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INTRODUCTION

9.1 This chapter of the ES considers the potential for the proposed quarry at Hatfield Aerodrome to impact upon air quality in the vicinity of the application site. The chapter describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing at the application site and its surroundings. It then considers any potential significant environmental effects the proposed operations would have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

9.2 The primary impacts from an air quality perspective in relation to the proposed operations relate to the release of dust and exhaust emissions of traffic visiting the quarry and the potential exposure of sensitive receptors to these emissions. This chapter specifically focuses on the potential of the quarry and associated operations to generate dust and the potential impact of this dust on the environment. Dust is generally categorised into two size classifications: 'suspended dust' with diameters below 10µm (microns[1]) (PM_{10}), and 'deposited dust' generally with diameters between 10µm and 75µm. An assessment of the potential for any increase in vehicle trips to have a significant effect on air quality is also considered within this assessment.

METHODOLOGY

Scope

9.3 The proposed quarry is located on land at the former Hatfield Aerodrome. As described in Chapter 3 above, the proposals would involve the winning and working, together with processing for sale, of some 8Mt of sand and gravel over a period of around 30 years (based on an annual output of around 250,000tpa). In parallel with the extraction of minerals would be the importation of low permeability inert material to infill the mineral workings to facilitate the restoration of the site to a beneficial after use, combining recreation and nature consideration. The imported material would typically comprise excavation wastes from construction and engineering projects (soils, overburden, clays etc.) within the region.

9.4 The scope of the assessment examines the sources of dust emissions from the proposed quarry and their impact on local receptors. In addition, the assessment considers the impact of vehicle exhaust emissions from the vehicles accessing the site. Potential impacts at sensitive receptors in terms of exposure to dust emissions are assessed, and appropriate mitigation measures are recommended where required.

9.5 The scope of the assessment has been agreed with Welwyn Hatfield Borough Council[2] (WHBC)

[1] A micron is a unit of measurement where 1 micron = one thousandth of a millimetre.
[2] Email Communication with Terry Vincent. Environmental Health Technical Officer Welwyn Hatfield Borough Council, 20th October 2015.

Legislation, Guidance and Industry Good Practice

Air Quality Strategy

9.6 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) July 2007[3]. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK.

9.7 The AQS set standards and objectives for ten priority pollutants. The standards set are for concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Objectives are policy targets often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedences within a specified timescale.

9.8 Many of the objectives in the AQS are made statutory in England with the Air Quality (England) Regulations 2010[4] for the purpose of Local Air Quality Management (LAQM).

9.9 The strategy objectives for the pollutants considered in this chapter are shown in Table 9-1.

Table 9-1
Relevant Air Quality Strategy Objectives

Pollutant	Standard (µg/m^3)	Measured as	Allowable exceedences
Particles (PM_{10}) (gravimetric)	40	Annual Mean	-
	50	24 Hour Mean	35/year
Nitrogen Dioxide	40	Annual Mean	-
	200	1 Hour Mean	18/year
Particles $PM_{2.5}$	25 (2020 target)	Annual Mean	-

National Planning Policy

9.10 As noted from Chapter 4 above, the National Planning Policy Framework (NPPF) describes the policy context in relation to pollutants including air pollutants. The Government's objective is that planning should help to deliver a healthy natural environment for the benefit of everyone and safe places which promote wellbeing. To achieve this objective,

'the planning system should contribute and enhance the natural and local environment by: [...] preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of land, air, water or noise pollution or land instability.' (Paragraph 109)

9.11 Specifically in terms of development with regard to air quality:

[3] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland - Defra - July 2007.
[4] The Air Quality Standards (England) Regulations 2010, 2010. No. 1001.

'Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.' (Paragraph 124).

9.12 Technical guidance[5] to the NPPF details within paragraphs 23 to 27 and Table 6 the key considerations to assess dust emissions, specifically for minerals workings. The policy contained within the NPPF relating to air quality is addressed within this assessment.

Local Planning Policy

9.13 As noted from Chapter 4 above, WHBC current planning policy comprises are set out in the saved policies within the Welwyn Hatfield District Plan[6]. These policies are relevant, prior to the completion of the new local plan which is currently being prepared.

9.14 One of the saved policies within the district plan is related to air quality and states:

9.15 Policy R18 – Air Quality:

'The Council will have regard to the potential effects of a development on local air quality when determining planning applications. Consideration will be given to both the operational characteristics of the development and to the traffic generated by it. Any development within areas designated as Air Quality Management Areas must have regard to guidelines for ensuring air quality is maintained at acceptable levels asset out in the Air Quality Strategy'.

Mineral Planning Policies

9.16 Again, as noted in Chapter 4 the existing minerals Local Plan[7] currently states:

'Aim 3: to ensure that the adverse impacts on the environment and people caused by mineral operations and the transport of minerals are kept, as far as possible, to an acceptable minimum.

To be achieved by:

[…] 3). protecting residents of the County from noise, dust, visual intrusion and other amenity effects of mineral extraction.'

9.17 In addition, Minerals Policy 18 – Operational Criteria for the control of mineral development states:

'*All proposals for mineral extraction and related development shall, where appropriate:*

[5] Technical Guidance to the National Planning Policy Framework. Communities and Local Government. March 2012.
[6] Welwyn Hatfield District Plan 2005.
[7] Hertfordshire Minerals Local Plan Review 2002 – 2016 (adopted March 2007).

[…] ix) demonstrate that no significant degradation of the air (particularly from dust and emissions) […] will occur.

[…] xi) include proposals to prevent the soiling of the public highway including the provision of suitably surfaced access roads, wheel cleaning equipment and sheeting to prevent dust or spillage and measures for dealing with the immediate cleaning of public roads should accidental soiling occur.

The Mineral Industry Research Organisation (MIRO)

9.18 A 'Good Practice Guide' issued on behalf of the Mineral Industry Research Organisation (MIRO) was released in 2011[8]. The purpose of the Guide is to assist in the identification, control and management of dust arising from the extractive industries during:

- site design and preparation of planning applications;
- site opening and preparation (soil and overburden removal, handling and storage);
- quarrying for the extraction of minerals;
- extraction and mineral processing; and
- site restoration and closure.

9.19 The guidance provides a useful reference for available methods of mitigation and monitoring.

General Nuisance Legislation

9.20 Part III of the Environmental Protection Act (EPA) 1990 (as amended by the Noise and Statutory Nuisance Act 1993) contains the main legislation on Statutory Nuisance and allows Local Authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines as a potential Statutory Nuisance amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance. It also defines as a nuisance accumulation or deposit which is prejudicial to health.

9.21 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist – 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

9.22 Dust deposition is not covered within the National Air Quality Strategy as it typically relates to nuisance effects as opposed to potential health effects. When the rate of accumulation of this coarser fraction of dust is sufficiently rapid to cause fouling or discolouration then it is generally considered to introduce a nuisance. The point at which an individual perceives dust deposition as a nuisance and causes a complaint is highly subjective, and there are no statutory numerical limits that define at what level dust becomes a nuisance. However, a custom and practice limit of 200mg/m^2/day is often used as a guide at which the onset of nuisance might be experienced.

[8] Good practice guide: Control and measurement of nuisance dust and PM_{10} from the extractive industries. Report to The Mineral Industry Research Organisation (MIRO). February 2011. AEAT/ENV/R3140.

EPUK Guidance

9.23 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have together published guidance[9] to help ensure that air quality is properly accounted for in the development control process. It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed. Importantly, it sets out a recommended approach to assess the significance of impacts.

9.24 The guidance also states that best-practice design and operational measures should be recommended and applied to all developments that require an Air Quality Assessment, to reduce emissions and human exposure to poor air quality. Additional measures are also suggested to off-set emissions, depending on the nature and scale of the development proposals. Emissions associated with the development can be assigned a value based on the 'damage cost approach' used by the Department for Environment, Food and Rural Affairs (Defra). The damage cost calculated provides a basis for defining the financial commitment required to offset emissions.

Assessment Approach

9.25 The impacts associated with deposited dust are related to potential nuisance effects, whilst for PM_{10} air quality standards exist. The approach for assessing the potential impacts of suspended dust (PM_{10}) and deposited dust has been undertaken separately.

Suspended Dust

9.26 The assessment of suspended dust considers the activities on site with the potential to release or generate significant volumes of PM_{10}, the existing levels of PM_{10} in the local area and the proximity of communities and other sensitive receptors. The potential for the activities to increase ambient particulate concentrations above the relevant AQS objectives is then assessed. Consideration of $PM_{2.5}$ has also been undertaken with the same approach as PM_{10}.

9.27 Existing PM_{10} concentrations have been reviewed to determine whether the PM_{10} concentration in the local area is likely to exceed the AQS objective.

9.28 Representative baseline PM_{10} data and $PM_{2.5}$ has been sought from local authority monitoring data, Automatic Urban Rural Network (AURN) monitoring sites in proximity to the application site, and estimated concentrations provided on 1km by 1km grid by Defra.

9.29 An approach is detailed within the LAQM technical guidance LAQM.TG(09) (Box 5.10)[10] for the screening assessment of dust emissions from fugitive and uncontrolled sources. The initial phase of the assessment establishes whether there is relevant exposure "near" to the source(s) of emissions. Relevant exposure is identified as "near" as follows:

[9] Environmental Protection UK and Institute of Air Quality Management, *'Land-Use Planning and Development Control: Planning for Air Quality '*, 2015.

[10] Department for Environment, Food and Rural Affairs, 2009. Local Air Quality Management. Technical Guidance LAQM.TG(09).

- 1,000m for a background PM_{10} concentration > 28 µg/m^3;
- 400m for a background PM_{10} concentration > 26 µg/m^3;
- 200m for any background PM_{10} concentration; and
- 50m from off-site access roads where background PM_{10} concentrations are > 25 µg/m^3.

9.30 If there is relevant exposure, further assessment is required entailing an assessment of site contribution to background PM_{10} levels and comparison with AQS objectives.

9.31 The distances used in this methodology are from the source of dust emissions which does not always coincide with the boundary of the application site. If there is no relevant exposure near to the source, in accordance with LAQMTG(09), there is considered no requirement to proceed further.

Deposited Dust

9.32 A qualitative assessment of potential impact on amenity from the proposed development has been undertaken. The assessment has been undertaken by constructing a conceptual model that takes into consideration the potential sources, surrounding receptors, and the pathway between source and receptor in order to assess the magnitude of risk.

9.33 The vast majority of particles responsible for annoyance are deposited within 100m of the source[11]. To allow for this effect of distance, buffer zones are often defined by mineral planning authorities around potentially dusty activities to ensure that sufficient protection is provided. The DETR / Defra Guidance[11] recommended a stand-off distance of 100-200m from significant dust sources (excluding short-term sources), although it is recognised that these distances can be reduced if effective mitigation measures are identified and implemented.

9.34 Assessment is considered to be required for those receptors within 500m of dust generating activities. This is considered to be a precautionary approach on the basis of the 200m stand-off given in the DETR guidance.

9.35 This involves identifying source-pathway-receptor linkages and a semi-quantitative assessment of the likelihood and magnitude of any effects that could be associated with each pollutant linkage. This assessment takes account of:

- wind direction and speed data (to estimate frequency of exposure);
- proximity to source (to estimate magnitude of exposure);
- sensitivity of receptor; and
- occurrence of natural dust suppression (rainfall patterns).

9.36 On the basis of this research, receptors located within 500m of the application site are identified and a selection made to represent isolated dwellings or settlements as appropriate. This initial screening may be regarded as a 'tier 1 assessment' and if there are no residences within this distance no further assessment is required.

[11] Based upon research document - DETR, The Environmental Effects of Dust from Surface Mineral Workings (Dec 1995).

9.37 If there are receptors located within 500m of the application site, a Tier 2 (semi-quantitative) assessment is required. This approach provides a mechanism for identifying the areas where mitigation measures are required and for identifying mitigation measures appropriate to the risk presented by the development.

9.38 The magnitude of the potential risk at each receptor is classified depending on the frequency of exposure and the distance from the application site to the receptor.

9.39 The screening assessment tool assesses the significance of the distance from site and the frequency of exposure of each receptor by assigning a ranked number. Receptors with a higher potential for dust impacts would therefore result in a higher value whilst receptors with lower potential would expect to carry a lower value. The value corresponding to an evaluation of risk is a product of the significance of the distance and frequency of exposure, each assigned a value representing its significance. The multiplication of the two values assigned gives a total, which is then corresponded to a qualitative term of risk magnitude.

Frequency of Exposure Criterion

9.40 The potential for any site to emit dust is greatly influenced by weather conditions. Increased wind speed increases the potential for the generation of airborne dust due to the suspension and entrainment of particles in airflow. A worst case situation would be strong, warm, drying winds which increase the rate at which dust is lifted from an untreated surface and emitted into the air. Wind can also have the effect of spreading dust over a large area. Conversely, rainfall decreases dust emissions, due to both surface wetting and increasing the rate at which airborne dust is removed from air. Research[12] suggests that rainfall of greater than 0.25mm per day is considered sufficient to effectively suppress wind blown dust emissions.

9.41 The frequency of exposure to dust emissions represents the percentage of time that wind speeds capable of carrying airborne dust (greater than 3.1m/s) are blowing from the site to the direction of the receptor. The frequency of exposure at this point would provide an overestimate or risk given that during days of rainfall no dust emissions would occur despite wind speed values.

9.42 For the screening assessment, a value of 1mm would be used for the criteria to classify days as ‘dry’ or ‘wet’; four times the recommended value, using annual average rainfall data. The average number of days when rainfall exceeds 1mm is calculated over the year to provide an average.

9.43 The resulting frequency of moderate to high wind speeds with the potential of carrying airborne dust towards receptors is then classified into the criteria in Table 9-2 with the respective rank value assigned.

[12] US-EPA, AP-42, Section 13.2.2 states ‘*annual average emissions are inversely proportional to the number of days with measurable (more than 0.254 mm [0.01 inch]) precipitation*’.

Table 9-2
Likelihood of Occurrence

Risk Category	Criteria
1	Frequency of winds (>3.1m/s) from the direction of the dust source on dry days are less than 3%
2	The frequency of winds (>3.1m/s) from the direction of the dust source on dry days are between 3% and 6%
3	The frequency of winds (>3.1m/s) from the direction of the dust source on dry days are between 6% and 9%
4	The frequency of winds (>3.1m/s) from the direction of the dust source on dry days are between 9% and 12%
5	The frequency of winds (>3.1m/s) from the direction of the dust source on dry days are between 12% and 15%
6	The frequency of winds (>3.1m/s) from the direction of the dust source on dry days are greater than 15%

Distance to Source Criterion

9.44 In assessing dust impacts, the distance from the source to the sensitive location is crucial, as airborne and deposited dust tend to settle out close to the emission source. Smaller dust particles remain airborne for longer, dispersing widely and depositing more slowly over a wider area.

9.45 The criteria for classifying the distance from receptor to source and thus assigning a rank value has been based on the various references to dust behaviour described above[13]. The rank classifications are presented below in Table 9-3.

Table 9-3
Distance to Source

Risk Category	Criteria
1	Receptor is more than 500m from the dust source
2	Receptor is between 300m and 500m from the dust source
3	Receptor is between 200m and 300m from the dust source
4	Receptor is between 100m and 200m from the dust source
5	Receptor is between 50m and 100m from the dust source
6	Receptor is less than 50m from the dust source

[13] A risk category is maintained for receptors in excess of 500m for circumstances where although a receptor is beyond 500m from the dust source, its sensitivity for example is seen sufficient enough for it to be taken onto a Tier 2 assessment. For example, a painting industry located at 510m from the boundary.

Evaluation of Risk

9.46 Once a rank value has been assigned to the frequency of exposure and distance to source, an overall risk can be evaluated by combining the two risk categories, along with consideration of the sensitivity of the receptor. For low sensitivity receptors the risk of dust impact are considered to be significantly lower than for medium and high sensitive receptors. Therefore a factor of 0.5 would be applied to the final risk evaluation ranking.

9.47 For each receptor, the relative magnitude of risk is given by identifying which of the score categories in Table 9-4 it falls into. This final evaluation represents the risk of dust impacts with current control and mitigation measures being employed on site.

Table 9-4
Risk Evaluation Ranking

Magnitude of Risk	Score
Insignificant	6 or less
Acceptable	8 to 12
Requires Further Mitigation	15 or more

9.48 Following the results of the risk assessment additional mitigation measures are detailed if required and the residual impact assessed.

Assessment of Offsite Vehicle Emissions

9.49 Exhaust emissions related to site proposals are primarily associated with Heavy Duty Vehicles (HDV's). The decision as to whether an assessment of potential impact is required is based upon the criteria set out in the EPUK guidance and DMRB guidance. The more stringent EPUK criteria for traffic assessment requirements is set out below:

- A change of Light Duty Vehicles (LDV) flows of:
  - more than 100 AADT within or adjacent to an AQMA; or
  - more than 500 AADT elsewhere.
- A change of HDV flows of:
  - more than 25 AADT within or adjacent to an AQMA
  - More than 100 AADT elsewhere
- Realign roads by 5m or more and within an AQMA
- Introduce a junction or remove an existing junction near to relevant receptors leading to significant change if vehicle acceleration and deceleration.

9.50 The Hatfield Aerodrome quarry is anticipated to generate around 174 additional HDV movements. Therefore, the criteria of 100 HDVs will be exceeded as a result of the proposed Hatfield Aerodrome Quarry. As such a detailed assessment on vehicle exhaust emissions from the additional movements has been carried out.

9.51 This assessment has been undertaken with reference to the following documents:

- LAQM.TG(09)[10];
- EPUK[9]; and

9.52 In order to quantify potential impacts of offsite vehicle emissions in the vicinity of the application site, a detailed dispersion modelling assessment has been undertaken using the ADMS Roads (version 3.4) software package following guidance provided in LAQM.TG(09). This model is routinely used in the UK for environmental assessment work and has been used to predict concentrations of nitrogen dioxide (NO_2) and PM_{10} at sensitive receptor locations in the locale. The assessment methodology and input data for the assessment of vehicle emissions is provided in Appendix 9/1.

9.53 A summary of the modelling parameters is summarised in Table 9-5.

Table 9-5
Summary of Modelling Inputs

Parameter	Description	Input Variable
Surface Roughness	Surface roughness of the modelling domain as a function of land use	z_0 = 0.7m
Road Source Emissions	Source of the emission factors used	EFT v.6.0.1
Emission Year	Modelling year used to factor the traffic emissions	2014 verification and sensitivity study; 2017 the potential year for site preparation
Road Type	Road type within the EFT emission database	Urban, Not London
Elevation of Road	Height of the road link above ground level	0
Road Width	Width of the road link	Road width used depended on data obtained from OS map data for the specific road link
Road Speed	Road speed in km/h	Reference should be made to Table 9-12 for further information
Time Varied Emissions	Daily, weekly or monthly variations in emissions applied to road sources	Daily
Meteorology	Representative hourly sequential meteorological data	Luton Airport 2014
Background	Background pollutant concentration considered during the modelling	Mapped 2014 backgrounds presented within Background Section.
Output	Output as gridded or specified points	Specific points along the main access route between the quarry and the A1(MM) (A1057 and A1001) to represent relevant exposure locations
Pollutant Output	Pollutants modelled and averaging time	NO_2 and PM_{10} annual mean

9.54 The Air Quality Assessment should demonstrate likely changes in air quality as a result of the proposals. These changes should be quantified and the

overall significance of the impact should be determined. Impacts should be assessed at individual relevant receptors and then professional judgement used to determine the overall impact.

9.55 Table 9-6 illustrates how to describe the impact at each receptor location. The term Air Quality Assessment Level (AQAL) is used to include all Air Quality Objectives and/or limit values. The assessment matrix uses the overall pollutant concentration, with the scheme in place and the %change relative to the AQAL.

9.56 It should be noted that in Table 9-6 if the scale of the impact magnitude is negative then the resulting effect is adverse. If the scale of the impact magnitude is positive then the resulting effect is beneficial.

Table 9-6
Impact Significance Matrix

Concentration with development	Percentage Change in Air Quality Relative to AQAL (%)			
	<1	1-5	5-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

BASELINE CONDITIONS

Site and Surroundings

9.57 As set out in chapter 2 the application site is located approximately at National Grid Reference (NGR) 5201070, 208050, 1.5 km west of the centre of Hatfield. The site lies within an area enclosed by the A1057 (Hatfield Road/St Albans Road) to the south, Oaklands Lane to the west, Coopers Green Lane to the north and the western fringe of Hatfield to the east.

9.58 The closest residential properties are located adjacent to A1057 (Hatfield Road/St Albans Road) to the south / south east of the application site and on Oaklands Lane to the west. In addition, there are isolated residential properties 700-800m to the north of the application site, 200 - 300m to the west of the application site.

Existing Air Quality

Local Review and Assessment of Air Quality

9.59 The application site is situated within the administrative area of WHBC and also St Albans District Council (SADC). Councils are required to review and assess their air quality under the Environment Act 1995, of which the most

recent report available is the 2014 Progress Report. Air quality monitoring data for the two councils are available from the Hertfordshire and Bedfordshire Air Quality network[14].

9.60 WHBC has declared no Air Quality Management Areas (AQMA's) within its administrative area whilst SADC has declared three AQMAs within its administrative area. The closest of the SADC AQMAs is located in the centre of St Albans, approximately 5 km west of the application site, and is therefore unlikely to be impacted by the proposed quarry.

9.61 Automatic NO_2 monitoring was undertaken by WHBC; however this site was closed in June 2014. SADC has no automatic monitoring stations within its administrative area.

9.62 WLDC and SADC operate a network of 24 and 30 non-automatic monitoring locations within its area, respectively. The closest of these monitoring locations is located at The Runway (WH16) approximately 700m from the application site. However, in 2014 only seven months of monitoring data was available for this location with an average bias adjusted concentration of 29 µg/m^3.

Air Quality Background Maps

9.63 Defra[15] provides background values for concentrations on a 1km x 1km resolution based upon 2011 values and projected forward to future years. They also provide a breakdown of the relative contributions of various sources for PM_{10} and $PM_{2.5}$.

9.64 The maximum background particulate matter concentrations for the area of the site are a maximum based on the 1km grid squares that includes the site. These background values are presented in Table 9-7.

14 Hertfordshire and Bedfordshire Air Quality network, http://www.hertsbedsair.net/, accessed October 2015.
15 Defra, UK Air Information Resource (UK-AIR) website, http://uk-air.defra.gov.uk/, accessed October 2015.

Table 9-1
PM 2014 Background Concentrations

Parameter	PM_{10}	$PM_{2.5}$
Total 2015	19.2	12.9
Motorway	0.08	0.09
Trunk A Rd	0	0
Primary A Rd	0.06	0.11
Minor Rd	0.10	0.11
Brake & Tyre	0.34	0.24
Road Abrasion	0.19	0.13
Industry	1.49	0.26
Domestic	0.15	0.23
Rail	0.03	0.01
Other	0.24	0.18
PM secondary	7.87	6.75
Residual & Salt	8.66	4.79
Point Sources	0.01	0.01

Based on maximum of grid squares (519500, 208500), (520500, 208500) and (519500, 207500).

9.65 From Table 9-7 it can be seen that existing air quality in terms of PM_{10} is considered to be good, with concentrations 'well below' the annual objective of 40 µg/m^3 and the $PM_{2.5}$ concentration is also 'well below' the 2020 objective of 25 µg/m^3.

9.66 The maximum NO_2 concentration for the grid squares containing the site are displayed in Table 9-8. This concentration is also 'well below' the annual objective of 40 µg/m^3.

Table 9-2
Background NO_2 Concentrations

Pollutant	2014
NO_2	17.6

Meteorology – Dispersion of Emissions

Local Wind Speed and Direction Data

9.67 A windrose for the conditions recorded at Luton Airport located approximately 15 km northeast of the application site in 2014 is presented in Figure 9-1.

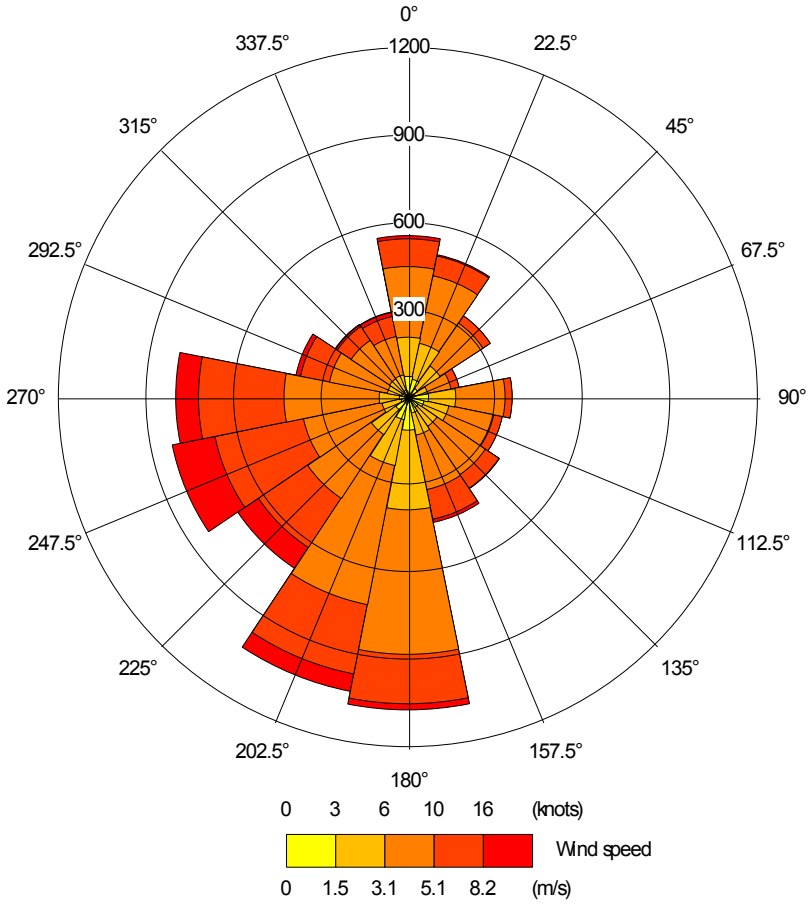

Figure 9-1
Windrose for Luton Airport Meteorological Station

Rainfall Data

9.68 Relevant rainfall data applicable to the application site has been obtained from the Met Office website of UK mapped climate averages for 1981-2010[16]. The average annual rainfall >1mm/day for the area of the site is 120-130 days per year, comprising 33% of the year.

Dust Sensitive Receptors

Human Receptors

9.69 Sensitive locations are those where the public may be exposed to dust from the proposed quarry. Types of locations with a high sensitivity to dust include hospitals and clinics, hi-tech industries, painting and furnishing and food processing. Locations classed as being moderately sensitive include schools, residential areas and food retailers, and those considered to be low sensitivity include farms[17].

16 The Met Office, data obtained from http://www.metoffice.gov.uk/climate/uk/averages/ukmapavge.html, accessed October 2015.
17 Communities and Local Government. Technical Guidance to the National Planning Policy Framework. March 2012.

9.70 The distances and directions of identified receptors are detailed in Table 9-9 and are illustrated in Drawing HQ 9/1. These closest properties have been identified in each direction for the purposes of assessing risk and therefore this list is not exhaustive.

Table 9-3
Identified Sensitive Receptors

Ref No.	Receptor	Easting	Northing	Distance from Extraction Area or Plant Site (m)	Direction from Nearest Site Boundary (°)
1	Popefield Farm	520069	208010	65	South
2	Settlement of Ellenbrook	520399	208094	240	South-east
3	Sports Pavilion	520737	208379	260	East
4	Residential Properties on Nimrod Drive	520786	208538	320	East
5	Residential Properties on Flamingo Close	520774	208722	410	East
6	Hatfield Business Park	520783	209259	800	North-east
7	Astwick Manor	520382	209938	1,220	North-east
8	Coopers Green Cottage	519502	209677	730	North
9	Old Forge Cottage	519436	209708	790	North
10	Freelands	519052	209315	730	North
11	Beech Farm	519029	208947	490	North-west
12	Residential Properties on Oaklands Lane	518930	208138	560	West
13	Settlement of Smallford	519431	207797	260	West
14	Nursery	519514	208071	75	West
15	Land at Chester Nurseries development	519554	207987	89	West
16	Notcutts Garden Centre	519693	207815	55	South-west
17	Residential Property on Hatfield Road	519720	207728	105	South-west

Ecological Receptors

9.71 No internationally and nationally designated ecological receptors have been identified within 2km of the application site. There are a number of locally designed ecological sites within 2km of the site as detailed in Table 9-10.

Table 9-4
Identified Ecological Receptors

Site	Location		Habitats and additional features
Oak Wood AW / LWS	0.7km	North	Ancient & Semi-Natural Woodland
Hooks Wood, AW / LWS	0.8km	North	Ancient & Semi-Natural Woodland
Symondshyde Great Wood AW / LWS	1.4km	North	Ancient Replanted Woodland
Home Wood, AW / LWS	1.5km	West	Ancient & Semi-Natural Woodland
Colney Heath LNR / LWS	1.8km	South	Acid heathlands
Hazel Grove AW	1.3km	South east	Ancient & Semi-Natural Woodland
Furzefield Wood LWS	1.2km	North	Semi-natural old secondary broadleaved woodland
Smallford Pit LWS	0.6km	South	A largely infilled former gravel pit supporting well developed secondary grassland along with some former old acid/neutral grassland
Home Covert & Round Wood LWS	<0.1km	North	Two areas of ancient semi-natural broadleaved woodland
Woodland by House Lane LWS	1.3km	North west	Small fragment of coppiced woodland supporting a ground flora
Oaklands Gravel Pit LWS	0.6km	West	Former gravel pit supporting a diverse habitat of grassland, flooded pits, scrub and wet land.
Sleeve Hall Wood LWS	0.6km	North	Broadleaved woodland with some characteristics of an ancient semi-natural
Land near Smallford Nurseries LWS	0.5km	South	Area of semi-improved neutral grassland with scattered coppiced woodland
Jersey Farm Estate, House Lane LWS	1.8km	North west	Large area of re-seeded grassland
Smallford Trail/Alban Way LWS	0.5km	South west	Secondary broadleaved woodland and scrub
St. Mark's Churchyard & Graveyard LWS	1.5km	South	Old unimproved neutral to somewhat acid grassland
Oaklands Wood LWS	0.6km	West	Old, possibly ancient broadleaf woodland.
Open Space off House Lane LWS	1.5km	North west	Area of semi improved grassland
The Old Vicarage, St. Marks Close, Colney Heath LWS	1.5km	South	Building and environs important for protected species
Sleapshyde Gravel Pit LWS	1.2km	South	Former gravel pit restored to an amenity/wildlife park
Hazel Grove LWS	1.4km	South east	Ancient semi-natural woodland
Copse at Nast Hyde LWS	0.7km	South	Ancient semi-natural woodland
Sleapshyde Farm LWS	0.9km	South	Buildings and environs important for protected species

Traffic Emissions Sensitive Receptors

Human Receptors

9.72 According to LAQM.TG(09) air quality standards should only apply to locations where '*members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. Authorities should not consider exceedences of the objectives at any location where relevant public exposure would not be realistic*'.

9.73 The purpose of this assessment is to assess the potential impact of vehicle exhaust emissions from the additional HDV movements associate with the proposed quarry. The receptors in Table 9-11 (illustrated in Figure HQ9/1) have been included in the assessment to represent to closet locations to the main access roads to the quarry (A1057 and A1001) assessed against relevant averaging periods

Table 9-5
Identified Sensitive Receptors

Ref No.	Receptor	Easting	Northing
1	Popefield Farm	520075	207963
2	Residential properties on Poplars Close	520399	208094
3	Residential properties on Poplars Close	520446	208122
4	Residential properties on Poplars Close	520566	208141
5	Residential properties on Poplars Close	520638	208150
6	Residential property on Ellenbrook Lane	520783	208186
7	Residential properties on St Albans Road West	520830	208184
8	Residential properties on St Albans Road West	521020	208208
9	Residential property on Ashbury Close	521137	208260
10	Residential property on Ashbury Close	521164	208271
11	Residential properties on Crossbrook	521191	207917
12	Residential properties on Crossbrook	521173	207887
13	Residential properties on Crossbrook	521163	207846
14	Residential properties on Crossbrook	521152	207774
15	Residential property off Crossbrook	521125	207674

ASSESSMENT OF EFFECTS AND SIGNIFICANCE

Sources of Dust

9.74 A summary of the activities on site and their potential to generate dust emissions in the absence of mitigation measures are presented in Table 9-14.

9.75 The proposed activities within the proposed quarry with a potential to generate dust emissions are as follows:

- stripping of soil and overburden;
- extraction of sand and gravel;
- transfer of extracted material for stockpiling and processing;
- progressive restoration using site derived and inert materials.
- material processing;
- material storage; and
- access road vehicle movements.

9.76 For all sources, the creation and subsequent dispersion of dust will be highly dependent on the weather conditions. Wind speed can determine the amount of dust raised, while wind direction determines those areas that may be affected. Higher wind speed increases the potential for the generation of airborne dust due to the suspension and entrainment of particles in airflow; rainfall however, has a suppressive effect on the generation of dust.

9.77 The amount of dust generated by each activity depends on the size of particles and, crucially, upon their moisture content. The principal activities that would give rise to potential for dust emissions from the development have been identified and are considered in turn below.

9.78 It should be emphasised that the activities which are described relate to the potential for dust emissions in the absence of mitigation measures. The potential is then assessed in terms of the risk of impact, followed by a consideration of the need for mitigation measures.

Construction Activities

9.79 Construction activities, including construction of internal infrastructure such as haul roads, car parking, offices/weighbridge/ancillary buildings and plant structures, would take place in the early phases of the development during the Establishment Phase, where the majority of this construction would occur within the processing plant area of the site.

9.80 The construction activities are considered to present a comparatively small potential for dust generation in comparison to other ongoing quarry activities, such as soil stripping, bund construction, and mineral extraction. As such, assessment of construction activities has been incorporated into consideration of these phases rather than considering them in isolation of other works.

9.81 A summary of the activities on site and their potential to generate dust emissions in the absence of mitigation measures for each scenario are presented in Table 9-12.

Table 9-1
Potential Dust Sources

Activity	Potential for Dust Generation	Description
Soil Stripping, Overburden Removal and Restoration	Moderate to High	Stripped soil would be used to construct a screening bund around the edge of the quarry. The potential for dust emissions from soil and overburden removal and bund construction is significant[11] but temporary and would vary depending on the level of activity, the specific operation, the location and the prevailing meteorological conditions. Soils and overburden would be removed using tracked excavators. The soils and overburden would be loaded onto dump trucks and either placed directly as restoration in previous extraction areas or within the screening bunds. Restoration of the site would be progressive and comprise a mixture of informal recreational and ecological after uses, with some waterbodies. Where possible soils and overburden from the working phase would be directly placed. The reinstatement of soils and overburden would involve placement, spreading and shaping activities. During dry and windy meteorological conditions these intermittent yet intensive operations have an increased potential for dust generation if working on areas of drier top soil. Such activities would be intermittent in nature so over the duration of the activities there is the potential for short-term moderate to high levels of dust emissions in the absence of mitigation measures.
Excavation of Sand and Gravel	Moderate	Excavation within the Quarry would be undertaken on a campaign basis with an extraction rate of sand and gravel at approximately 250,000 tpa over a 30 year period. The method of excavation would take place using a hydraulic excavator which would load the as-dug mineral onto an articulated dump truck for transport to the plant site. The excavation of sand and gravel is not a prescribed process'[18]. Dry material would present a higher potential risk of generation; however 'material with an inherent moisture content greater than 3%, e.g. sand and gravel, would not be expected to give rise to dust emission of dust[19]'. Some extraction would be undertaken below the water table and would therefore have high moisture content. The volume of material extracted per annum is relatively high; however sand and gravel has a low dust generating potential. Therefore, there is considered to be a moderate potential for dust emissions during excavation.
Storage and	Low	The potential for dust emissions from storage of sand, gravel and overburden, results from several

[18] Defra. Process Guidance Note 3/08(12) Statutory guidance for quarry processes. September 2012.
[19] Environment Effects of Surface Mineral Workings. DoE, October 1995.

Activity	Potential for Dust Generation	Description
Material Handling		distinct components of the storage process, including: the loading / unloading of material, vehicle movement in the storage area and wind erosion of surfaces and ground around the piles. Stockpiles will be located in the processing plant. The greatest volume of material handled would be sand and gravel, which is not considered to result in a significant potential for generation during handling due to the inherent elevated moisture content. The emissions from the stockpiles depend on the age of the pile, the moisture content, exposure to wind and the proportion of fines. The site is worked on a campaign basis and therefore product stockpiles are likely to continually be in use with new product added and removed from site. The potential of dust emissions from product storage within the quarry are anticipated to be moderate[8]. The handling of soil and overburden has a significant dust generating potential but depends on the timing of operations with respect to meteorological conditions and the characteristics of the material being handled. Stripped soils would be placed into storage mounds (3m in height) located on the periphery of the working area. Soil and overburden from the initial operations within the quarry would be temporarily placed in a screening bund within the workings pending placement into the worked out void. In subsequent strips, the interburden would be placed directly into the void. Initially during short term operations of the bund construction the potential for emissions is high, but following profiling and seeding, the potential for dust emissions from storage would be significantly reduced. Overall dust from soil storage areas are considered to be low once bunds are constructed.
Processing	Low	The plant site is located within the northern part of the application site, away from the closest receptors. All mineral excavated at the site would be processed on site. As-dug material would be transported from the working area and placed within stockpiles. From the stock pile, as-dug material would be placed into feed hopper and processed through the processing plant. The oversize material is stockpiled for sale/reprocessing, whilst the fine fraction is transferred to the sand plant. Further processing and screening spilts off the gravel into three fractions graded by size which are conveyed to stockpiles. The processed aggregates (sand and gravel) would then be loaded into lorries for removal from site. Some of the processed aggregates would be transferred to the on-site concrete batching plant where they would be used to manufacture concrete. Screening has the potential to disaggregate particles; however it is unlikely that screens give rise

Activity	Potential for Dust Generation	Description
		to significant quantities of airborne dust as the top screen handles larger material and the lower screens handling the finer material are enclosed[20]. Water is used in the washing process which also reduces the risk of dust emissions. Crushing, screening and grading of wet material is not likely to result in the release into air of particulate matter except in quantifies with is trivial[18]. Therefore, the processing plant is considered to have a low potential for dust emissions.
Transport – Internal Movements	Moderate to High	Raw material would be transported within the quarry by excavators and dump trucks. The movement would be on unpaved haul roads made of compacted material from the upper mineral horizon. The emissions from vehicles on unpaved haul roads are dependent on the weight, speed and number of wheels in contact with the road surface. Particulate emissions have been found to be higher at greater vehicular speeds[21] and greater vehicle weight[22]. Particulate emissions from road surfaces are primarily due to re-suspension of loose material present on the road surface and the additional deposition of material from the under carriage of passing vehicles. Emissions may be increased as a result of erosion of the haul road surface. In addition to the generation of dust from the passage of vehicles, any loose dust across the road surface can also become entrained in wind blow, with the level of dust generation affected by wind speed, the condition of the surface and the size of dust particles. Therefore, internal unpaved haul roads have a moderate to high potential for dust generation.
Transport – Access Road	Moderate to Low	Access to the quarry would be via Hatfield Road close to the south-west corner of the application site. The potential for dust emissions from paved road surfaces are significantly less when compared to unpaved surfaces due to the fact that the road base does not erode. The main factor in the production of dust emissions is the re-suspension of loose material on the surface deposited by vehicles through spillages or trackout[23]. In addition to the generation of dust from the passage of vehicles, any loose dust across the road surface can also become entrained by wind blow, with the level of dust generation depending on wind speed, rainfall and the size of dust particles. There is expected to be an average of 174 HDV movements per day (87 trips). Given the number of daily HDV movements, the potential for dust generation associated with vehicle movements along access roads is considered to be moderate to low.

20Defra Process Guidance Note 3/16 Statutory guidance for mobile crushing and screening September 2012.
21 Williams, D.S et al;., 2008. Particulate matter emissions by a vehicle running on unpaved roads. Atmospheric Environment (2008), doi:10.1016/j.atmosenv.2008.02.003.
22 Gillies, J.A et al. (2004) Effect of Road Vehicle Characteristics on unpaved road dust emissions. Atmospheric Environment (2005) doi:10.1016/j.atmosenv.2004.05.064.
23 USEPA 2011. AP42 Fifth Edition. Volume 1. Chapter 13. Miscellaneous Sources. Section 13.2.1.

Risk of Impacts

Suspended Dust

9.82 The likelihood of the AQS objective being exceeded due to the proposed quarry operations has been assessed. The existing air quality in terms of annual PM_{10} has been taken from the Defra background maps due to the absence of any PM_{10} monitoring in close proximity to the application site. The background PM_{10} concentration for 2014 is 19.2 µg/m^3. In accordance with LAQM.TG(09) considering the existing background levels and the proximity of receptors within 200m of the potential dust source, there is considered to be relevant exposure 'near' to the sources of dust emissions.

9.83 These baseline levels shows concentrations to be 'well below' the limit, with a large 'headspace[24]' of 20.8µg/m^3. Therefore it is considered highly unlikely that the development would lead to an increase in PM_{10} to a level that would cause an exceedance of the AQS objective. Any mitigation measures implemented to reduce nuisance dust would also be effective at mitigating $PM_{10.}$

9.84 Similarly $PM_{2.5}$ background concentrations from the Defra background maps for 2014 at the application site are 12.9µg/m^3. This shows concentrations to be 'well below' the limit, with a large 'headspace' of 12.1µg/m^3.

Deposited Dust

Human Receptors

9.85 Table 9-13 presents the variables that effect the magnitude of dust risk for each settlement or isolated receptor within approximately 500m.

24 Headspace – difference between the Air Quality Objective and the background air quality concentration.

Table 9-2
Dust Risk Variables

Ref No.	Receptor	Distance from Extraction Area or Plant Site (m)	Wind direction (start)	Wind direction (end)	Frequency [A] (% of year)	Frequency [A] (% of year) when dry [B]
1	Popefield Farm	65	250	30	25.1%	16.8%
2	Settlement of Ellenbrook	240	260	350	16.1%	10.8%
3	Sports Pavilion	260	250	310	15.4%	10.3%
4	Residential Properties on Nimrod Drive	320	240	300	18.4%	12.3%
5	Residential Properties on Flamingo Close	410	230	270	15.4%	10.3%
11	Beech Farm	490	90	150	6.9%	4.6%
13	Settlement of Smallford	260	0	120	11.6%	7.8%
14	Nursery	75	340	130	14.6%	9.8%
15	Land at Chester Nurseries development	89	340	130	14.6%	9.8%
16	Notcutts Garden Centre	55	330	60	10.8%	7.2%
17	Residential Property on Hatfield Road	105	330	40	9.4%	6.3%

Note A: Frequency = percentage of year wind speed is greater 3.1m/s for the given wind direction.
Note B: Based on being wet for 33% of the year

9.86 Table 9-14 presents the evaluation of these variables on the basis of the dust risk matrix (described in Paragraph 9.40 – 9.48).

Table 9-3
Dust Risk Variables

Ref No.	Receptor sensitivity	Distance Score	Frequency Score	Overall Score	Overall Risk
1	Popefield Farm	5	6	30	Requires Further Mitigation
2	Settlement of Ellenbrook	3	4	12	Acceptable
3	Sports Pavilion	3	4	12	Acceptable
4	Residential Properties on Nimrod Drive	2	5	10	Acceptable
5	Residential Properties on Flamingo Close	2	4	8	Acceptable
11	Beech Farm	2	2	4	Insignificant
13	Settlement of Smallford	3	3	9	Acceptable
14	Nursery	5	4	20	Requires Further Mitigation
15	Land at Chester Nurseries development	5	4	20	Requires Further Mitigation
16	Notcutts Garden Centre	5	3	15	Requires Further Mitigation
17	Residential Property on Hatfield Road	4	3	12	Acceptable

9.87 Due to the distance, the high frequency of rainfall and the low frequency of winds affecting the receptors, the risks are judged to be acceptable or require further mitigation apart from at Beech Farm where the risk of dust is considered to be insignificant. The mitigation measures in order to reduce emissions in accordance with best practice are included within paragraph 9.97.

Ecological Receptors

9.88 The majority of the research undertaken has focussed on the chemical effects of alkaline dusts. A summary of a review of available research on behalf of the DETR[25] concluded that:

'the issue of dust on ecological receptors is largely confined to the associated chemical effect of dust, and particularly the effect of acidic or alkaline dust influencing vegetation through soils.'

9.89 Significant quantities of highly alkaline or acidic dusts with a significant risk of becoming airborne could cause some risk of impact on nearby vegetation. With regard to dust deposition an Interim Advice Note (IAN) prepared as a supplement for Volume 11, Section 3, part 1 of the Design Manual for Roads

[25] Department of the Environment, Transport and the Regions (DETR) 1995: *The Environmental Effects of Dust from Surface Mineral Workings – Volume Two.*

and Bridges (and now incorporated into HA207/07[26]) suggests that only dust deposition levels above 1,000 mg/m^2/day are likely to affect sensitive ecological receptors. This level of dust deposition is approximately five times greater than the level at which most dust deposition may start to cause a perceptible nuisance to humans. It states that most species appear to be unaffected until dust deposition rates are at levels considerably higher than this[27].

9.90 The majority of dust is deposited within 100-200m of the source. All ecological sites apart from Home Covert & Round Wood LWS are greater than 500m, which is considered a conservative buffer distance from the application site.

9.91 Due to the proximity of human receptors close to the site, by ensuring dust levels are kept to levels whereby perceptible nuisance to humans is not apparent (200mg/m^2/day) this would be significantly below the suggested level at which ecological receptors would be affected. Therefore, the risk of dust impacts at these ecological receptors is considered to be low.

Offsite Traffic Emissions Effects

9.92 The full results of the offsite traffic emissions assessment are presented in Appendix 9/1. The assessment predicted the concentrations at representative and worst case sensitive receptor locations.

9.93 The assessment showed that there are no predicted exceedences of the annual mean NO_2 Air Quality objective (AQO) at the assessment locations in either the 'without development' and 'with-development' scenarios. The predicted magnitude of impact on annual mean NO_2 concentrations is small (1-5% change in the annual mean AQO) at one of the assessed locations and imperceptible (<1% change in the annual mean AQO) at all other locations. The unmitigated impact significance is predicted to be negligible at considered receptors in accordance with the stated assessment methodology.

9.94 In addition, all annual mean NO_2 concentrations are predicted to remain well below 60 µg/m³ therefore there is not considered a risk of the 1-hour mean Objective being exceeded.

9.95 The assessment showed that there are no predicted exceedences of the annual mean PM_{10} AQO at the assessment locations in either the 'without development' and 'with-development' scenarios. The predicted magnitude of impact on annual mean PM_{10} concentrations is imperceptible (<1% change in the annual mean AQO) at all of the assessed locations. The unmitigated impact significance is predicted to be negligible at considered receptors in accordance with the stated assessment methodology.

9.96 The proposed development would not increase the number of days of PM_{10} concentrations greater than 50 µg/m³ by more than 1 day at assessed receptors. The number of predicted 24-hour mean PM_{10} exceedences are within the number permitted (35-exeedences per year are allowed).

[26] Design Manual for Roads and Bridges. Volume 11, Section 3. Part 1 HA207/07. Annex F.
[27] Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSI's (Supplement to DMRB 11.3.1), Interim Advice Note 61/04, March 2005.

Predicted impacts on 24-Hour Mean PM_{10} concentrations are 'imperceptible' resulting in a 'negligible' significance of impact at all assessed receptors.

MITIGATION MEASURES

9.97 Mitigation measures are defined on the basis of industry good practice guidance in accordance with MIRO, and Process Guidance Note 3/08(12)[28]. The risk of dust impact at the majority of receptors is considered to be acceptable or negligible. However, as the potential for dust generation ranges from low potential to high potential mitigation measures and in line with best practice mitigation measures will be implemented. Mitigation measures to reduce nuisance dust and particulate matter in accordance with best practice, particularly during soil and overburden removal and internal vehicle movements should be implemented on site.

9.98 The mitigation measures described represent conventional practice and would be effective in reducing dust emissions.

9.99 The proposed 3m to 4m high screening bund and acoustic bund would help reduce offsite dust emissions from the quarry as this would provide a physical barrier to dust as well as reducing wind speeds, thereby reducing dust entrainment, as well as collecting the dust by encouraging deposition.

Management

9.100 The success of dust control measures is dependent on the awareness of site personnel and their willingness to promptly apply these actions when necessary.

9.101 There would be a trained and responsible site supervisor / manager on site during working hours to ensure dust emissions are under control. Responsibilities would be allocated to specific personnel to ensure dust generation are effectively controlled.

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

Mitigation Measures Summary

9.103 These mitigation measures are considered to be effective at reducing nuisance and particulate dust emissions. A summary of the mitigation measures to be employed at the proposed quarry are presented in Table 9-15.

[28] Defra. Process Guidance Note 3/08(12) Statutory guidance for quarry processes. September 2012.

Table 9-1
Summary of Dust Control Measures and Estimate of Effectiveness

Site Operation	Potential for Dust Generation	Dust Control Measures	Estimate of Effectiveness
Excavation of Sand and Gravel	Moderate	Use of water as and when necessary particularly in the event of dry and windy weather	High
		Vehicles not overloaded	Moderate
		Reduction of drop heights	Moderate
		Avoid double handling of material	Moderate/Low
Soil Stripping and Overburden Removal (including restoration)	Moderate to high	Water sprays to be used as required	Low
		Phased activity to minimise the duration of activity	High/Moderate
		Avoid soils handling during adverse weather conditions	High
		Optimise timing regarding weather and seeding season. Seed as soon as possible	High
		Soil bunds & mounds profiled to minimise wind blown dust	Moderate
		Temporary cessation of activities in the event of unacceptable dust emissions in the vicinity of receptor properties.	High
Storage and Material Handling	Low	Water sprays to be used as required	Low
		Avoid soils handling during adverse weather conditions	High
		Optimise timing regarding weather and seeding season. Seed as soon as possible	High
		Soil bunds & mounds profiled to minimise wind blown dust	Moderate
		Where material contains less than 3mm in size the material should be conditioned with water before the point of discharge into the pile.	Low
		Areas around the base of the storage piles would be clearly designated to ensure passing vehicles do not disturb dusty material and the area should be kept clean and in good repair	Low
Processing	Low	Processing operations will take place to the north of the quarry, away from the closest receptors	Moderate
		Enclosure of transfer points with chutes	High
		Cleaning belts with scrapers and dust catch plates	Moderate
		Materials are deposited carefully into screens by reducing drop heights and the correct matching of machine	Moderate
		Ensure base of stockpiles clearly marked and shielded from wind and keep moist in dry weather	Moderate

Site Operation	Potential for Dust Generation	Dust Control Measures	Estimate of Effectiveness
		Operations ceased during adverse weather conditions	High
Transport: Internal Movements	Moderate to High	Controlled use of haul routes	Moderate/High
		Haul routes to be regularly maintained by grading to minimise dust generation	High
		Speed controls of 10mph to be implemented on all haul routes	Moderate Error! Bookmark not defined.
		Water bowsers to be used as required	High[29]
		Mobile plant exhausts will discharge above the horizontal	Moderate
Transport – access road	Moderate to Low	Controlled use of fixed haul routes	Moderate/High
		All vehicles exiting the site carrying material are sheeted or totally enclosed as soon as possible after loading and before leaving site	High/Moderate
		Speed controls to be implemented and enforced on all haul routes	Moderate
		Wheel wash installed at the site entrance and used	Moderate

[29] Environment Effects of Surface Mineral Workings. DoE, October 1995.

RESIDUAL EFFECTS

9.104 It is considered that with the mitigation measures effectively employed, the dust impact at surrounding receptors is insignificant. Potential impacts are considered to be reversible once extraction is complete.

9.105 The change in air quality as a result of additional HDV traffic on local roads is predicted to be 'small' to 'imperceptible' and therefore the impact is considered 'negligible' according to IAQM / EPUK assessment criteria.

CONCLUSIONS

9.106 This assessment has considered the potential impacts of the operations of the proposed development. The assessment has considered the relevant legislation, baseline conditions, activities associated with the site including haulage, excavation activities, storage and processing of material, and restoration of the site. This assessment has also considered the impact of vehicle exhaust emissions generated by the additional HDV movements on the local road network.

9.107 The potential impacts of the development have been assessed in terms of potential emissions of particulates (dust). Two assessments have been undertaken; the first to assess the PM_{10} fraction for which Air Quality Standards exist, and the second to assess the coarse fraction dust which is typically associated with amenity issues.

9.108 An assessment of PM_{10} and $PM_{2.5}$ was completed following guidance within LAQM.TG(09) considering background particulate matter levels and distance to receptors. Background levels are 'well below' the limit. Proposed operations are not considered to result in an increase in the generation of dust and therefore not considered to lead to a significant increase in PM_{10} or $PM_{2.5}$ emissions which would lead to an exceedance of the AQO.

9.109 A qualitative assessment of deposited dust was undertaken; this identified the potential sources of dust onsite. Risk of dust impact at receptors was determined based on the potential sources of dust, the distance from the site, the frequency of wind direction and proposed site operations.

9.110 Dust mitigation measures have then been identified by reference to the relevant guidance documents. With effective implementation of theses mitigation measures the risk of adverse dust effects on local receptors is considered to be low. On completion of the proposed development the risk of dust effects would be negligible. The potential for dust impacts on the surrounding ecological sites has been assessed as insignificant.

9.111 The change in air quality as a result of additional HDV traffic on local roads is predicted to be 'small' to 'imperceptible' and therefore the impact is considered 'negligible' according to IAQM / EPUK assessment criteria.