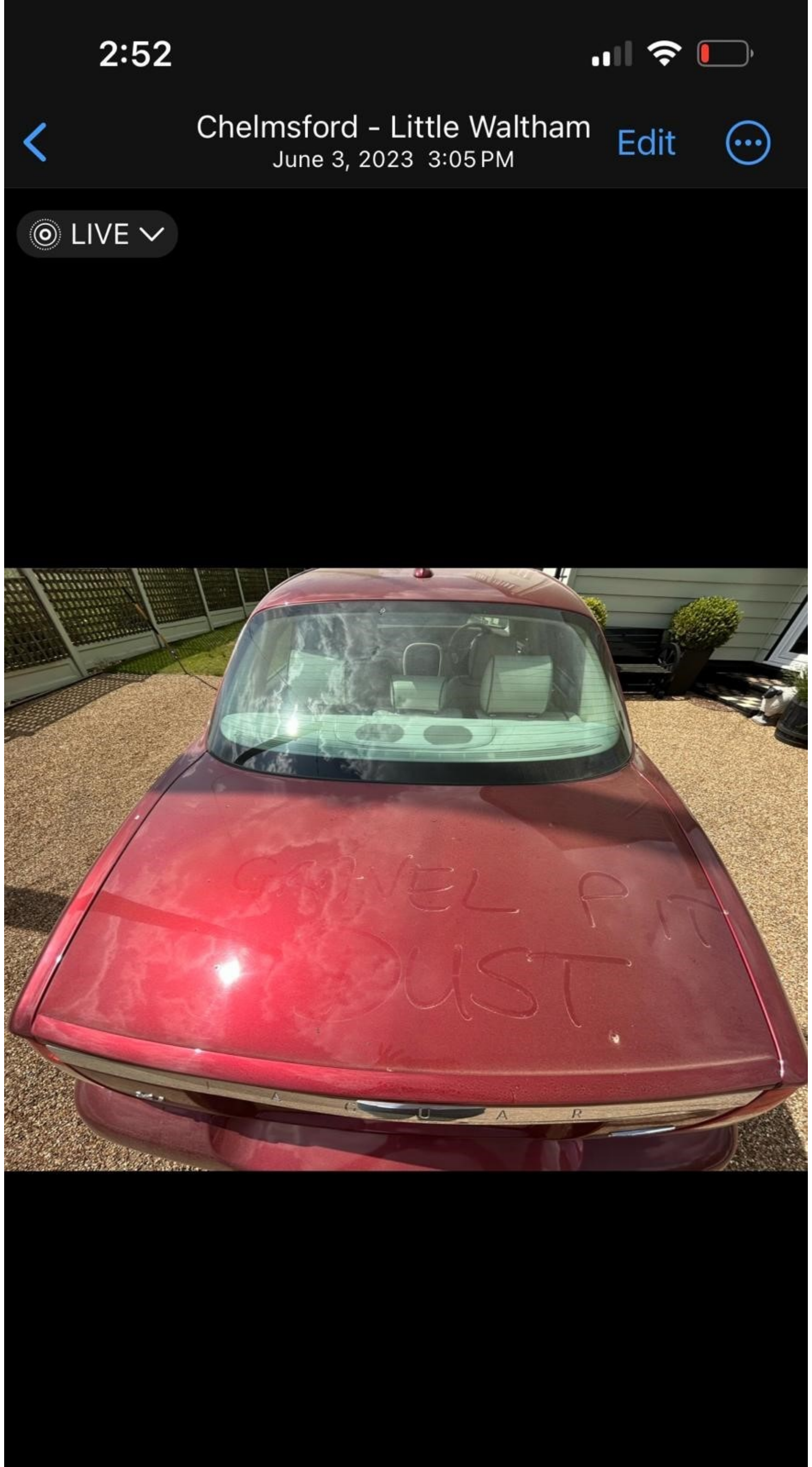
Appendix 2 - dust photograph



Appendix 3 - Photographs of the mounds

5. Assessing the dust impacts and effects of minerals developments

5.1 Deposited Dust - General Approach

The Defra Green Leaves III guidance[22] describes the Government`s recommended generic guidelines for the assessment and management of environmental risks. The Source-Pathway-Receptor (S-P-R) concept presents the hypothetical relationship between the source (S) of the pollutant, the pathway (P) by which exposure might occur, and the receptor (R) that could be adversely affected. The dust impact at relevant receptors should be predicted using this concept. This approach is applicable to both the disamenity and the ecological effects of deposited dust.

Estimates (measurements or approximations) are required for dust emissions from the source and a technique to forecast how the dust will disperse and dilute in the air and what the resultant dust levels are likely to be at local receptors. This uses the Residual Source Emissions, that is the potential dust emissions after designed-in mitigation measures have been taken into account.

Predictive techniques vary in their sophistication, cost and in how quantitative the predictions will be; they include:

- Qualitative (risk-based) dust assessments;
- Simplified modelling, such as screening models, look-up tables and nomographs; and
- Fully quantitative atmospheric dispersion modelling.

The collective view of the IAQM Working Group is that it is currently inappropriate to use a quantitative modelling approach to predict the impact in most cases and a qualitative risk-based approach using the S-P-R concept should usually suffice. This is primarily due to a lack of UK derived emission factors for minerals sites that could be used for modelling.

Step 1: Describe Site Characteristics and Baseline Conditions
IAQM recommends that the site is visited at the beginning of the assessment to understand the site itself and its locality including local factors that can affect dust emissions and dispersion.

The proposed development and the surrounding area should be described. Factors that need to be taken into account are (based on AEAT, 2011)[16]:

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

The assessment should also take into account the principal existing dust sources (other than the application site) such as dust from existing mineral operations, agricultural activities and construction activities.

The following information is likely to be required to understand the site characteristics and the baseline conditions:

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

Step 2: Estimate Dust Impact Risk
The Dust Impact Risk for each representative receptor needs to be determined. **Table 2** shows how the Source term and the

Pathway term can be combined to estimate the risk of dust impacts at individual receptors.

As the Dust Impact Risk predicted in any given case is wholly dependent on the categories assigned to the Source term and the Pathway term, it is crucial that practitioners justify within their report the particular categorisations they have chosen, drawing on the important factors (described in **Chapter 6)** that influence these terms. Various schemes have been used by IAQM members to determine the Source term and the Pathway term and **Appendix 3** gives one such illustrative example of a Dust Disamenity assessment procedure. Whether this or other schemes are used, they should all follow the underlying S-P-R concept and be robust and based on sound scientific principles.

Where there is uncertainty or in the assessors' judgement a site lies between categories a precautionary approach should be adopted and the higher category used. The assessment should typically be based on the closest point of a receptor to a potential dust generating activity.

Some guidance is provided in **Appendix 4** on categorising the residual source emissions.

Step 3: Estimate Likely Magnitude of Effect

The likely Dust Impact Risk predicted at each representative receptor then needs to be considered together with the sensitivity of that receptor, to give the likely magnitude of the effect that will be experienced (**Boxes 3** and **5** in **Chapter 6** show the sensitivities of relevant receptors to disamenity and ecological effects, respectively). For disamenity this effect can include annoyance or even nuisance from soiling of clean surfaces such as window sills, cars or laundry.

There is relatively little available evidence of the effect of dust deposition. That available, however, points to disamenity (to people and property) occurring at significantly lower levels of dust deposition than that which may adversely affect plants. For assessing the ecological effects resulting from the predicted dust impact, it may be necessary to consult an ecologist.

For disamenity, gauging the magnitude of the effect that results from the predicted dust impact on a receptor of a particular sensitivity is a matter of judgement that cannot easily be defined by scientific methods alone. Most practitioners would agree that a high sensitivity receptor subject to a high dust impact will experience a substantial adverse effect and a low sensitivity receptor subject to a low dust impact will experience a negligible effect. However, between these extremes the various combinations will give rise to a gradation of effects for which no descriptor terms have been universally agreed. The IAQM proposes the following framework of descriptors for the magnitude of disamenity effects for receptors of different sensitivities receiving different dust deposition impacts, based on the *IAQM guidance on the assessment of odour for planning*[23]. This framework will be kept under review to benefit from the feedback of affected or interested parties, be they air quality practitioners, EIA specialists, planners, or communities.

Table 2. 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

Table 3. Descriptors for Magnitude of Dust Effects

	Receptor Sensitivity		
	Low	**Medium**	**High**
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 Risk	Slight Adverse Effect
Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

Having predicted the magnitude of the likely effect from dust deposition at individual, representative receptors, the next step for most assessments for planning purposes will be to estimate the overall effect from dust deposition on the surrounding area, taking into account the different magnitude of effects at different receptors, and the number of receptors that experience these different effects[24]. This requires a competent and suitably experienced Air Quality Practitioner to apply professional judgement. A separate estimate of the overall disamenity effect and the overall ecological effect (where relevant) is required.

5.2 Suspended Particulate Matter - General Approach to Assessing the Health Effects

The main potential effect from mineral sites is disamenity due to dust deposited on surfaces. The minerals section of the nPPG[25] however, states that if there are residential properties (or other sensitive uses) in close proximity to the source of emission (e.g. haul roads, crushers, stockpiles, etc.) on the mineral site, then the dust assessment study should additionally consider the concentrations of dust particles suspended in the air (PM_{10}) that can potentially have effects on human health by considering the likelihood of PM_{10} exceeding the Air Quality Objectives.

The IAQM recommends the PM_{10} dust assessment includes the following key elements:

1. Determine the existing background ambient concentration of PM_{10}. This can be based on publically available background data, or where this is not adequate from site-specific monitoring data. The reason behind the choice of data used should be clearly stated. If the long term background PM_{10} concentration is less than 17µg/m³ there is little risk that the Process Contribution (PC) would lead to an exceedence of the annual-mean objective and such a finding can be put forward qualitatively, without the need for further consideration, in most cases. This will obviously depend on the distance between dust generating activities on the site and the closest receptor, the type of quarry/mine and designed mitigation measures. If this is the case there would be no need for the detailed consideration of Steps (2) to (6).

Evidence provided by the Minerals Guidance Working Group (shown in **Appendix 2)** suggests that the maximum annual mean PC is likely to be around 15 µg/m³ although occasionally it can be greater. The value of 17 µg/m³ is derived by extracting 15 µg/m³ from 32 µg/m³. The latter value is that provided in LAQM (TG16) as an indication of the relationship between annual mean concentrations and the risk of the daily PM_{10} objective being exceeded. Based on the currently available information 17 µg/m³ is considered to be a suitable screening value for an assessment of annual mean PM_{10} concentrations[26].

There may be a number of days per year with particularly intense operations which increase the number of days with a concentration greater than 50 µg/m³ but do not have a significant impact on annual mean concentrations. While the current lack of published data/evidence on short-term process contributions (PCs) persists, the IAQM recommends the focus in assessments should be on the annual mean objective.

2. Estimate the expected PC of PM_{10} at the sensitive receptors that comes from the site activities (see **Appendix 5**). In many cases, this can be done semi-quantitatively, using published estimates of the likely PM_{10} addition locally from this type of activity.

3. Estimating the total predicted environmental concentration (PEC) by adding the PC and background PM_{10} concentration (see **Appendices 2** and **4**).

4. Comparing the PEC with the annual mean objective for PM_{10}.

5. Determine the overall PM_{10} impact on the surrounding area. The significance of this overall PM_{10} impact (i.e. whether it is "significant" or "not significant") is determined using professional judgement, for example a "moderate" impact at one receptor may not mean that the overall impact has a significant effect and other factors need to be considered. Further guidance is provided in the Environmental Protection UK/ IAQM guidance on Land-use Planning & Development Control: Planning for Air Quality[27].

5.3 Conclusion on the Significance of Residual Dust Effects

From **Sections 5.1** and **5.2**, the assessor will have derived separate estimates of the overall disamenity and, where required, the ecological and health effects. From this, a conclusion must be reached on the likely significance of the air quality effects collectively (also considering traffic pollutants in those cases where vehicle emissions have come within the scope of the assessment[28]). This is a binary judgement: either it is "significant" or "not significant".

This stage requires the application of professional judgement by a competent, suitably qualified and experienced air quality professional. As well as weighing up the degree to which adverse disamenity, health and ecological effects will be experienced at different numbers and types of receptors, particular consideration needs to be given to factors emphasised in national planning guidance. The PPG advises that in considering planning permission, the relevant question for air quality is *"will the proposed development (including mitigation) lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives for pollutants or fail to comply with the requirements of the Habitats Regulations?"*

▲ **Image: © Hugh Datson, DustScan Ltd**

The above assessment of impacts and their effects will have been carried out based on the residual emissions from the development taking account of the controls that are incorporated into the design of the submitted scheme. If the outcome of the assessment is that the air quality effect is "not significant" then it is likely that these controls will be sufficient. If, on the other hand, the assessment predicts the impacts and their effects are likely to be "significant" then it is likely that additional mitigation will be required, to a proportionate degree to sufficiently reduce the impacts. Dust control and mitigation measures are discussed in **Chapter 7**.

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[22] Department for Environment, Food and Rural Affairs, 2011. Guidelines for Environmental Risk Assessment and Management: Green Leaves III, November 2011.
[23] Institute of Air Quality Management, 2014. Guidance on the assessment of odour for planning. London. www.iaqm.co.uk/text/guidance/odourguidance-2014.
[24] Unless there are only a few local receptors, then a representative selection of receptors will have been used in the assessment. This final stage of considering the overall effect needs to take into account how many receptors these selected ones represent.
[25] Department for Communities and Local Government, 2014. National Planning Policy Guidance on Assessing Environmental Impacts from Mineral Extraction. Paragraph: 030 Reference ID: 27-032-20140306, Revision Date 6 March 2014. London.
[26] Defra's Local Air Quality Management Technical Guidance (LAQM.(TG16)) uses the following screening criteria: 200 m from a fugitive dust source and a background PM_{10} concentration of 28µg/m^3. The basis of the TG16 criteria is not provided. As receptors may be within 200m of a mineral site a more conservative screening approach has been adopted in this IAQM guidance.
[27] EPUK/IAQM, Land-use Planning & Development Control: Planning for Air Quality, London. Available from iaqm.co.uk.

6. Factors influencing the risk of dust impacts

6.1 Categorising the Source, Pathway and Receptor Terms
The previous chapter described how the risk of dust impacts from any given minerals development proposal, and any resulting adverse effects, depended on: the level of dust emissions from the site (the Source); the effectiveness of transport through the air (the Pathway), and the sensitivity of surrounding land users (the Receptors) that could be exposed. The important factors that need to be considered in categorising the S, P and R terms are summarised below.

6.2 Factors Influencing the Residual Source Emissions
The scale and nature of the works will determine the level of residual (i.e. abated) dust emissions from fugitive sources, diffuse sources and, if applicable, point sources associated with the development. The judgement on the categorisation of the Source term will need to take into account the emission potential of each of the sources on the site (including source strength, frequency and duration) and how effectively they are likely to be controlled by designed–in measures proposed as part of the scheme. Specific factors include:

- 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).

Further information on these factors is given below.

6.2.1 Activities being undertaken
The following seven types of dust-generating activities on mineral extraction sites are likely to have the greatest potential for dust emissions:

a) Site preparation/restoration (including soil and overburden handling);
b) Mineral extraction (including blasting);
c) Materials handling (e.g. loading onto haul trucks or conveyors);
d) On-site transportation (haul roads);
e) Mineral processing (e.g. crushing and screening);
f) Stockpiling/exposed surfaces; and
g) Off-site transportation (e.g. leading to trackout onto external road network).

It is not usually possible to predict with any degree of certainty when particular work activities will take place and whether these will coincide with high-risk meteorological conditions (see further details below). It is usual therefore to make assumptions; a worst case would be to assume that for those periods when winds are blowing from the site to receptors, those specific site activities that generate dust will be occurring. In practice this is unlikely to always be the case.

6.2.2 Materials
The type of material being extracted and processed can have a significant influence on potential emissions. Sand and gravel deposits may possess an inherently high moisture content, which can cause particles to adhere and thereby affords a high degree of natural mitigation. However, this does not negate the potential for fugitive emissions from this material if it dries out, especially during high wind conditions. Conversely, the extraction and processing of hard rock such as granites and limestone can more readily generate dust, which requires appropriate mitigation.

Particle size distribution of the material is particularly important to dust emissions from vehicles passing over unpaved ground, as well as the speed and weight of the vehicle, the moisture content of the material, the distance covered and the frequency of vehicle movements.

High levels of PM_{10} may be associated with high levels of deposited dust. However, there is no direct correlation between

▲ **Image: © Hugh Datson, DustScan Ltd**

the two; indeed, as airborne particles fall out of the parcel of dust-laden air, the suspended PM concentration is reduced. The relative proportions of size fractions that deposit quickly compared to those that stay suspended for lengthy periods is determined by the materials and activities involved. Mineral type can dictate the potential influence on PM_{10}. Extraction of material with a high moisture content, such as sand and gravel, can potentially generate a smaller impact than the percussive processes associated with hard rock. The particle size and/or processes associated with specific minerals can also generate PM_{10}, for example, the inherently small particle size of clay.

6.2.3 Dust control measures incorporated into the design

Individual mineral site design and associated environmental management can significantly influence the fugitive emissions of dust generation. This can limit the capability of precise dust impact prediction as each site is distinct. Ideally, the various dust control measures and management controls should be described in a formal Dust Management Plan document (see **Appendix 6** for the IAQM's recommendation on what a DMP should contain).

6.2.4 Meteorological conditions

High wind speeds increase the likelihood of dust being raised and blown from the site. Dry materials are more easily raised into the air and so rainfall acts as a natural dust suppressant. High-risk meteorological conditions are, therefore, when the wind is coming from the direction of the dust source[28] at a sufficient strength, during periods of little or no rainfall (often taken as <0.2 mm per day) especially during periods when evaporation exceeds rainfall and drying conditions prevail. The threshold wind speeds for initiation of wind blow[29] can range from 2.4 m/s (Force 2, "light breeze") up to gale force, depending on the particle size and the condition of the surface[30] but moderate breeze, 5.5 m/s and above, is sometimes used as a general threshold. It is preferable to use a wind blow initiation wind speed specific to the mineral type.

Due to the variability of the weather, it is impossible to predict what the weather conditions will be when specific activities are being undertaken, so it is common practice to use either a worst-case approach (assuming the high-risk meteorological conditions exist for all working activities) or a probabilistic approach (assuming the high-risk meteorological conditions occur for a particular percentage of the time).

Impacts during the summer and winter months are generally different, and if it can be guaranteed that certain activities or those at a specific location will take place during a particular season (with this enforced through a planning condition, for example), consideration could be given to using seasonal wind and rainfall data. However, this type of guarantee is not usual because the demand for minerals is not usually seasonal.

Large scale physical features such as rivers, valleys and hills can influence wind direction over a large area, as can be seen in the wind roses for certain Met Office meteorological stations, for example the influence of the Severn Estuary on wind at Bristol and Cardiff airports and the Pennines at Manchester Airport. Therefore the use of wind data from the nearest meteorological station to the site under consideration may be influenced by the terrain and not represent local conditions. Expert judgement is required to choose the most representative meteorological station, or whether there is a need for site specific data. This could be informed by looking for signs of the prevailing wind, such as the shape of trees, during the site visit.

6.3 Factors Influencing the Pathway

The primary factor influencing the Pathway is the distance between the sensitive receptor and the dust sources. However, other factors can cause a higher or a lower category to be assigned then would be the case based on distance alone. These factors include:

- orientation of receptors relative to the prevailing wind direction; and
- topography, terrain and physical features.

6.3.1 Distance between dust source and receptors

The dust that has become suspended in the air will dilute, disperse and deposit from the air (as deposited dust) with the resultant airborne PM concentration decreasing rapidly as a function of distance from its source (see **Appendix 2**). In general, smaller particles have the potential to be entrained within airflow for longer, thereby dispersing over a wider area.

6.3.2 Orientation of receptors relative to the prevailing wind direction

Dust impacts can occur in any direction from the site; they are, however, more likely to occur downwind of the prevailing wind direction and close to the boundary[31]. Although, overall, receptors in the prevailing downwind direction tend to be at higher risk of dust impact, this is a simplification: it should be noted the "prevailing" wind direction is usually the most frequent direction over a long period such as a year; whereas activity may only occur at a specific location over a period of weeks or months during which the most frequent wind direction might be quite different; furthermore, the most frequent wind direction may also not be the direction from which the wind speeds are highest[32]. The use of the prevailing wind direction in the assessment of risk is most useful, therefore, for activities of long duration such as processing carried out in dedicated areas, rather than activities such as extraction which may only occur at a specific location for a matter of weeks or months.

A more refined picture of this important factor in the effectiveness of the Pathway term can be obtained by considering the frequency that the receptor is downwind of the dust source. The percentage frequencies of winds blowing from the sources to the relevant receptors can be calculated from suitable meteorological data.

It should be noted that when strong winds occur from non-prevailing wind directions disamenity can occur if robust mitigation measures are not in place.

▲ **Image: © Rachel McHale, SLR Consulting Limited**

6.3.3 Terrain and physical features

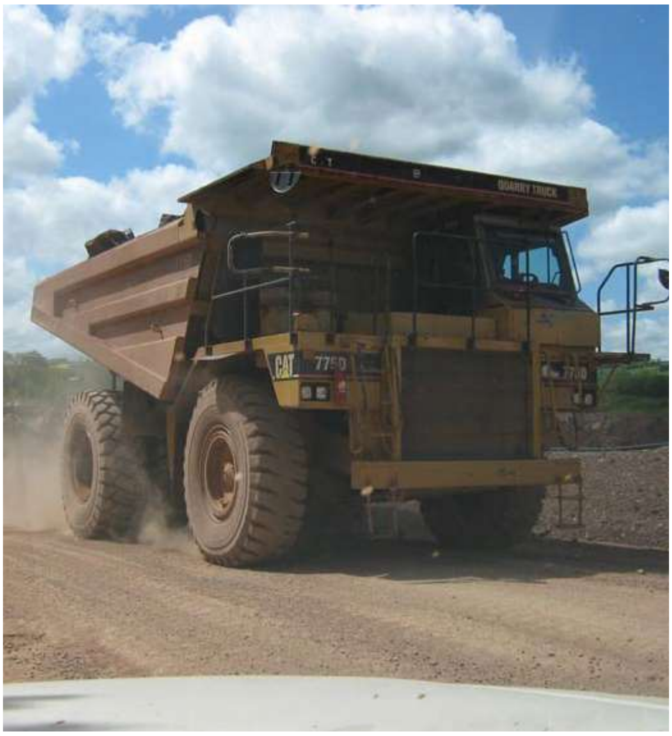
The local terrain and natural and built features between the source and the receptor can variously act as barriers, reduce airborne concentrations due to impaction, lengthen pathways, affect air flow and increase or inhibit dispersion and dilution. Examples include trees and woodland, escarpments, hills and valleys, bunds, buildings/structures and trees.

6.4 Receptors

Boxes 3, 4 and **5** provide guidance on how to categorise the dust sensitivities of different receptors to disamenity, human health and ecological effects, respectively. These are the same categorisations used in other guidance (specifically the IAQM demolition and construction dust assessment guidance[8]), which is entirely appropriate as the dust sensitivity of a receptor is an inherent property and not one that is dependent on the type of development being assessed. As always, the specific circumstances should be taken into account and may mean that on some occasions particular receptors may not automatically fall into the example categorisations given in **Boxes 2**, **3** and **4**. Further discussion on this is given below.

A 'human receptor' refers to any location where a person may experience the disamenity effects of dust, or the health effects from exposure to PM_{10}. The latter should take account of the time period relevant to the air quality objectives, as defined in the Government's technical guidance for Local Air Quality Management[33].

In terms of disamenity effects, residential dwellings are considered highly sensitive. In some instances, industrial and commercial premises may be considered highly sensitive receptors if they are particularly vulnerable to soiling effects. The latter may include, for example, vehicle showrooms, food manufacturers and electronics manufacturers. The sensitivity will relate to the level of amenity that can be reasonably expected. For example, dwellings and schools are more sensitive than industrial units or farms. Care should be taken to ensure that the assessment takes into account whether exposure will arise in practice (e.g. computer chip manufacture is sensitive to dust and so premises are likely to have extensive dust filtering equipment, although the frequency of filter changes may need to be increased).



▲ **Image: © Advance Environmental**

An 'ecological receptor' refers to any sensitive habitat affected by dust deposition. This includes the direct impacts on vegetation or aquatic ecosystems, and the indirect impacts on fauna (e.g. on foraging habitats). For locations with a statutory designation, e.g. Special Areas of Conservation (SACs) and Sites of Special Scientific Interest (SSSIs), consideration should be given as to whether the particular site is sensitive to dust and this will depend on why it has been designated. Some non-statutory sites (i.e. local wildlife sites) and/or locations with very specific sensitivities may also be considered if appropriate. The level of dust deposition likely to lead to a change in vegetation is very high (over 1 $g/m^2/day$[34]) and the likelihood of a significant effect is therefore very low except on the sites with the highest dust release close to sensitive habitats. Notwithstanding this, the inclusion or exclusion of sites should be justified in the assessment.

[28] For receptors ≤30 m of the site, it has been assumed that they would be affected during any wind direction, which will be a conservative assumption.
[29] Wind blow is the suspension of dust by the wind from the exposed surfaces e.g. within the extraction area, and stockpiles.
[30] Arup Environmental, Ove Arup and Partner, 1995. The Environmental Effects of Dust from Surface Minerals Workings, HMSO, London (ISBN 11 75 3186 3).
[31] For receptors very close to sources the worst-case assumption, that they would be affected during any wind direction, could be made.
[32] High wind speeds, as well as raising dust (including that previously deposited), can better disperse and dilute the suspended dust.
[33] Department of the Environment, Food and Rural Affairs, 2016. Local Air Quality Management Technical Guidance LAQM.TG(16).
[34] Farmer, A M, 1993. The effects of dust on vegetation – a review. Environmental Pollution 79, 63-75.

Box 3. Sensitivities of People to Dust Soiling Effects

For the sensitivity of people and their property to soiling, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:

High sensitivity receptor

- users can reasonably expect[a] enjoyment of a high level of amenity; or
- the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected[a] to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.
- indicative examples include dwellings, medium and long term car parks[b] and car showrooms.

Medium sensitivity receptor

- users would expect [a] to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or
- the appearance, aesthetics or value of their property could be diminished by soiling; or
- the people or property wouldn't reasonably be expected [a] to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.
- Indicative examples include parks, and places of work.

Low sensitivity receptor

- the enjoyment of amenity would not reasonably be expected[a]; or
- there is property that would not reasonably be expecteda to be diminished in appearance, aesthetics or value by soiling; or
- there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.
- Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks[b] and roads.

a. People's expectations will vary depending on the existing dust deposition in the area.

b. Car parks can have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with work place or residential parking might have a high level of sensitivity compared to car parks used less frequency and for shorter durations, such as those associated with shopping or errands. Cases should be examined on their own merits.

Box 4. Sensitivities of Human Receptors to the Health Effects of PM_{10}

For the sensitivity of people to the health effects PM_{10}, the IAQM recommends that the air quality practitioner assumes that there are three sensitivities based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period, consistent with the Defra's advice for local air quality management (Defra. 2009, LAQM Technical Guidance LAQMTG.O9).

High sensitivity receptor

- locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day)[a].
- indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.

Medium sensitivity receptor

- locations where people are occupationally exposed over a full working day[b].
- indicative examples include offices, warehouses and industrial units.

Low sensitivity receptor

- locations where human exposure is transient[c].
- Indicative examples public footpaths, playing fields, parks and shopping streets.

a. This follows Defra guidance as set out in LAQM.TG(16).
b. The air quality objectives and limit values do not apply to occupational exposure, but individuals may still be affected.
c. There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.

Box 5. Sensitivities of Receptors to Ecological Effects

A Habitat Regulation Assessment of the site maybe required as part of the planning process, if the site lies close to an internationally designated site[a].

Professional judgement is required to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the likely effect and the value of the ecological asset. A habitat may be highly valuable but not sensitive, alternatively it may be less valuable but more sensitive to dust deposition. For the sensitivity of ecosystems to dust deposition the IAQM recommends that an ecologist is consulted to determine the potential effects on plant communities.

High sensitivity receptor

- locations with an international designation and the designated features may be affected by dust soiling
- locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain.
- an indicative example is a Special Area of Conservation (SAC) designated for acid heathlands adjacent to a minerals development releasing alkaline dusts.

Medium sensitivity receptor

- locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown;
- nationally designated site and the designated features may be affected by dust deposition; or indicative examples include Sites of Special Scientific Interest (SSSIs) or a local wildlife sites with very specific sensitivities

Low sensitivity receptor

- locations with a local designation where the features may be affected by dust deposition.
- an indicative example is a local Nature Reserve with dust sensitive features.

a. Special Conservation Areas (SAC) and Special Protection Areas (SPA) designated under the Habitats Directive (92/43/EEC) and RAMSAR sites
b. Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee