PRIORS HALL PARK

Phased Extraction of Minerals- Planning Application

Urban&Civic

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Dust Impact Assessment

Dust Impact Assessment

Extraction Works - Priors Hall, Corby

Quality Management

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1	12/11/2020	Draft 1	Client comments	
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Contents

Tables, Figures and Appendices

Tables

Figures

1 Introduction

1.1 This report details the air quality assessment undertaken to accompany the planning application for the proposed limestone extraction works, on Priors Hall Urban Extension, Corby. The extension will provide limestone for use as a building material, principally for road construction, as part of the outline development.

1.2 The site is split across two local authority areas with the north of the site containing the extraction areas located within the district of East Northamptonshire Council (ENC) and the south of the site within Corby Borough Council (CBC). Neither ENC or CBC have designated any Air Quality Management Areas (AQMAs). The closest AQMA to the Application Site is a considerable distance (approximately 30 km) from the Application Site.

1.3 The assessment focuses on dust impacts from the extraction works, from both suspended particulate matter up to 10 microns diameter (PM_{10}) and deposited dust once it has fallen out of the air. The key components of the assessment are:

- identification of sensitive receptors and their distances and directions from the site activities;
- prediction of the risk of dust impacts at receptors, based on the well-established source-pathway-receptor concept and accounting for dust generation, dispersal and sensitivity; and
- recommendation of further mitigation measures, if required.

1.4 Traffic pollution impacts have been scoped out of the assessment. The Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) Land-Use Planning & Development Control: Planning For Air Quality document [1] indicates that air quality assessments should include developments increasing annual average daily Heavy Duty Vehicle (HDV) traffic flows by more than 100 outside an AQMA. In this case, the proposal will result in fewer HGV movements on local roads during construction, as material gained will be used in situ rather than imported. Therefore, the proposal is not expected to generate vehicle movements above the threshold and the impacts are expected to have an insignificant effect.

1.5 This report presents the relevant legislation and policy, the assessment methodology and describes the existing air quality; before summarising the results of the assessment of air quality impacts based on the source, distance, orientation and sensitivity of receptors. Measures to eliminate, reduce or mitigate the effects are proposed where necessary.

2 Legislative and Planning Policy Context

Ambient Air Quality Legislation and National Policy

The Ambient Air Quality Directive and Air Quality Standards Regulations

2.1 The 2008 Ambient Air Quality Directive (2008/50/EC) [2] aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants; it sets legally binding concentration-based limit values, as well as target values. There are also information and alert thresholds for reporting purposes. These are to be achieved for the main air pollutants: particulate matter (PM10 and PM2.5), nitrogen dioxide (NO2), sulphur dioxide (SO2), ozone (O3), carbon monoxide (CO), lead (Pb) and benzene. This Directive replaced most of the previous EU air quality legislation and in England was transposed into domestic law by the Air Quality Standards Regulations 2010 [3], which in addition incorporates the 4th Air Quality Daughter Directive (2004/107/EC) that sets targets for ambient air concentrations of certain toxic heavy metals (arsenic, cadmium and nickel) and polycyclic aromatic hydrocarbons (PAHs). Member states must comply with the limit values (which are legally binding on the Secretary of State) and the Government and devolved administrations operate various national ambient air quality monitoring networks to measure compliance and develop plans to meet the limit values.

UK Air Quality Strategy

2.2 The Environment Act 1995 established the requirement for the Government and the devolved administrations to produce a National Air Quality Strategy (AQS) for improving ambient air quality, the first being published in 1997 and having been revised several times since, with the latest published in 2007 [4]. The Strategy sets UK air quality standards[♦] and objectives[#] for the pollutants in the Air Quality Standards Regulations plus 1,3-butadiene and recognises that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the EU Directives.

♦ Standards are concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Standards, as the benchmarks for setting objectives, are set purely with regard to scientific evidence and medical evidence on the effects of the particular pollutant on health, or on the wider environment, as minimum or zero risk levels.

Objectives are policy targets expressed as a concentration that should be achieved, all the time or for a percentage of time, by a certain date.

2.3 The 1995 Environment Act also established the UK system of Local Air Quality Management (LAQM), that requires local authorities to go through a process of review and assessment of air quality in their areas, identifying places where objectives are not likely to be met, then declaring Air Quality Management Areas (AQMAs) and putting in place Air Quality Action Plans to improve air quality. These plans also contribute, at local level, to the achievement of EU limit values.

2.4 For the purposes of this assessment, the limit values set out in the Air Quality Standards Regulations 2010 and the objective levels specified under the current UK AQS have been used.

2.5 The limit values and objectives relevant to this assessment are summarised in Table 2.1. Although the EU limit values and the UK AQS objectives are numerically equal, there are some differences in where they apply and who is responsible for their achievement.

Table 2.1 Summary of Relevant Air Quality Limit Values and Objectives

Pollutant	Averaging Period	Objectives/ Limit Values	Not to be Exceeded More Than	Target Date
Particulate Matter (PM_{10})	24 Hour	50 µg.m^{-3}	35 times per calendar year	-
	Annual	40 µg.m^{-3}	-	-

2.6 On 14 January 2019, Defra published the 'Clean Air Strategy 2019'. The report sets out actions that the Government intends to take to reduce emissions from transport, in the home, from farming and from industry.

Disamenity Dust

2.7 Dust can conveniently be considered in two situations; while it is suspended in the air; and once it has settled out of the air and deposited onto surfaces. In the suspended state, statutory standards exist for concentrations of particulate matter (PM), as described above.

2.8 However, for deposited dust, there are no UK, European or World Health Organisation (WHO) limits that define when disamenity or nuisance is caused. A range of non-official yardstick criteria is found in the literature [5]. In the absence of any criteria, an unofficial benchmark of 200 mg.m^{-2}.day^{-1} (monthly average samples) for *"complaints likely"* in residential areas and outskirts of towns, as recommended by Vallack and Shilito [6].

National Planning Policy

National Planning Policy Framework

2.9 The National Planning Policy Framework (NPPF) [7] is a material consideration for local planning authorities and decision-takers in determining applications. At the heart of the NPPF, is a presumption in favour of sustainable development, subject to caveats where a plan or project affects a habitats site. For determining planning applications, this means approving development proposals if they accord with an up-to-date local development plan, unless material considerations indicate otherwise. If the development plan does not contain relevant policies, or the policies are out of date, then planning permission should be granted unless the application of policies in the NPPF that protect areas or assets of particular importance provides a clear reason for refusing the development, or any adverse impacts would significantly outweigh the benefits.

2.10 The NPPF sets out three overarching objectives to achieve sustainable development. The relevant objective in the context of this air quality assessment is:

> "*an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution and adapting to climate change, including moving to a low carbon economy*" (Paragraph 8c)

2.11 Under the heading 'Promoting sustainable transport', the NPPF states:

> "*The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making*." (Paragraph 103)

2.12 Under the heading 'Conserving and enhancing the natural environment', the NPPF states:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *…*
>
> *Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local*

environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; …" (Paragraph 170)

"*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."* (Paragraph 181)

National Planning Practice Guidance

2.13 The National Planning Practice Guidance (NPPG) was issued on-line on 6 March 2014 and is updated periodically by government as a live document. The last major update was on 1 November 2019. The Air Quality section of the NPPG describes the circumstances when air quality, odour and dust can be a planning concern, requiring assessment.

2.14 The NPPG advises that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity. The NPPG states that when deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

"*Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*

Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power

plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;

Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;

Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;

Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value."

2.15 The NPPG provides advice on how air quality impacts can be mitigated and notes "Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met."

Local Planning Policy

2.16 The site is split into zones two and three with zone three located within the district of East Northamptonshire Council (ENC) and zone two primarily within Corby Borough Council (CBC).

2.17 ENC's Local Development Plan adopted in 2017, sets out policies allowing the council to manage the development of land. To accompany this, ENC has published the Air Quality and Emissions Mitigation: Guidance for Developers in 2019. The guidance relevant to this assessment is:

"*AQMAs are declared based on high nitrogen dioxide (NO2) levels and/or high levels of particulate matter (PM10). Whilst East Northamptonshire does not at this time have any AQMAs, our data shows that in certain areas breaches in the National Air Quality Objectives is very likely in the near future. As such it is important that all future developments consider the impact the development will have on air quality and consider mitigation options to reduce the impact as part of any planning application.*

*East Northamptonshire Council will refer to this document when assessing air quality assessments. Consideration of air quality is a priority regardless of whether an AQMA has been declared and steps should be taken to improve air quality and reduce the cumulative impacts wherever possible****"***

2.18 CBC submitted their Part 2 Local Plan for examination in 2019 containing policies for 2011 – 2031. The relevant policy from this plan is:

"Policy 2 – Health and Wellbeing

The potential for achieving positive health and wellbeing outcomes will be taken into account when considering development proposals. Where any potential adverse impacts are identified, the applicant will be expected to demonstrate how these will be addressed and mitigated. Development proposals should promote, support and enhance health and wellbeing by:

……

c) Ensuring that development will not have adverse environmental health impacts, such as noise, vibration, smell, light or other pollution, remediation of contaminated land and measures are taken to mitigate the risk associated with climate change;

d) Monitoring to ensure that there is no further decline in air quality;"

2.19 Also relevant, is the Northamptonshire Minerals and Waste Local Plan, which was adopted on 1st July 2017. The policies which relate to this development include;

"Policy 18: Addressing the impact of proposed minerals and waste development

Proposals for minerals and waste development must demonstrate that the following matters have been considered and addressed:

- *protecting Northamptonshire's natural resources and key environmental designations (including heritage assets),*
- *avoiding and / or minimising potentially adverse impacts to an acceptable level, specifically addressing air emissions (including dust), odour, bioaerosols, noise and vibration, slope stability, vermin and pests, birdstrike, litter, land use conflict and cumulative impact*

…….

Where applicable a site-specific management plan should be developed to ensure the implementation and maintenance of mitigation measures throughout construction, operation, decommissioning and restoration works."

3 Methodology

3.1 The approach is consistent with the EPUK & IAQM *Land-Use Planning & Development Control: Planning for Air Quality* document [1], the IAQM *Guidance on the Assessment of Mineral Dust Impacts for Planning* [8] and, where relevant, Defra's Local Air Quality Management Technical Guidance: LAQM.TG16. It includes the key elements listed below:

- assessment of the existing air quality in the study area (existing baseline) and prediction of the future air quality (future baseline), using official government estimates from Defra, publicly available air quality monitoring data for the area, and relevant Air Quality Review and Assessment (R&A) documents; and
- a qualitative assessment of disamenity dust using a source-pathway-receptor conceptual model.

3.2 Air quality guidance advises that the organisation engaged in assessing the overall risks should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The RPS air quality team members involved at various stages of this assessment have professional affiliations that include Fellow and Member of the Institute of Air Quality Management, Chartered Chemist, Chartered Scientist, Chartered Environmentalist and Member of the Royal Society of Chemistry and have the required academic qualifications for these professional bodies. In addition, the Director responsible for authorising all deliverables has over 25 years' experience.

Summary of Key Pollutants Considered

3.3 The activity on site will include;

- removal and temporary storage of overburden;
- extraction of limestone;
- processing of minerals on site to form appropriately sized/ quality building material;
- transportation of material within site to development area where it is required;
- backfilling of extraction zones to original levels with engineered fill, overburden and excess clay from earthworks surcharge process elsewhere on site'.

3.4 The equipment on site will consist of excavators (including ripper-tooth attachment), dump trucks and graders for the crushing and grading of materials for the extraction phase. There will also be a shovel loader to assist with processing extracted material. The reinstatement phase will require dump trucks, excavators, dozers and rollers.

Dust

3.5 The main potential sources or activities generating dust from the development will be:

- the removal and storage of top and sub-soils;
- the extraction and removal of over-burden material using an excavator with ripper tooth attachment;
- the extraction of lime by extraction with ripper tooth attachment;
- crushing and grading of materials using dumpers and graders;
- haulage of extracted materials to the storage areas;
- the reinstatement phase using dumpers, excavators, dozers and rollers; and
- the movement of vehicles and plant on access and egress routes.

3.6 In addition, there could potentially be fugitive releases from wind-blow across disturbed site surfaces.

3.7 Dusts can contain a wide range of particles of different sizes. The normal fate of suspended (i.e. airborne) dust is deposition. The rate of deposition depends largely on the size of the particle and its density; together these influence the aerodynamic and gravitational effects that determine the distance it travels and how long it stays suspended in the air before it settles out onto a surface. In addition, some particles may agglomerate to become fewer, larger particles; whilst others react chemically.

3.8 The effects of dust are linked to particle size and two main categories are usually considered: PM_{10} particles, those up to 10 µm in diameter, remain suspended in the air for long periods and are small enough to be breathed in and so can potentially impact on health; and disamenity dust (also sometimes called nuisance dust), generally considered to be particles larger than 10 µm which fall out of the air quite quickly and can soil surfaces (e.g. a car, window sill, laundry).

Likely Radius of Effect of Different Dust Fractions

3.9 Dust may be suspended in the atmosphere from:

- site operations that actively generate airborne dust, such as extraction and restoration operations, loading and export of materials and plant movements on haul roads etc; and

- wind blow, whereby dust is lifted from rest (e.g. from bare ground and conveyors) by the wind to become airborne.

3.10 Where there is suspended dust, it will eventually be deposited onto surfaces and accumulate. It can potentially cause disamenity, annoyance or even nuisance to the local community by causing soiling of clean surfaces such as window sills, cars or laundry. Additionally, where there are sensitive ecological sites nearby, dust can, potentially, have a bulk smothering effect on vegetation and invertebrates.

3.11 If disamenity/nuisance dust deposition occurs, then it will vary according to factors such as the type, duration and location of dust-generating activity, weather conditions, the effectiveness of dust suppression measures and sheltering features such as topography, purpose-made screening and bunds and tree cover. The risk of there being an adverse effect depends on whether the particular meteorological conditions that could transport dust to the receptors occur at the same time as the dust-generating activities.

3.12 The impacts of dust decrease with distance from the source, due to dispersion and dilution. For quarries, the IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning (referred to hereafter as the IAQM Minerals Guidance) indicates that dust impacts will occur mainly within 400 m of the operation, even at the dustiest of quarries. Box 1 summarises the typical impacts with distance.

Box 1 Typical Impacts with Distance (from the IAQM minerals guidance)

> From the experience of the Working Group, adverse dust impacts from sand and gravel sites are uncommon beyond 250m and beyond 400m from hard rock quarries measured from the nearest dust generating activities.
>
> In the absence of other information, it is commonly accepted that the greatest impacts will be within 100m of a source and this can include both large (>30µm) and small dust particles. The greatest potential for high rates of dust deposition and elevated PM_{10} concentrations occurs within this distance. Intermediate-sized particles (10 to 30µm) may travel up to 400m, with occasional elevated levels of dust deposition and PM_{10} possible. Particles less than 10µm have the potential to persist beyond 400m but with minimal significance due to dispersion.

3.13 The screening criteria given in the IAQM Minerals Guidance have been used to establish the study area for the assessment of dust impacts. That guidance states that:

- *"If there are no relevant receptors within 1 km of the operations, then a detailed dust assessment can be screened out. In such a case, it is considered that irrespective of the*

nature, size and operation of the site, the risk of dust impact is likely to be "negligible" and any resulting effects are likely to be 'not significant'

- *In cases whereby receptors are located between 400 m and 1 km of operations, it would normally be assumed that a detailed dust impact assessment is not required. However, the decision on whether to assess should be made and justified on a site-specific basis by a suitability experienced air quality professional…*
- *If there are relevant human and/or ecological receptors within 250-400 m (depending on the rock type) then a dust impact assessment will almost always be required. This step is deliberately chosen to be conservative (and will in practice result in assessments being required for most minerals development schemes)"*

Dust Assessment Methodology Outline

3.14 The IAQM Minerals Guidance mentions that detailed dispersion modelling of dust impacts from minerals sites in the UK is extremely rare and is not generally recommended by the IAQM given the lack of accurate UK emissions data for this sector.

3.15 This assessment has used the IAQM Minerals Guidance, which sets out the recommended content of a minerals dust assessment:

I. *"A description of the existing PM_{10} concentration (and dust deposition rates where available);*

II. *A description of the location of receptors and their relative sensitivities to PM_{10} concentration and dust deposition;*

III. *Details of potential dust sources associated with the proposed development, including the activities and materials involved (including a brief outline of quantities, duration, methods of handling and storage, etc.) and the resulting potential for releasing dust, covering fugitive sources, diffuse sources and point sources as applicable;*

IV. *A description of the control/mitigation measures incorporated into the scheme (including design features, management controls (e.g. Dust Management Plan) and, where appropriate, engineering controls);*

V. *A prediction, using appropriate assessment tools, of the likely PM_{10} and dust deposition impacts and resulting effects (on health, amenity, and/or ecology) at relevant sensitive receptors, and taking into account the following:*

a) *The likely magnitude of dust emissions (after control by measures incorporated into the scheme);*

b) *the likely meteorological characteristics at the site;*

c) the dispersion and dilution afforded by the pathway to the receptors, taking into account distance, orientation, local terrain and features, and other relevant factors;

d) the sensitivity of the receptors to disamenity, health and/or ecology effects; and

e) any likely cumulative interactions.

VI. The residual PM_{10} and dust deposition impacts and their disamenity, health and/or ecology effects;

VII. A conclusion on the significance of the overall residual air quality effect, i.e. whether "significant" or "not significant";

VIII. Where the effects are assessed as significant, appropriate further mitigation (including modification of site design) and control measures that could allow the proposal to proceed without causing significant adverse effects; and

IX. Proposals, where appropriate, for proportionate dust monitoring and reporting to check the ongoing effectiveness of dust controls and mitigation, check compliance with appropriate environmental standards and to enable an effective response to complaints."

Disamenity Dust Deposition Assessment Methodology

3.16 Once the magnitude of the likely effect from dust deposition has been predicted 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 effects1, which requires a competent and suitably experienced Air Quality Practitioner to apply professional judgement.

3.17 Dust arising from quarries could, if effective control measures are not employed, potentially cause disamenity to the local community if its deposition caused noticeable soiling of clean surfaces such as window sills, cars or laundry. A separate estimate of the overall disamenity effect and the overall ecological effect (where relevant) is required.

3.18 This qualitative risk-based estimate of the dust deposition impact has used the method in the IAQM Minerals Guidance [8] to consider both:

a) The magnitude of the dust episodes that could potentially happen, which depends on the magnitude of the residual (i.e. abated) dust emissions and the effectiveness of the pathway to the receptor; and

[1] 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.

b) The probability of such dust episodes being experienced at the receptor, which depends on the frequency of winds blowing from those sectors that could disperse dust towards sensitive receptors (the probability being greatest when such conditions coincide with site activity during dry days). Overall, receptors in the prevailing downwind direction tend to be at higher risk of dust impact.

3.19 Further detail is given later in this section on how these two elements were assessed.

3.20 The IAQM guidance uses the following framework of descriptors for the magnitude of disamenity effects for receptors of different sensitivities receiving different dust deposition impacts.

Table 3.1 Descriptors for Magnitude of Dust Effects (from the IAQM Minerals Guidance)

		Receptor Sensitivity		
		Low	**Medium**	**High**
Dust Impact Risk	**High Risk**	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
	Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
	Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
	Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

3.21 The sensitivities of the receptors under consideration have been categorised as Low, Medium or High, according to Box 3 in the IAQM minerals guidance.

3.22 Categorising the other factor, the dust deposition impact on each receptor, is more challenging. This is obtained by considering, together, the Residual Source Emissions term and the Pathway Effectiveness, as shown below in Table 3.2.

Table 3.2 Estimation of Dust Impact Risk (from the IAQM Minerals Guidance)

		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

3.23 The Residual Source Emissions term was categorised as small, medium or large based on the detailed consideration of the emission potential of each of the sources on the site as described in Section 4 and how effectively they are likely to be controlled.

3.24 The Pathway Effectiveness term was categorised as ineffective, moderately effective, or highly effective based on the frequency of potentially dusty winds from the direction of the dust source to the sensitive receptor and the distance between the sensitive receptor and the dust source.

3.25 The IAQM minerals guidance sets out the following example method for determining the Pathway Effectiveness term. Firstly, the frequency of potentially dusty winds are categorised using the criteria in Table 3.3 below.

Table 3.3 Categorisation of Frequency of Potentially Dusty Winds (from the IAQM Minerals Guidance)

Frequency Category	Criteria
Infrequent	Frequency of winds (>5 m /s) from the direction of the dust source on all days in the year are less than 5%
Moderately frequent	The frequency of winds (>5 m/s) from the direction of the dust source on all days in the year are between 5% and 12%
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on all days in the year are between 12% and 20%
Very frequent	The frequency of winds (>5 m/s) from the direction of the dust source on all days in the year are greater than 20%

Note: Table reproduced from Table A3-2 in the IAQM minerals guidance

3.26 Each receptor's distance from the dust source is then categorised based on the criteria in Table 3.4 below.

Table 3.4 Categorisation of Receptor Distance from Source (from IAQM Minerals Guidance)

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

3.27 The pathway effectiveness then is classified using the Frequency of Potentially Dusty Winds from Table 3.3 and the Receptor Distance from Source from Table 3.4, as per Table 3.5 below.

Table 3.5 Pathway Effectiveness (from IAQM Minerals Guidance)

		Frequency of potentially dusty winds			
		Infrequent	**Moderately frequent**	**Frequent**	**Very frequent**
Receptor Distance Category	**Close**	Ineffective	Moderately Effective	Highly Effective	Highly Effective
	Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
	Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

3.28 The meteorological conditions in the area are discussed in Section 7.

3.29 Finally, having used Table 3.1 to estimate the magnitude of the likely disamenity effect at individual representative receptors, professional judgement must then be applied to estimate the overall disamenity dust effect 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. From this, a conclusion is reached on the likely significance of the effects; this is a binary judgement: either it is "significant" or "not significant". The EPUK/IAQM guidance states that "Whilst it maybe that there are 'slight', 'moderate' or 'substantial' impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances."

Suspended Dust (PM_{10}) Assessment Methodology

3.30 The main potential effect is the disamenity or nuisance impact of dust that could be deposited on surfaces; however, because there are residential receptors within 1 km of the dust sources, this study has additionally assessed 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 Strategy objective. The 1 km radius has been adopted for this proposed development and can be considered a very conservative distance.

3.31 A semi-quantitative assessment has been carried out of the PM_{10} effect on local air quality from the site activities. The PM_{10} assessment follows the method described in the IAQM minerals guidance. The method involves the following key elements:

1. Establishing the existing background PM_{10} concentration through a review of available air quality monitoring data for the area, National Air Quality Information Archive estimates for the location and consideration of ENC's Air Quality Review and Assessment (R&A) documents;

2. Estimating the expected process contribution (PC) of PM_{10} at the sensitive receptors from the site activities, based on published sources of information on minerals sites, with some reduction factored-in from the application of dust mitigation and controls;
3. Estimating the total predicted environmental concentration (PEC) by summing PC and the background PM_{10} concentration;
4. Comparing the PEC with the annual mean Air Quality Strategy objective for PM_{10}; and
5. Determining 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.

3.32 It is generally considered good practice that, where possible, an assessment should communicate impacts both numerically and descriptively. The predicted PM_{10} impacts have also, therefore, been expressed descriptively. To ensure that the descriptions of impacts are clear, consistent and in accordance with recent guidance, definitions have been adopted from the EPUK & IAQM *Land-Use Planning & Development Control: Planning for Air Quality* document. When describing the air quality impact at a sensitive receptor, the change in magnitude of the concentration should be considered in the context of the absolute concentration at the sensitive receptor. Table 3.6 provides the EPUK & IAQM approach for describing the air quality impacts at sensitive receptors.

Table 3.6 Impact Descriptors for Individual Sensitive Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level			
	1	2-5	6-10	>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 than AQAL	Moderate	Substantial	Substantial	Substantial

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
2. The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5% will be described as negligible.
3. The table is only designed to be used with annual mean concentrations.

4. Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

3.33 The human-health impact descriptors above apply at individual receptors. The EPUK & IAQM guidance states that the impact descriptors *"are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. Whilst it maybe that there are 'slight', 'moderate' or 'substantial' impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances."*

3.34 Professional judgement by a competent, suitably qualified professional is required to establish the significance associated with the consequence of the impacts. This judgement is likely to take into account the extent of the current and future population exposure to the impacts and the influence and/or validity of any assumptions adopted during the assessment process.

4 The Site, Surrounding Area and Local Receptors

The Application Site and Location

4.1 The existing site contains two locations designated as areas of potential limestone extraction. These designated extraction areas are expected to cover approximately 4.2 ha.

4.2 All designated extraction areas are to the north of the development located at the site boundary on the west of the site, as shown in Figure 4.1.

4.3 The proposed areas of extraction are as follows:

Area A (1.95 ha) – north west– area for future allotments/ formal open space;

Area B (2.25 ha) – site of planned 'KP4 gateway' landscaping scheme; and

4.4 Vehicles are to access the site by Kestrel Road, to the Western boundary.

Local Receptors

4.5 The area to the north and east of the application site is predominantly rural with the village of Deene approximately 800 m to the east. To the west of the site is a business park and car racing track. The nearest sensitive receptor is a data centre (which would be categorised as high risk using the IAQM guidance) immediately to the west of the site, located approximately 100 m from the site boundary. The nearest residential receptor (also categorised as high risk) to the part of the site boundary nearest the extraction activity respectively is Lake Drive located 225 m to the south west.

4.6 The proposed development is not expected to generate a substantial number of HGV movements and the impacts associated with emissions from vehicles on the local road network are expected to have an insignificant effect. Extracted material will not be moved offsite and will have no impact on the access road, therefore sensitive receptors near to Kestrel Road are not expected to be adversely affected and have not been considered further in this assessment.

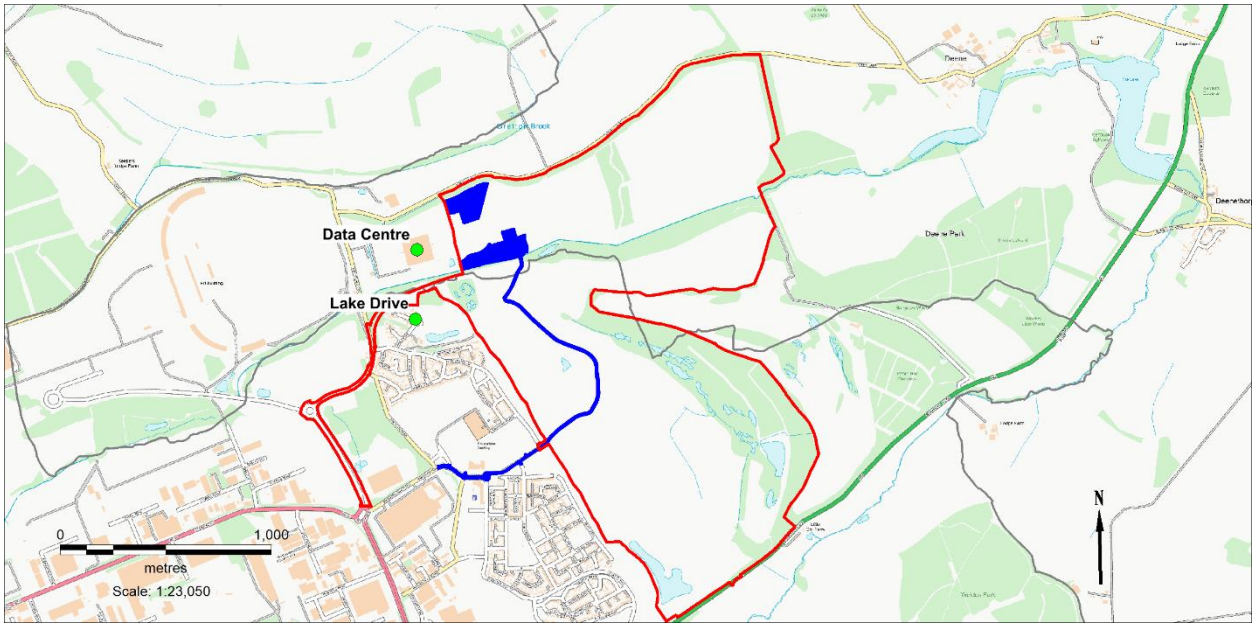
4.7 The proposed limestone extraction will cover an area of 4.2 ha. The extracted material will be used to supply building material for future residential dwellings on the site. Extracted material will be stored in a specified area and limestone extraction will avoid disturbing the archaeological conservation area located towards the south boundary of the site.

4.8 The distances from each area to the nearest sensitive receptors are shown in Table 4.1.

Table 4.1 Approximate Distance (in metres) from Quarry to Existing Sensitive Receptors

Receptor ID	Receptor type	Distance (m)
Data Centre	Nearest High Risk Receptor (Material Extraction)	100 m, west of the site
Lake Drive	Nearest Residential Receptor (Material Extraction)	225 m, south-west of the site

Figure 4.1 Location of High Risk Receptors and Site Activities



High Risk Receptors

Full Site Area

Application Area

Local Authority boundaries

5 Dust Control Measures Incorporated into the Design of the Development

5.1 The proposed measures already incorporated into the design of the scheme to control dust emissions from process activities and the movement of vehicles are set out below. These measures have been set out in the CoCP and will be implemented with reference to this.

- as far as practicable, dust-generating activities will be located away from high and medium sensitive receptors;
- haul roads, tips and mounds, and exposed areas will be located as far away as possible from sensitive receptors;
- good standards of housekeeping to be kept with debris to be cleared away on a regular basis and the site left safe, clean, and tidy at the end of each shift or task;
- there is a dust suppression system fitted to the crusher and spray bars that are fed from a water container to the belts;
- a tractor and bowser are available if haul roads and working areas require dust suppression;
- a road sweeper will be on call and utilised as and when needed;
- no burning of waste is permitted on site;
- site speed limits are to be observed and adhered with at all times. and
- noise and dust pollution to be implemented as dictated in the agreed RAMS for working areas

5.2 The control measures incorporated into the design of the scheme, described above, will reduce the impact that the activities have on local air quality.

6 Baseline Conditions

Overview

6.1 The background concentration often represents a large proportion of the total pollution concentration, so it is important that the background concentration selected for the assessment is realistic. EPUK & IAQM guidance highlight public information from Defra and local monitoring studies as potential sources of information on background air quality. LAQM.TG16 recommends that Defra mapped concentration estimates are used to inform background concentrations in air quality modelling and states that: "*Where appropriate these data can be supplemented by and compared with local measurements of background, although care should be exercised to ensure that the monitoring site is representative of background air quality".*

6.2 For this assessment, the background air quality has been characterised by drawing on information from the following public sources:

- Defra maps [9], which show estimated pollutant concentrations across the UK in 1 km grid squares; and
- published results of local authority Review and Assessment (R&A) studies of air quality, including local monitoring and modelling studies.

6.3 A detailed description of how the baseline air quality has been derived for this Proposed Development site is summarised in the following paragraphs.

Review and Assessment Process

6.4 Neither ENC or CNC have designated any Air Quality Management Areas (AQMAs). The closest AQMA to the Application Site is a considerable distance (approximately 30 km) from the Application Site.

Local Urban Background Monitoring

6.5 Neither ENC or CBC undertake any particulate matter monitoring. There is no particulate monitoring in the vicinity of the application site.

Defra Mapped Concentration Estimates

6.6 In the absence of any PM_{10} monitoring in the vicinity of the site, the Defra total annual-mean PM_{10} concentration estimate for 2018 has been collected for the grid square. The Defra mapped

concentration for the north of the application site at the material extraction areas is 13.8 µg.m^{-3}. The Defra mapped concentration in the south of the site is 14.8 µg.m^{-3}.

7 Impacts Assessment and Significance of Effects

Assessment of Disamenity Dust Deposition

7.1 There are sensitive human receptor locations within 400 m of extraction activity in zone three. Lake Drive and the data centre are within 400 m of extraction activity.

7.2 Table 7.1 Summary of Dust Impact Risk at Individual Representative Receptors within 400 m

Receptor Name	Approximate Distance and Direction to Area	Sensitivity (IAQM classification)
Data Centre	100 m west	High
Lake Drive	225 m south-west	High

Residual Source of Emissions

7.3 In this case, the size of the area being worked is limited to approximately 4.2 hectares in total. The site will be subdivided, and each worked area would be separated from other areas.

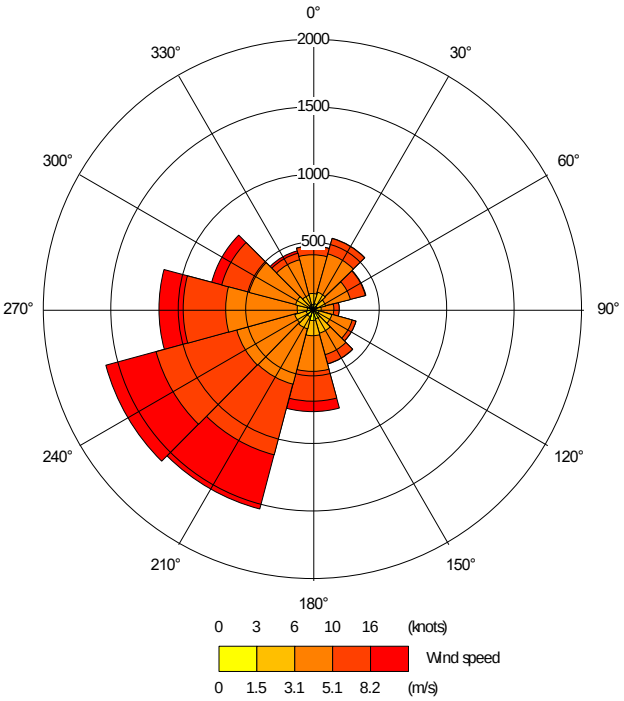
7.4 On-site vehicle movements would be restricted to site speed limits and site housekeeping would be carried out with debris removed and the site left clean and tidy after each shift.

7.5 The residual source emissions after taking into account the designed-in mitigation and control is categorised as ‘medium’ for extraction activities, taking into account the mitigation measures already incorporated into the scheme design, the nature of the development and the example magnitude categorisations given in the appendix of the IAQM minerals guidance.

Pathway Effectiveness

7.6 The nearest weather station to the application site is Wittering, approximately 14.5 km north east of the site. The 2015 wind rose for Wittering has been used in this assessment, in Figure 7.1

Figure 7.1 Wind Rose (Wittering 2015)



7.7 The level and distribution of nuisance dust emissions will vary according to factors such as the type of dust, duration and location of dust-generating activity, weather conditions and the effectiveness of suppression measures.

7.8 The annual windrose for 2015 for Wittering meteorological station is shown above in Figure 7.1. Each sector shows the direction that the wind has blown from, for different wind speeds. The prevailing winds in this area are typical of the UK, being dominated by winds from a south-westerly direction. An analysis of the data shows that the majority of winds (58.3%) are of low wind speed (from 0.1 to 5.4 $m.s^{-1}$, equal to 1.2 to 11.5 mph, or 1 to 10 knots). A further 24.6% are moderate winds (5.5 to 7.9 $m.s^{-1}$, equal to 12.7 to 18.4 mph, or 11 to 16 knots) and 15.9% are strong winds/gales (8 $m.s^{-1}$ and above, over 19.6 mph or over 17 knots). The remaining 0.26 % are made up of calm conditions when the meteorological site reported a wind speed of 0 $m.s^{-1}$.

Magnitude of Dust Effect

7.9 As shown in Table 7.2 below, the residual source emissions are categorised as ‘medium’ from extraction and movement of material around site, taking into account the mitigation measures already incorporated into the scheme design, and the nature of the development, and the example magnitude categorisations given in the appendix of the IAQM minerals guidance.

7.10 The pathway effectiveness was estimated for each receptor, based on the frequency of potentially dusty winds and the distance between the receptor and the dust source. The frequency of potentially dusty winds is defined as the percentage of time in a year having hourly wind speeds of greater than 5 m.s-1 blowing towards the relevant representative sensitive receptor. The dust risk time includes winds at all times of the day.

7.11 Receptors would be considered to be at risk from disamenity dust if the wind was coming from the direction of the dust source at a sufficient strength (> 5 m.s-1), during periods of little or no rainfall, especially during periods when evaporation exceeds rainfall and drying conditions prevail. This assessment has used the worst-case assumption that conditions are constantly dry, i.e. that there is zero rainfall at all times. In reality, this would not be the case, and so the assessment can be considered extremely conservative/pessimistic.

Table 7.2 summarises the predicted time each sensitive receptor would be at risk of disamenity if dust were emitted, the dust impact risk and the magnitude of dust disamenity effect at each receptor based on the receptor's sensitivity and the dust impact risk.

Table 7.2 Summary of Dust Disamenity Effects at Specific Receptors

Receptor ID	Primary Site Activity	Source Dust Potential	Risk Wind Direction	Frequency of Potentially Dusty Winds*	Receptor Distance from Source (m)**	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effects
Data centre	Extraction	Medium	North East to East	Infrequent (4%)	100	Ineffective	Negligible Risk	High	**Negligible**
Lake Drive	Extraction	Medium	North East to East	Infrequent (4%)	225	Ineffective	Negligible Risk	High	**Negligible**

*Percentage shown in brackets is percentage of winds >5 $m.s^{-1}$ from the risk wind direction, based on the number of hours in the year

**Distances have been measured from the nearest point of the site boundary to the receptors; therefore the categorisation of pathway effectiveness will be pessimistic

7.12 The magnitude of the dust effect at each of the sensitive receptors is negligible. On that basis, the deposited dust effects are not considered significant.

Significance of Dust Disamenity Effects

7.13 When the probability of at-risk meteorological conditions occurring is considered together with the magnitude of dust episodes on those days (using pessimistic and conservative assumptions), and the sensitivity of the land uses, the disamenity effect is categorised as 'negligible' at all receptors.

7.14 The disamenity dust assessment incorporates numerous conservative/pessimistic assumptions, including:

- the assessment has assumed no rainfall, with dry conditions prevailing constantly; and
- the assessment has assumed 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.

7.15 Using professional judgement, taking into account the magnitude of effects predicted at different receptors, the number of people represented by these receptors that would experience the effects, and the extent to which pessimistic assumptions have been used; the overall disamenity effect on the surrounding area is considered to be 'negligible'. Such an effect on amenity is "not significant".

Assessment of Suspended Dust (PM_{10}) Impacts

7.16 The IAQM minerals guidance considers that if the background PM_{10} concentration is less than 17 $\mu g.m^{-3}$, there is little risk that the process contribution (PC) would lead to an exceedance of the annual-mean objective and such a finding can be put forward qualitatively.

7.17 Existing PM10 concentrations have been characterised in Section 6 through a review of available air quality monitoring data for the area and Defra mapped estimated concentrations for the location. The Defra mapped concentration estimate of PM_{10} concentrations in the area surrounding the Application Site is 13.8 $\mu g.m^{-3}$ for the north of the site and 14.8 $\mu g.m^{-3}$ for the south.

7.18 As background PM^{10} concentrations are comfortably below 17 µg.m-3, there is little risk that the PC from the development would lead to an exceedance of the annual-mean objective. The impact on receptors in the surrounding area can therefore be considered negligible.

7.19 Notwithstanding that, a semi-quantitative assessment of the PM_{10} impact of the PC from the extraction works has been made for completeness and to provide a conservative approach. In terms of the expected process contribution (PC), earlier versions of Defra's Technical Guidance to local authorities on Local Air Quality Management stated that the approximate contribution to PM_{10} concentrations from industry (fugitive dusts, quarries, construction) is:

- variable, up to 5 µg.m^{-3} in the immediate local (very close) area; and
- variable, up to 2 µg.m^{-3} to the urban background.

7.20 On the basis of the above, and other recommendations in that guidance for screening assessment of fugitive and uncontrolled sources, RPS' own approach to the semi-quantitative assessment of PM_{10} contributions from these types of sources is to assume the following PCs:

- 5 µg.m^{-3} within 200 m of the actual source;
- 2 µg.m^{-3} between 200 m and 400 m;
- 1 µg.m^{-3} between 400 m and 1000 m; and
- <1 µg.m^{-3} beyond 1000 m

7.21 The total predicted environmental concentration (PEC) at local sensitive receptors has then been estimated by summing the abated PC and the background PM_{10} concentration. The estimated annual-mean PM_{10} concentrations at sensitive receptors are summarised in Table 7.3 Predicted Annual-Mean PM_{10} Concentrations at Sensitive Receptors

Table 7.4 Predicted Annual-Mean PM_{10} Concentrations at Sensitive Receptors

Receptor ID	Approx. Distance to Receptor (m)	Background (µg.m-3)	PC (µg.m-3)	PEC (µg.m-3)	% change in concentration relative to Air Quality Assessment Level (AQAL)	Impact Descriptor
Data Centre	100	13.8	5	18.8	10	Slight
Lake Drive	225	13.8	2	15.8	5	Negligible

7.22 The annual-mean PM_{10} concentrations with the development are predicted to be well below the annual-mean objective of 40 µg.m^{-3} at all sensitive receptors.

7.23 When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is described as 'negligible to slight'. The impact on the surrounding area from PM_{10} is considered to be 'slight' using the criteria adopted for this assessment and based on conservative assumptions, and is judged "not significant" and temporary.

8 Additional Mitigation

8.1 The air quality effects on the surrounding area are considered ‘slight’ and temporary. This level of effect is considered “not significant” and, on that basis, no additional mitigation measures are considered necessary over and above those incorporated into the design of the scheme as detailed in Section 5.

9 Residual Effects

9.1 The air quality effects on the surrounding area are considered ‘slight’ and temporary. This level of effect is considered “not significant”.

10 Cumulative Effects

10.1 Cumulative effects may need to be considered where a minerals development is close to another minerals site, or other dust generating sources. Cumulative effects are only likely to occur in the area where two or more proposed minerals developments or other dust generating sources are close to each other. No other minerals development or dust generating sources have been identified in the local area. Nonetheless, with the effective implementation of relevant mitigation measures at this development and any other development, the residual dust effects are unlikely to be significant.

11 Conclusions

11.1 This report considers the air quality effects from the proposed limestone extraction at land north of Priors Hall, Corby. The extracted limestone will be utilised as building material for later residential development.

11.2 The Application Site is not located within an AQMA and air quality at the site is generally good.

11.3 The proposed development is not expected to generate a substantial number of HGV movements and the impacts associated with emissions from vehicles on the local road network are expected to have an insignificant effect.

11.4 The disamenity dust effects and the PM_{10} effects on the surrounding area as a whole are predicted to be 'slight' and temporary based on conservative assumptions. This level of effect is considered "not significant" and, on that basis, no additional mitigation measures are considered necessary over and above those incorporated into the design of the scheme.

11.5 The proposed limestone extraction at land north of Priors Hall, Corby does not, in air quality terms, conflict with national or local policies. There are no constraints to the development in the context of air quality.

Glossary

AADT	Annual Average Daily Traffic Flow
ADMS	Atmospheric Dispersion Modelling System
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
Deposited Dust	Dust that has settled out onto a surface after having been suspended in air
DMP	Dust Management Plan
Dust	Solid particles suspended in air or settled out onto a surface after having been suspended in air
Effect	The consequences of an impact, experienced by a receptor
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
Impact	The change in atmospheric pollutant concentration and/or dust deposition. A scheme can have an 'impact' on atmospheric pollutant concentration but no effect, for instance if there are no receptors to experience the impact
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
R&A	Review and Assessment
Receptor	A person, their land or property and ecologically sensitive sites that may be affected by air quality
Risk	The likelihood of an adverse event occurring
Trackout	The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network

References

1 EPUK & IAQM (January 2017) Land-use Planning and Development Control: Planning for Air Quality

2 Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe.

3 Defra, 2010, The Air Quality Standards Regulations.

4 Defra, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 2.

5 Defra, 2016, Local Air Quality Management – Technical Guidance (TG16).

6 Vallack H W and Shilitto D E, 1998, Atmospheric Environment Vol.32 (No 16) pp.2737-2744.

7 Communities and Local Government, February 2019, National Planning Policy Framework

8 IAQM (May 2016) Guidance on the Assessment of Mineral Dust Impacts for Planning

9 Drawn from Defra Maps at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

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