-commencement of quarrying at the Site.

Key Guidance and Methodology

In developing the DMP key guidance documents that have been consulted include:

- The Mineral Industry Research Organisation (MIRO), *Good practice guide: control and measurement of nuisance dust and PM₁₀ from the extractive industries* (2011)⁸. The guidance provides best practice in terms of dust control and content of DMPs.
- Institute of Air Quality Management (IAQM), *Guidance on the Assessment of Mineral Dust Impacts for Planning* (2016)⁹. The guidance includes a methodology for risk assessment of dust from mineral sites which can be used as the basis for defining appropriate mitigation.

Overview and Structure of the DMP

The DMP is an active document which requires periodic evaluation and updating as operations and circumstances change. The principal mechanisms of formulating and continually improving a DMP are presented in Figure 12.A-7.

The components of the DMP are set out within this document as follows:

- Identification of Dust Sources and Influencing Factors;
- Dust Control;
- Dust Action Plan (Contingency Measures and Complaints Procedure); and
- Management, Review and Reporting.

⁷ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007.

⁸ MIRO, *Good practice guide: control and measurement of nuisance dust and PM₁₀ from the extractive industries*, February 2011.

⁹ IAQM, *Guidance on the Assessment of Mineral Dust Impacts for Planning* (2016).

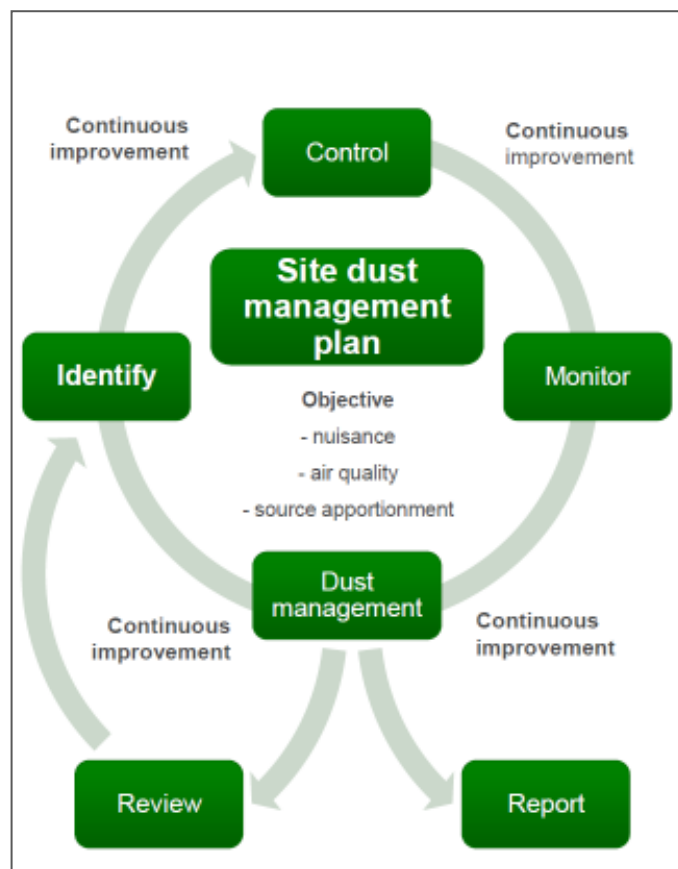


Figure 12.A-7
MIRO Dust Management Plan Process

Dust Sources and Influencing Factors

Meteorological Conditions

The most important climatic parameters governing the release and dispersal of fugitive emissions from the Site are wind speed, direction, and rainfall:

- wind direction determines the broad direction of dispersal;
- wind speed affects ground level concentrations by increasing the initial dilution of pollutants in the emission. It will also affect the potential for dust entrainment; and
- rainfall naturally suppresses dust release.

A windrose from Sennybridge meteorological recording station, located approximately 35km to the north-west of the Site, providing the frequency of wind speed and direction is presented in Figure 12.A-8. It is evident that winds from the south-west sector are predominate in the area.

Relevant rainfall data applicable to the Site has been obtained from the Meteorological Office website¹⁰ of UK mapped climate averages for 1991-2020. The average annual rainfall >0.2mm/day for the area of the Site is 220 to 240 days per year, comprising 60% to 66% of the year.

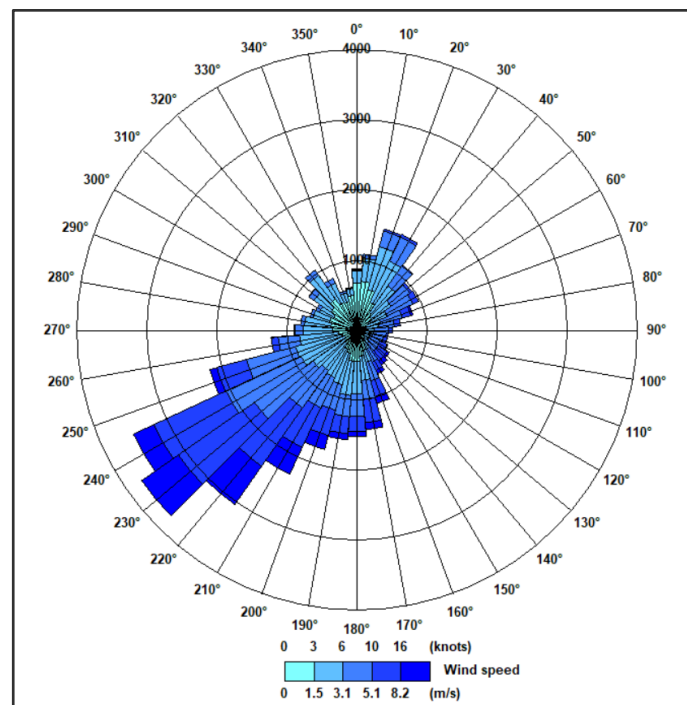


Figure 12.A-8
Windrose from Sennybridge Meteorological Station (2015 – 2019)

Potential Dust Sources

Activities or sources with dust emissions potential at the Site are:

- site preparation and restoration;
- mineral (limestone) extraction;
- mineral processing;
- storage of material;
- on-site transportation; and
- off-site transportation.

¹⁰ Met Office, <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages>, accessed December 2021.

Dust Control

Measures for minimising, controlling, and monitoring dust emissions from the Site are outlined in this section and have been based upon the stated guidance, the outcome of the risk assessment and the processes and equipment utilised on-site.

Overview

The key methods for controlling potential dust emissions are good site design, management practices, and subsequent good housekeeping, whereby 'avoidance' of dust emissions is the main aim.

As reproduced from the MIRO guidance, the control hierarchy for minimising the potential for dust emissions has been based on:

- good operating and management practices to avoid emissions arising from activities;
- good process design or revision to minimise emissions;
- abatement or control to reduce dust emissions, e.g. use of mobile dust suppression units and sprays; and
- disrupting the emission pathway to sensitive receptors, i.e. shielding receptors through the use of screening (e.g. locating stockpiles in sheltered areas as far as practicable).

Dust Control Measures

Management Actions and Dust Control Techniques

Control measures employed at the Site are detailed in Table 12.A-14.

Table 12.A-14
Operational Dust Control Measures

Potential Source/Process	Dust Control Measures
Hydraulic excavators and loaders	Use of water sprays to moisten material being handled, if feasible.
	Minimise drop heights when unloading material, if feasible.
	Protect from exposure to wind where possible.
	Avoid double handling of materials where possible.
	Vehicles not overloaded.
Blasting	Avoid blasting under unfavourable weather conditions subject to safety consideration.
	Prior to the firing of a blast the shot-pile area shall first be dampened down, provided that the area is accessible and it is safe to do so.
Hydraulic breakers	Water spraying of rock prior to fragmentation when high degree of control required.
Drill rigs	Enclosure of drill holes with shrouds fitted with dust extraction system.
	Use of dust suppression (filters) on waste air vented from equipment.
Transportation	Minimise on-site transportation distances.
	Use of water sprays and water bowsers to moisten haul road surfaces during dry weather.
	Controlled use of fixed haul routes.
	Use mechanical road sweepers on the access road and Vaynor Road (as required) during working hours, especially during dry weather, to limit visible dust emissions.
	Restrict vehicle speeds through signage/staff training.

Potential Source/Process	Dust Control Measures
	20mph speed limit enforced.
	Heavy Goods Vehicles sheeted prior to leaving Site.
Crushers & screens/graders	Dust suppression spraying of material to be crushed.
	Enclosure of plant where practicable.
Stockpiles	Seed surfaces of completed mounds of overburden and topsoil (restoration materials) and/or allow natural re-vegetation.
	Limit mechanical disturbance.
	Minimise drop heights from conveyors.
	Shield from wind, e.g., through the use of tree planting or screening.
	Use of water sprays to moisten surfaces during dry weather.
	Long-term stockpiles are profiled to optimise wind dynamics and reduce dust entrainment, where feasible.
	Avoid certain activities (e.g. bund formation) during adverse weather conditions.
	Clear designation of stockpile area to prevent tracking over.

Environmental Design Measures

Environmental design measures employed at the Site include:

- mobile processing plant located in the quarry void and therefore sheltered;
- tarmacked access road off Vaynor Road, approximately 100m in length to any active areas;
- extraction areas located away from the majority of sensitive receptor locations;
- stocking areas located upwind from sensitive receptor locations;
- wheel washing facilities located at the Vaynor Road entrance; and
- north-eastern soil screening bund is seeded as soon as practicable.

Residual Source Emissions Magnitude

Table 12.A-15 sets out the residual source emissions magnitude (i.e. the potential magnitude of dust emission after the designed in environmental measures have been taken into account) for each potential dust source/activity.

Table 12.A-15
Residual Source Emissions Magnitude

Potential Dust Source	Factors and Assumptions	Residual Source Emissions Magnitude
Site Preparation and Restoration	5-10 No. of heavy plant active at any one time. Minimal site preparation given historic use. Working area approx. 5-10ha.	Medium
Mineral Extraction and Mineral Waste Tipping	Average 500,000tpa output. Blasting required. Blasting undertaken within the quarry void. Specialist dust suppression equipment fitted to the drill rig. Quarry working faces covering an area approx. 5-15ha. Disturbance of tips minimised to allow stabilisation / natural re-vegetation.	Medium

Potential Dust Source	Factors and Assumptions	Residual Source Emissions Magnitude
Mineral Processing	Mobile plant located within quarry void. Average 500,000tpa throughput. A combination of crushing and processing.	Medium
Storage of Material	Designated stocking areas. Average output of 500,000tpa. Stockpiles located upwind of sensitive receptor locations. Soil screening bund seeded.	Small
On-site Transportation	20mph speed limit. Set haul roads and controlled movements. Majority of haul roads located within the quarry void. Edge protection on haul roads.	Medium
Off-site Transportation	10mph speed limit on access road. An average of 87 one-way / 174 two-way HDV movements per working day. Tarmacked access road approx. 100m in length. Wheel cleaning facilities. Road sweeping as required.	Small

Monitoring

Meteorological Conditions

Weather forecasts will be monitored on a daily basis to predict weather conditions such as prolonged dry, hot spells or significantly strong winds which may generate elevated levels of dust. Using this information, the necessary precautionary measures are employed on-site, or certain activities are suspended if necessary. In this way the Site employs a proactive approach, planning for potential dust events before they happen.

Visual Dust Monitoring

Dust monitoring is undertaken visually by Site personnel throughout the working day, i.e. routine vigilance. In addition, the Site Manager provides observations which are recorded in the Site Log Book.

Targeted visual dust monitoring may be undertaken as part of responses to incidents or contingency actions. Observations are recorded in the Site Log Book. The following details are recorded:

- weather conditions (wind speed (qualitative i.e. strong/light), wind direction, rainfall);
- identification of any significant dust on Site or dust dispersion beyond the Site boundary; and
- additional mitigation measures put in place if required.

In the event of a complaint, more frequent or off-site visual monitoring will be undertaken if required until the issue is resolved as described in the Dust Action Plan contingency measures.

Monitoring Impacts

Monitoring of impacts will be achieved by recording and monitoring complaints. Complaints may be reported directly to the Site, or via the Mineral Planning Authority or Local Environmental Health Department.

The complaint response and investigation procedure are provided in a following section.

Dust Action Plan

This section details the dust action plan, inclusive of contingency plans to prevent adverse impacts materialising or continuing, and the dust complaints procedure.

Contingency Plans

The contingency plans have been defined to react to situations where visual monitoring indicates that a potential dust source is not completely under control, control measures may have failed, or that an adverse impact has/or may occur with the aim of preventing adverse impacts materialising or continuing.

This includes incidents that have the potential to cause an unacceptable impact on the local community.

Contingency measures for the following events have been defined in Table 12.A-16:

- malfunction in mobile dust suppression units rendering in-effective;
- malfunction of wheel wash rendering in-effective;
- malfunction in spray bars/atomisers in any of the processing plant;
- failure in water supply;
- visual monitoring indicating dust generation in significant quantities, that is either likely to or is actually leaving the Site boundary in quantities likely to cause nuisance to sensitive receptors;
- weather monitoring indicates potential dust generation issues, i.e. prolonged dry spell followed by high winds; and
- complaints received from members of the public or neighbouring businesses.

Table 12.A-16
Contingency Plans

Event	Malfunction in mobile dust suppression units rendering in-effective
Contingency Actions	Notify management of malfunction so repairs can be made, engineer called out, or plant hired. Determine whether the unit is required that day given meteorological conditions. If not, continue operation but continually monitor operations and meteorological conditions. If dust is likely to leave the Site boundary in sufficient quantities as to be unacceptable apply further controls: (as required/feasible) apply manual hosing, use of road sweeper on access road, hire dust suppression units from off-site, move operational area. If impact is considered likely to occur, then cease operations until dust suppression unit is available.
Comment	Record details in Site Log Book.
Event	Malfunction of wheel wash rendering in-effective
Contingency Actions	Notify management of malfunction so repairs can be made, or an engineer called out. Use manual hosing as required on vehicles. Use road sweeper more frequently on access road. If mud is being tracked out onto the public highway in quantities likely to be a nuisance or a danger, then cease exports until effective wheel washing is reinstated.
Comment	Essential spares to wheel wash should be retained on Site. Record details in Site Log Book.

Event	Malfunction in spray bars/atomisers in any of the processing plant
Contingency Actions	Notify management of malfunction so repairs can be made, engineer called out, or plant hired. Determine if operating the process is essential given meteorological conditions. If essential, continue operations but continually monitor operations and meteorological conditions. If dust is likely to leave the Site boundary in sufficient quantities as to be unacceptable apply further controls: (as required/feasible) apply manual hosing, more frequent use of mobile dust suppression units in processing area. If impact is considered likely to occur, then cease operations until conditions improve, or plant is repaired.
Comment	Record details in Site Log Book. Essential spares/consumables should be retained on Site.
Event	Water supply failure
Contingency Actions	Determine through visual monitoring and weather forecast whether the application of water represents essential mitigation to continue operations. If yes cease operations until a water supply is available. Notify relevant parties at earliest opportunity (site management, engineers, utility company).
Comment	Record details in Site Log Book.
Event	Visual monitoring indicating dust leaving Site boundary in quantities and direction likely to cause nuisance
Contingency Actions	Notify management and record observations in Site Log Book (or example Dust Event Form). Continue to monitor situation. Investigate and identify dust source. If dust is from a particular source (e.g. haul road, stockpile, crusher etc) then review mitigation options. Review application of dust control measures. Apply appropriate contingency measures as required e.g. : more frequent/effective application of mobile dust suppression units to problem areas or additional sweeping of the access road. Ultimately cease identified operation if it cannot be effectively controlled.
Comment	Record details in Site Log Book. DMP may require updating on the basis of results of investigations.
Event	Weather monitoring indicates potential dust generation issues
	Anticipate level of abatement required (i.e. bowser use), including the hire of additional equipment if necessary. Increase frequency of visual dust monitoring; management to advise all staff of greater vigilance. If dust is seen to be crossing the Site boundary follow contingency measures as detailed above. If water supply runs out, follow contingency measures as detailed above.
Comment	Record details in Site Log Book.
Event	Complaint received from members of the public or neighbouring businesses
Contingency Actions	Notify management. Follow complaint reporting and investigation procedure.
Comment	Complaints will be reported to the relevant authorities in accordance with any relevant permit requirements. DMP may require updating on the basis of results of investigations.

Dust Complaints Procedure

Hanson have a formal complaint process whereby the complaint is logged and responded to within 24-hours.

Complaints may be notified to Site Management either during or after an event, directly by the complainant or indirectly through a regulator (such as the Mineral Planning Authority or Environmental Health Department) who was notified.

Complaints will be reported to the relevant authorities by the operator in accordance with any relevant permit requirements.

Complaint records will include the following (recorded in the Site Log Book):

- date, time, and name of complainant (if given);
- nature of complaint;
- locality of complaint; and
- a summary of investigation and actions taken and the outcome.

Complaint response will have the objective of investigating the incident and preventing any continuing issue, for example by putting in place additional control or management measures to prevent re-occurrence of the incident and updating the DMP. Complainants will be informed of the findings of investigations and the actions taken (if contact details are provided at the time the complaint is made).

Investigations will include but not be limited to:

- visit by site personnel to location of complainant to verify issue (if the complaint is made 'after' rather than 'during' a dust event this may not be possible);
- review of activities at time of incident to investigate potential sources;
- if dust event is occurring or a recurring event undertake more frequent targeted on-site and off-site visual monitoring and record findings;
- review of control measures and management actions at the time of the incident;
- review of meteorological conditions at the time of the incident; and
- reporting of findings (using example Dust Event Form or Site Log Book).

Management

Dust Control Responsibilities

There shall be a competent person on-site during working hours responsible for dust management measures. Responsibilities are allocated to specific personnel to ensure dust is effectively controlled (Table 12.A-17).

Table 12.A-17
Dust Management Responsibilities

Actions	Responsibility
Monitoring Meteorological Forecast	Site Manager / Supervisor
Routine Visual Dust Monitoring	Site Manager / Supervisor
Co-ordinating Access Road Cleaning	Site Manager / Supervisor
Application of Plant / Working Area Dust Suppression	Operatives
Completing Dust Event Forms	Site Manager
Liaison with Community and Regulator	Site Manager / Other Management Personnel
Co-ordinating Dust Management Plan Updates	Site Manager / Environment Manager

Training

All personnel on-site shall understand their responsibility to ensure the generation of dust is minimised. Each employee will be made aware of the importance of dust control and the most effective measures available to minimise such emissions.

The Mines and Quarries Act (as amended) requires an 'appointed person' to be present on-site with a minimum qualification to an NVQ Level 3 in 'Safety, Health and Environment'. This relates to the means of dealing with an environmental emergency, including releases of dust to air beyond the Site boundary and actions to be taken as a result. There will thus be at least one supervising person on Site at all times during which production is taking place that is qualified to at least Level 3 NVQ in Safety, Health and Environment.

All operational plant and equipment is routinely checked and maintained as per manufacturers recommendations to ensure good working order.

Liaison with Community and Regulators

The Site Manager (or nominated representative) will act as liaison with the regulator and local community for issues relating to dust nuisance. The nominated representative shall follow the Dust Complaints Procedure to respond promptly to all complaints.

Record Keeping

The operator shall keep records of all dust monitoring, investigations, and complaints on Site in accordance with the DMP. These shall be made available to the regulator to examine on request.

DMP Review and Update

This DMP is a controlled document, and forms part of the Site management documentation. The DMP is intended to serve as a reference during daily operations, and will be updated should the following occur:

- significant changes are made to the plant or operational practices;
- the Mineral Planning Authority requests that the DMP is updated; or
- complaints are received, which on subsequent investigation identify a need for further control measures or remedial action, in addition to those set out within this DMP.

Example Dust Event Form

Dust Event Form	
Name of Author	
Description of Event e.g. Complaint registered (name and address), or location of the visible dust crossing the Site boundary	
Date / Time	
<u>Activities taking place during time of event</u>	
<u>Dust mitigation techniques employed at time of event</u>	
<u>Summary of weather conditions leading up to and during the event</u>	
<u>Details of corrective actions</u>	
<i>Notes</i>	

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