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INTRODUCTION

9.1 This chapter considers the potential air quality effects associated with the operation of a proposed sand and gravel quarry (the 'proposed development') at the Hatfield Aerodrome (also known as the 'application site') upon the receiving environment.

9.2 This chapter should be read in conjunction with the supporting Appendices:

- **Appendix 9/1: Dispersion Modelling Methodology; and**
- **Appendix 9/2: Dispersion Modelling Results.**

Development Description

9.3 As set out in Chapter 3 above, the proposed development comprises the extraction and processing of 8Mt material over a period of around 30 years (based upon an annual output of around 250,000tpa). Excavated material would be processed at the quarry using a combination of screening and washing plant to produce a range of graded aggregates and sands.

9.4 Processed aggregates would be dispatched from the site in heavy good vehicles (HGV) via a new access constructed onto the A1057 Hatfield Road, on the southern side of the quarry. From the site entrance, an internal paved road would be constructed to a similar specification up until the plant area to facilitate loading and minimise vehicles travelling on internal unpaved surfaces.

9.5 A wheel washing facility will be in operation within the plant site to minimise suspension of dust/particulate matter (PM) on internal and external paved surfaces, following access to unpaved surfaces at the plant area.

Scope of Assessment

9.6 The objective of the assessment is to consider the potential air quality impacts arising from the operation of the proposed development on the surrounding environment. These impacts relate to emissions generated by road vehicles accessing the site, as well as on-site operational activities.

9.7 The scope of the assessment comprises:

- a review of baseline conditions at the application site;
- operational phase assessment, comprising:
  - assessment of emissions generated from road traffic accessing the site; and
  - assessment of fugitive dust/PM_{10} emissions generated from on-site activities.
- identification of appropriate mitigation measures, as required.

LEGISLATIVE CONTEXT, POLICY AND GUIDANCE

National Air Quality Legislation

Air Quality Standards Regulations

9.8 The Air Quality Standards Regulations 2010[1] include Limit Values, Target Values, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment. Limit values are legally binding and are considered to apply everywhere with the exception of the carriageway and central reservation of roads and any location where the public do not have access (e.g. industrial sites).

Air Quality Strategy

9.9 The UK Air Quality Strategy (AQS) 2007 for England, Scotland, Wales and Northern Ireland[2] provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the UK Government and Devolved Administrations for the protection of public health and the environment.

9.10 The AQS objectives are only applicable at locations:

- which are situated outside of buildings or other natural or man-made structures above or below ground; and
- where members of the public are regularly present.

9.11 As such, compliance with the objectives should focus on areas where members of the general public are present over the entire duration of the concentration averaging period specific to the relevant objective, herein referred to as 'relevant exposure'.

Local Air Quality Management

9.12 Part IV of the Environment Act 1995 induces a statutory duty for local authorities to undergo a process of Local Air Quality Management (LAQM). This requires local authorities to Review and Assess air quality within their boundaries to determine the likeliness of compliance, regularly and systematically.

9.13 Where any of the prescribed AQS objectives are not likely to be achieved, the authority must designate an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the objective. AQMAs can give rise to potential constraints to development, or at least a higher degree of scrutiny to air quality assessment work. Local authorities therefore have formal powers to control air quality through a combination of LAQM and through application of wider planning policies.

1 The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.
2 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra. July 2007.

Protection of Nature Conservation Sites

9.14 Ecological habitats vary in terms of their sensitivity, perceived ecological value, geographic importance, and level of protection. Within the UK, there are three types of nature conservation designations: international, national and local designations, which are all provided environmental protection from developments, including from atmospheric emissions, with a greater level of protection afforded to the former, relative to the latter.

9.15 The Conservation of Habitats and Species Regulations 2017 ('Habitats Regulations') introduces the precautionary principle for protected European sites, i.e. that projects can only be permitted to proceed; having ascertained that there will be no adverse effect on the integrity of the designated site. It requires an assessment to determine if significant effects (alone or in combination) are likely, followed by an 'appropriate assessment' by the competent authority, if necessary. European sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA). The Habitats Regulations were subsequently amended in 2019 to make them operable from 1 January 2021 despite the UK's withdrawal from the EU[3].

9.16 Other sites of international significance are Ramsar sites, which are wetlands protected under the 1971 Ramsar Convention[4]. Many of these sites in the UK were initially selected on the basis of their importance to waterbirds, and are therefore also classified as SPAs.

9.17 The Countryside and Rights of Way (CRoW) Act (2000) provides protection to Sites of Special Scientific Interest (SSSI) to ensure that developments are not likely to cause damage.

9.18 Locally important sites (such as National Nature Reserves (NNR), Local Nature Reserves (LNR), Local Wildlife Sites (LWS) or Sites of Importance for Nature Conservation (SINCs) and Ancient Woodland (AW)) are also protected by legislation to ensure that developments do not cause significant pollution.

General Nuisance Legislation

9.19 Part III of the Environmental Protection Act (EPA) 1990 (as amended) 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, amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises, as to be prejudicial to health or a nuisance, as a potential Statutory Nuisance. It also defines accumulation or deposit, which is prejudicial to health, as a nuisance.

Planning Policy

9.20 The following section presents planning policies relevant to the assessment, of which have been addressed throughout this assessment.

[3] The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

[4] Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat.

National Planning Policy

9.21 As noted from Chapter 4 above the National Planning Policy Framework (NPPF) describes the policy context in relation to pollutants, with specific reference to air quality its states:

"174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

[….]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... air … pollution ... Development should, wherever possible, help to improve local environmental conditions such as air … quality …"

[….]

"186. 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."

9.22 The NPPF is accompanied by supporting Planning Practice Guidance (PPG) which includes guiding principles on how planning can take account of the impacts of new development on air quality. In regard to air quality, the PPG states:

"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 generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife)."

9.23 The PPG sets out the information that may be required within the context of a supporting air quality assessment, stating that *"assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality […] Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact".*

9.24 Furthermore, in relation to minerals, the NPPF states:

"Planning policies should:

[….]

f) set out criteria or requirements to ensure that permitted and proposed operations do not have unacceptable adverse impacts on the natural and historic environment or human health, taking into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality."

9.25 The NPPF further states:

"When determining planning applications, great weight should be given to the benefits of mineral extraction, including to the economy. In considering proposals for mineral extraction, minerals planning authorities should:

[….]

b) ensure that there are no unacceptable adverse impacts on the natural and historic environment, human health or aviation safety, and take into account the cumulative effect of multiple impacts from individual sites and/or from a number of sites in a locality;

c) ensure that any unavoidable noise, dust and particle emissions and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties."

Local Air Quality Planning Policy

9.26 WHBC's current local plan is the Welwyn Hatfield District Plan[5] adopted in 2005, comprising saved policies. The following policy is of relevance to this assessment:

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'.

9.27 WHBC's new local plan (Welwyn Hatfield Local Plan[6]) is currently in the process of examination which will shape the future of local development up until 2032. The following policies are of relevance to this assessment:

Policy SADM 18:

"Air Quality

Prevailing air quality and potential impacts upon air quality arising from airborne emissions, dust and odour associated with the construction and operation of a proposal (including vehicular traffic) will be considered when determining planning applications. Proposals that would result in or be subject to unacceptable risk to human health and the natural environment from air pollution, or would prejudice compliance with national air quality objectives, will be refused.

[5] Welwyn Hatfield District Council. Welwyn Hatfield District Plan 2005.
[6] Welwyn Hatfield District Council. Draft Local Plan Proposed Submission. August 2016.

An Air Quality Assessment that demonstrates how prevailing air quality and potential impacts upon air quality have been considered and how air quality will be kept to an acceptable standard through avoidance and mitigation will be required for major and minor development proposals that are:

i. Likely, due to the nature of the proposal, to give rise to significant air pollution;

ii. Within an Air Quality Management Area;

iii. Within 50 metres of a major road or heavily trafficked route;

iv. Within proximity to a source of air pollution which could present a significant risk to human health; and/or v. Particularly sensitive to air pollution due to their nature, such as schools, health care establishments or housing for older people."

9.28 SADC's current local plan is The District Local Plan Review 1994[7], comprising saved policies. No policies relate to air quality.

Local Mineral Planning Policy

9.29 HCC have adopted their Minerals Local Plan[8] in 2007. The following policies relate to air quality:

Minerals Policy 18 – Operational Criteria for the Control of Mineral Development

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

[…] 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."

Assessment Guidance Documents

9.30 The air quality assessment has been undertaken in accordance with the principles outlined within the following guidance documents:

- Defra: 'LAQM Technical Guidance 16' (LAQM.TG(16)) (2021);
- Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK): 'Land-Use Planning and Development Control: Planning for Air Quality' (2017);
- IAQM: 'Guidance on the Assessment of Mineral Dust Impacts for Planning' (2016);
- United States Environmental Protection Agency: 'Air Pollutant 42' (US EPA AP-42) (2021);
- Australian Government: National Pollutant Inventory (NPI) 'Emission Estimation Technique Manual for Mining' Version 3.1 (2012); and
- EA: 'Monitoring Particulate Matter in Ambient Air around Waste Facilities' (2013).

[7] St Albans District Council. The District Local Plan Review 1994. Saved and Deleted Policies Version (July 2020).
[8] Hertfordshire Minerals Local Plan Review 2002 – 2016 (adopted March 2007).

Applied Environmental Standards

9.31 The sections below presents the environmental standards applied for the purposes of this assessment.

Ambient Concentrations

9.32 The ambient air quality standards of relevance to human receptors in this assessment (collectively termed Air Quality Assessment Levels (AQALs) throughout this report) are provided in Table 9-1.

Table 9-1
Relevant AQALs Applied

Pollutant	Standard (µg/m^3)	Measured As	Equivalent Percentile
Nitrogen Dioxide (NO_2)	40	Annual Mean	-
	200	1-hour Mean	99.79th percentile of 1-hour means (equivalent to 18 1-hour exceedences)
Particles (PM_{10})	40	Annual Mean	-
	50	24-hour mean	90.41th percentile of 24-hour means (equivalent to 35 24-hour exceedences)
Particles ($PM_{2.5}$)	25	Annual Mean	-

9.33 As per Defra's LAQM.TG(16), these AQALs should only be assessed at locations of relevant exposure i.e. where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period. These AQALs do not apply to exposure at the workplace. For further information including examples of relevant exposure for each exposure period, see LAQM.TG(16).

Dust Deposition

Human Receptors – Disamenity Dust

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

9.35 The EA's dust monitoring guidance (M17) proposes limit values for protection against dust annoyance for different monitoring methods that are acknowledged as coming into use through 'custom and practice'. A limit of 200mg/m^2/day is proposed for use with dust gauges as a guide at which the onset of nuisance might be experienced, and has therefore been adopted within this assessment.

Ecological Receptors – Dust Smothering

9.36 In relation to dust deposition, the physical effects on ecological receptors can be associated with blockage and damage to stomata (for small particle size 8-12µm), shading, and abrasion. However, there is limited published evidence and guidance available.

9.37 The IAQM minerals guidance suggests that a level of dust deposition is likely to lead to a change in vegetation at a rate of 1,000mg/m^2/day, as evidenced by research[9]. This value has commonly been prescribed in various other guidance documents (M17), and has therefore been adopted as an appropriate standard for the purposes of this assessment.

9.38 Application of this threshold is believed to be conservative; it is known that moist species appear to be unaffected until dust deposition rates are at levels considerably higher than this.

9.39 Effects associated with dust smothering on ecological sites should only be considered for distances up to 250m in relation to sand and gravel quarries, as per IAQM guidance.

METHODOLOGY

9.40 Detailed dispersion modelling of both road traffic and fugitive dust emissions generated by site activities has been undertaken in consideration of potential effects onto both sensitive human and ecological receptors.

9.41 This has involved the consideration of potential effects on human health associated with increases in ambient pollutant concentrations, as well as the loss of amenity and deterioration of sensitive ecological environments arising from dust deposition.

9.42 Modelling in relation to road traffic emissions has been undertaken through use of the Cambridge Environmental Research Consultants (CERC) ADMS-Roads dispersion model (v5.0.0.1), to predict concentrations of NO_2, PM_{10} and $PM_{2.5}$ at human receptor locations, for the following scenarios:

- 2019 Baseline (2019 BC) - Without development base flows for the year (2019);
- 2023 Do Minimum (2023 DM) - Without development flows for the proposed year of opening (2023), inclusive of any relevant committed development; and
- 2023 Do Something (2023 DS) – 'Do Minimum' flows, plus all trips associated with the Proposed Development flows for the proposed year of opening.

9.43 For the above future year scenario (DM and DS), 2019 emission factors and background pollutant concentrations have been used to reflect the opening year (2023). This theoretically assumes that there is no improvement in emission factors or background concentrations for the pollutants considered within the local area, relative to the verified year. These modelled scenarios are likely to represent a conservative approach as, despite uncertainty in quantification, it is generally accepted that variables such as background concentrations and/or vehicle emission factors will improve to some degree in future years, with local monitoring trends somewhat supporting this.

[9] 4 Farmer, A M, 1993. The effects of dust on vegetation – a review. Environmental Pollution 79, 63-75.

9.44 Modelling of fugitive dust emissions generated by on-site operation activities has been undertaken through use of the US American Meteorological Society and Environmental Protection Agency Regulatory Model (AERMOD v9) dispersion model. This has focussed on concentrations of $PM_{2.5}$ and PM_{10} for human receptors as well as the predicted dust deposition rates (as total suspended particles (TSP)) for both human and ecological receptor locations.

9.45 In the absence of dust emissions factors for similar quarry operations in the UK, emission factors and associated compilation methodologies provided within the following guidance documents have been used:

- Australian Government Department of the Environment and Heritage National Pollutant Inventory (NPI) 'Emission Estimation Technique Manual for Mining'; and
- United States Environmental Protection Agency 'Air Pollutant 42' (US EPA AP-42);

9.46 Application of these emission factors within the context of UK schemes is believed to be conservative given these relate to arid regions of the USA and Australia, therefore likely to over-predict the potential impacts. The modelling assessment quantified emissions from all operational processes, as well as control measures proposed to be implemented. This will determine whether additional mitigation measures (outside of those already proposed) are required.

9.47 Consideration was given to the phased excavation of material within the dispersion model, to ensure all worst case impacts (in terms of separation distance and orientation to nearby sensitive receptors) are understood and assessed.

9.48 Five year of meteorological data was used for the purposes of modelling fugitive dust emissions, whereby the maximum concentration (across all phases considered) has been used to account for conservatism and inter-year variability.

9.49 It is acknowledged that a recent planning application[10] for an extension of a sand and gravel quarry at Hatfield Quarry off Oaklands Lane, Hertfordshire (Land Adjoining Coopers Green Lane) located 2km north east of the application site has been submitted. To facilitate a cumulative assessment, maximum modelled PM_{10} (1.26µg/m^3) and $PM_{2.5}$ (0.89µg/m^3) concentrations reported within the accompanying health impact assessment[11] for all phases and receptors considered were added to the future year modelled concentrations. This ensures the assessment and resultant modelled concentrations considers potential future localised sources of PM concentrations in line with IAQM guidance. This approach is believed to be conservative on reflection, given that the development does not represent a committed development and as assumes the maximum calculated concentration from all receptors considered is constant across the modelled area (not accounting for dispersion and dilution with distance).

9.50 Where modelled contributions from road traffic and fugitive dust emissions overlap, these have been combined to provide a cumulative assessment. This is limited to $PM_{2.5}$ and PM_{10} concentration contributions at human receptors. In relation to the 24-hour mean PM_{10} AQAL, given the known

[10] Hertfordshire County Council, Planning Application PL\0963\18.
[11] Land adjoining Coopers Green Lane Extension to Hatfield Quarry, off Oaklands Lane, Hertfordshire Health Impact Assessment. CEMEX UK Operations Ltd and Gascoyne Cecil Estates. September 2018.

limitations with modelling short-term objectives for road traffic assessments, the empirical relation provided within LAQM.TG(16) has been adopted through combination of both outputs.

9.51 Full details of the dispersion modelling methodology are provided in **Appendix 9/1**.

Receptors

Human Receptors

9.52 Human receptors considered in the assessment are detailed in **Appendix 9/1**, whilst their locations are illustrated in **Figure 9-1**. These receptor locations are considered to capture worst-case relevant exposure relative to the Site, in accordance with LAQM.TG(16) and excludes workplace locations.

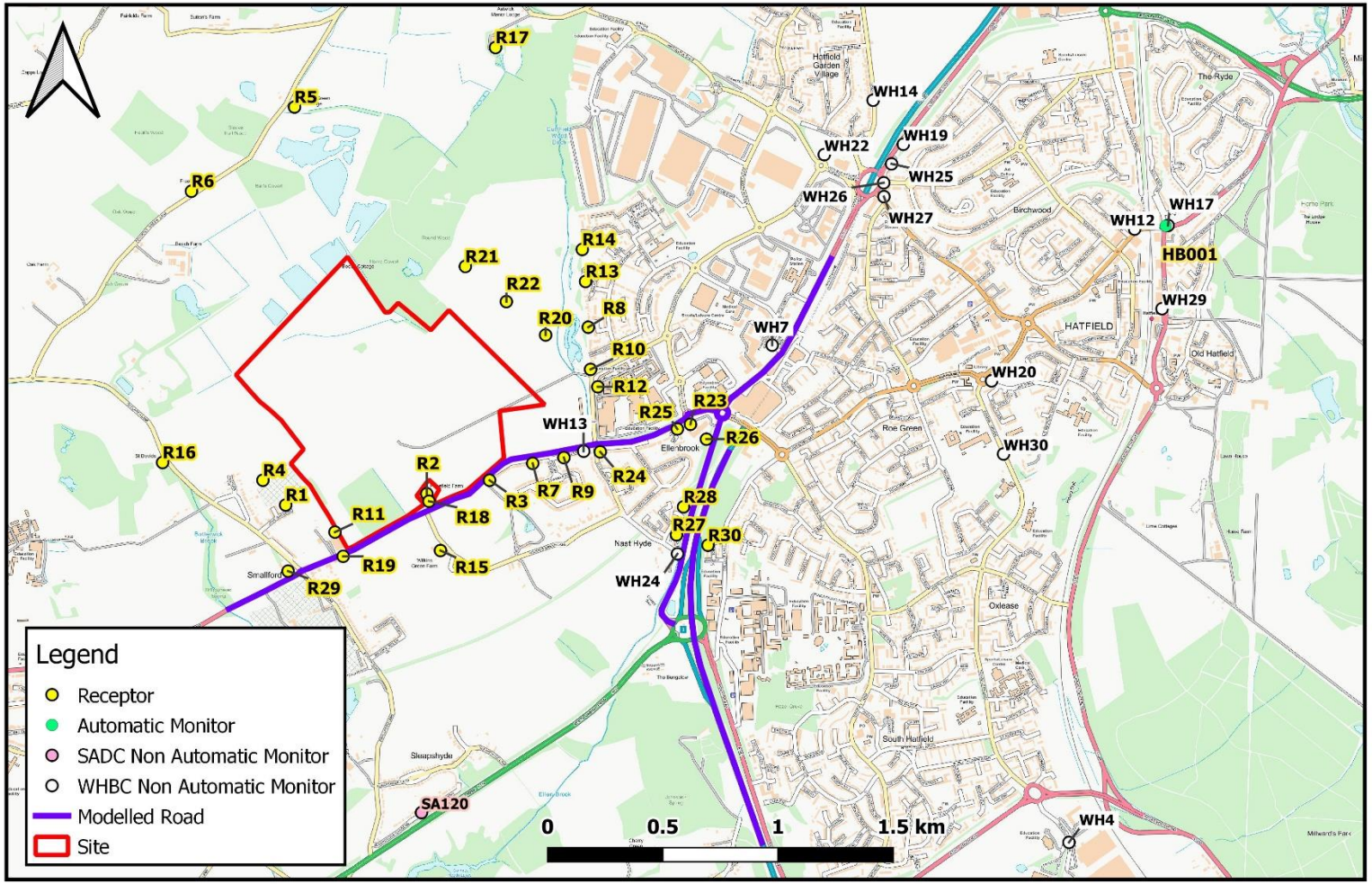
9.53 Consideration has also been given to land uses with sensitive populations for inclusion within the model (e.g. elderly care home, schools etc.).

9.54 Both sets of dust and road traffic sensitive receptor locations have been modelled in full to provide a complete assessment.

Ecological Receptors

9.55 No statutory ecological designations are located within 250m of the site boundary. Therefore, as per IAQM guidance, dust deposition impacts on ecological sites can be screened out and classed as insignificant. No further consideration is given herein.

Figure 9.1 - Modelled Road Network and Local Monitoring Locations Relative to the Site



Significance Criteria

Human Health

9.56 In relation to ambient AQALs at human receptor locations, the significance criteria provided within the EPUK/IAQM guidance document has been applied.

9.57 Whilst considering long-term AQALs, the significance criteria outlined in Table 9-2 has been used. Impacts are defined based upon the resultant total concentration at a specific receptor location, as well as the magnitude of change in relation to respective AQALs.

Table 9-2
Impact Descriptor Matrix for Long Term AQALs at Human Receptors

Long Term Resultant Concentration	Change in Concentration Relative to AQAL			
	1% [(A)]	2-5%	6-10%	>10%
75% or less of AQAL ('well-below')	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

[(A)] Changes <0.5% will be described as Negligible.

9.58 The EPUK/IAQM guidance requires a judgment on the significance of the 'effect' as 'significant' or 'not significant'. This is based upon the impact descriptors at receptors alongside other considerations that also have a bearing, including:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the worst case assumptions adopted when undertaking the prediction of impacts; and
- the extent to which the proposed development has adopted best practice to eliminate and minimise emissions.

Dust Deposition

Human Receptors

9.59 For the assessment of disamenity dust at human receptors, a deposition rate of 200mg/m^2/day has been adopted. If modelled deposition rates are below this threshold, impacts can be classed as insignificant.

BASELINE ENVIRONMENT

Ambient Air Quality

Local Air Quality Management

9.60 Both SADC and WHDC, in fulfilment of statutory requirements, have conducted an on-going exercise to review and assess air quality within their administrative area (Review and Assessment).

9.61 The latest publicly available LAQM reports (titled Annual Status Reports (ASR)) for both councils at the time of writing are as follows:

- 2020 ASR – WHBC[12]; and
- 2019 ASR – SADC[13].

9.62 WHDC do not presently have any declared AQMAs; however SADC have three at present. The nearest AQMA is located approximately 5km west of the application site in central St Albans, titled 'St Albans AQMA No. 1'. Given the separation distance relative to the proposed development, no further consideration has been given to this AQMA within this assessment.

Automatic Monitoring

9.63 Automatic monitoring is undertaken by WHBC at one location; however the location of this monitor could not be corroborated due to incorrect coordinates presented within the ASR.

9.64 The nearest monitor associated with the national Automatic and Urban Rural Network is located >10km away, and therefore has not been considered as not considered relevant to the study area.

9.65 Automatic monitoring is undertaken as part of the regional Hertfordshire and Bedfordshire Air Quality Network at two locations within WHBC, titled HB016 and HB001. Monitoring at HB016 commenced in September 2020 so therefore has not been considered. Monitoring at HB001 commenced in 2016 however limited to $PM_{2.5}$. HB001 is located approximately 2.7km east of the site within Hatfield at a roadside location.

9.66 Details and relevant 2016-2019 concentrations monitored at HB001 are presented in Table 9-3 and Table 9-4, whilst its location relative to the site is illustrated in **Figure 9-1**.

Table 9-3
Relevant Automatic Monitoring Locations: Details

Site ID	Site Type	Pollutants Monitored	X	Y	Distance to site
HB001	Urban Traffic	$PM_{2.5}$	523283	209161	2.7

Table 9-4
Relevant Automatic Monitoring Locations: $PM_{2.5}$ Annual Mean Results

[12] Welwyn Hatfield Borough Council, 2020 Air Quality Annual Status Report, 2020.
[13] St Albans District Council, 2019 Air Quality Annual Status Report, 2019.

Site ID	2019 Data Capture (%)	Annual Mean $PM_{2.5}$ Concentration (µg/m³)			
		2016	2017	2018	2019
HB001	97.3	13.2	12.7	11.0	9.8

9.67 For the period assessed (2016-2019), annual mean $PM_{2.5}$ concentrations were below the relevant AQAL.

Non-Automatic Monitoring

9.68 Passive NO_2 diffusion tube monitoring is currently undertaken by both WHBC and SADC within the development locale. The details and results of the monitoring locations of relevance to the site (i.e. within 1.5km of the site and adjacent/within the modelled domain) are presented in Table 9-5 and Table 9-6 respectively, whilst their locations are illustrated in **Figure 9-1**.

Table 9-5
Local LAQM NO_2 Passive Diffusion Tube Monitoring Sites: Details

Site ID	Site Type	X	Y	Height (m)	Distance to site (km)
WH7	Roadside	521575	208645	2.0	0.2
WH13	Urban Background	520757	208185	2.0	1.0
WH24	Urban Centre	521164	207740	2.0	0.9
SA120	Kerbside	520053	206618	2.3	1.3

Table 9-6
Local LAQM NO_2 Passive Diffusion Tube Monitoring Sites: 2015 – 2019 Results

Site ID	2019 Data Capture (%)	Annual Mean NO_2 Concentration (µg/m³)				
		2015	2016	2017	2018	2019
WH7	100	30	31	30	28	28
WH13	-	14	16	17	15	-

Site ID	2019 Data Capture (%)	Annual Mean NO_2 Concentration (µg/m³)				
		2015	2016	2017	2018	2019
WH24	100	39	44	40	38	36
SA120	-	31.5	30.3	30.3	29.3	-

9.69 Annual mean NO_2 concentrations at all locations of relevance to the site, with the exception of WH24 in 2016 and 2017 have been below the AQAL for the period assessed.

9.70 WH24 is located roadside of the A1001 Comet Way, not at a location of relevant exposure. Despite this, annual mean NO_2 concentrations have appeared to reduce year on year since 2016 to be below the AQAL, demonstrating improvements at key roadside locations, correlating somewhat to national projections.

9.71 Annual mean NO_2 concentrations recorded at the remainder of sites appear to be stable, and can largely be considered to be 'well below' the AQAL. WH13 is an urban background site located 0.2km from the site, however a 2019 concentration was not reported.

9.72 The empirical relationship given in LAQM.TG(16) states that exceedences of the 1-hour mean AQAL for NO_2 is unlikely to occur where annual mean concentrations are <60µg/m³. This indicates that an exceedence of the 1-hour mean AQAL is unlikely to have occurred at any of the monitoring sites between 2015 and 2019.

Defra Mapped Background Concentration Estimates

9.73 Defra maintains a nationwide semi-empirical model of projected background air quality concentrations at a 1km grid square resolution across the UK. The data sets include annual average concentration estimates for NO_x, NO_2, PM_{10} and $PM_{2.5}$ using a base year of 2018 (the year in which comparisons between modelled and monitoring are made)[14].

9.74 Annual mean background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ have been obtained from the Defra published background maps (2018 base year), based on the 1km grid squares which cover the modelled domain.

9.75 The Defra mapped background concentrations for the base year of 2019 are presented in Table 9-7.

Table 9-7
2019 Defra Mapped Background Pollutant Concentrations

Grid Square (X, Y)	Annual Mean Concentration (µg/m³)			
	NOx	NO_2	PM_{10}	$PM_{2.5}$
519500, 207500	18.8	13.8	15.4	10.3

[14] Defra Background Maps (2018-Reference) http://uk-air.defra.gov.uk/data/laqm-background-home.

Grid Square (X, Y)	Annual Mean Concentration (µg/m³)			
	NOx	NO_2	PM_{10}	$PM_{2.5}$
520500, 208500	18.3	13.6	15.4	10.1
519500, 208500	17.3	12.9	15.8	10.0
519500, 209500	15.2	11.4	14.9	9.7
520500, 209500	16.8	12.5	14.9	9.8
520500, 207500	18.8	13.9	16.0	10.3
518500, 208500	18.3	13.5	15.3	10.0
521500, 208500	29.0	20.3	17.1	11.2
521500, 207500	27.0	19.1	17.1	11.1
AQAL	-	*40*	*40*	*25*

9.76 All of the mapped background concentrations presented are well below the respective annual mean AQALs.

Meteorology

9.77 Figure 9-2 presents a wind rose recorded at Luton Airport for the cumulative period of 2015-2019. This demonstrates south-westerlies as the predominate wind in the area.

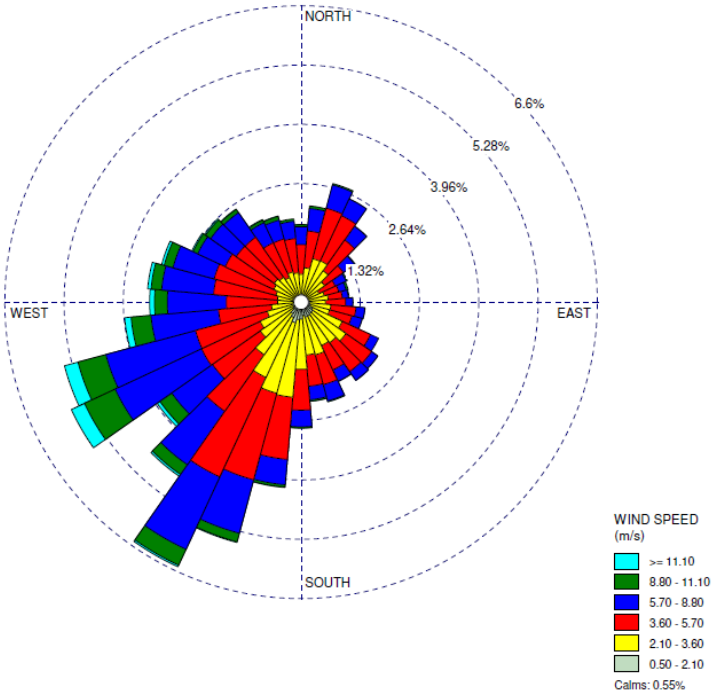


Figure 9-2
2015-2019 Meteorological Data Recorded at Luton Airport

9.78 From inspection of the meteorological data, 39.1% of the period with available data (i.e. four out of five years) precipitation >0.254mm/day, equating to circa 114 days per year where natural suppression of dust occurs irrespective of controls.

ASSESSMENT OF EFFECTS AND SIGNIFICANCE

Human Receptors - Health

9.79 A summary of modelled concentrations for worst-case human receptors is provided in turn below for each pollutant assessed, complete results are provided in **Appendix 9/1**. The worst-case receptors presented below refers to the location of maximum change and resultant predicted pollutant concentration.

NO_2 Modelling Results

9.80 Table 9-8 presents a summary of the annual mean NO_2 concentrations predicted for the 2019 BC, 2023 DM and 2023 DS scenarios.

Table 9-8
Predicted Annual Mean NO_2 Concentrations: Summary

Receptor	Predicted Annual Mean NO_2 Concentration (µg/m³)			% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2019 BC	2023 DM	2023 DS			
R19	19.8	19.9	20.1	0.5	50.3	Negligible
R30	29.3	29.7	29.8	0.2	74.5	Negligible

9.81 In accordance with EPUK and IAQM guidance, the impact of the development on annual mean NO_2 concentrations at all assessed existing receptors is considered to be 'negligible'. Furthermore, there are no predicted exceedences of the annual mean NO_2 AQAL, and are calculated to be 'well below' the AQAL.

9.82 Effects associated with annual mean NO_2 concentrations at all assessed receptor locations are therefore considered to be 'not significant', despite the conservative nature of the applied assessment methodology.

PM_{10} Modelling Results

9.83 Table 9-9 presents a summary of the annual mean PM_{10} concentrations predicted for the 2019 BC, 2023 DM and 2023 DS scenarios.

9.84 Modelled annual mean PM_{10} concentration contributions arising from on-site fugitive dust releases have been added to the 2023 DS reported concentration to facilitate a cumulative assessment.

Table 9-9
Predicted Annual Mean PM_{10} Concentrations: Summary

Receptor	Predicted Annual Mean PM_{10} Concentration (µg/m³)			% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2019 BC	2023 DM	2023 DS			
R3	16.4	17.7	18.1	0.9	45.3	Negligible
R30	19.6	21.0	21.0	0.1	52.5	Negligible

9.85 In accordance with EPUK and IAQM guidance, the impact of the development on annual mean PM_{10} concentrations at all assessed existing receptors is considered to be 'negligible'. Furthermore, there are no predicted exceedences of the annual mean PM_{10} AQAL, and are calculated to be 'well below' the AQAL.

9.86 Cumulative effects associated with annual mean PM_{10} concentrations at all assessed receptor locations are therefore considered to be 'not significant', despite the conservative nature of the applied assessment methodology.

9.87 Based upon the maximum predicted annual mean PM_{10} concentration of 21.0µg/m^3 (predicted at Receptor R30 – 2026 DS), this equates to less than 5 days where 24-hour mean PM_{10} concentrations are predicted to be greater than 50µg/m^3. This is well below the 35 permitted exceedences, and therefore the number of maximum exceedences is in compliance with the 24-hour mean AQAL. Cumulative effects associated with likely 24-hour mean PM_{10} concentrations at all assessed receptor locations are therefore considered to be not significant.

$PM_{2.5}$ Modelling Results

9.88 Table 9-10 presents a summary of the annual mean $PM_{2.5}$ concentrations predicted for the 2019 BC, 2023 DM and 2023 DS scenarios.

9.89 Modelled annual mean $PM_{2.5}$ concentration contributions arising from on-site fugitive dust releases have been added to the 2023 DS reported concentration to facilitate a cumulative assessment.

Table 9-10
Predicted Annual Mean $PM_{2.5}$ Concentrations: Summary

Receptor	Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m^3)			% Change of AQAL	% of 2023 DS Relative to AQAL	EPUK & IAQM Impact Descriptor
	2019 BC	2023 DM	2023 DS			
R3	10.7	11.6	11.7	0.4	46.8	Negligible
R30	12.6	13.5	13.5	<0.1	54.0	Negligible

9.90 In accordance with EPUK and IAQM guidance, the impact of the development on annual mean $PM_{2.5}$ concentrations at all assessed existing receptors is considered to be 'negligible'. Furthermore, there are no predicted exceedences of the annual mean $PM_{2.5}$ AQAL, and are calculated to be 'well below' the AQAL.

9.91 Cumulative effects associated with annual mean $PM_{2.5}$ concentrations at all assessed receptor locations are therefore considered to be 'not significant', despite the conservative nature of the applied assessment methodology.

Dust Deposition

Human Receptors – Dust Disamenity

9.92 From review of results presented in **Appendix 9/1**, the maximum modelled dust deposition rate at any human receptor considered was 7.5mg/m^2/day at Receptor R3. This equates to 3.7% of the applied assessment limit (200mg/m^2/day). Effects associated with dust disamenity can therefore be classed as insignificant.

CUMULATIVE EFFECTS

9.93 Cumulative consideration has been given to pollutant contributions associated with both road traffic and fugitive dust releases at human receptor locations, where relevant. Effects were found to be not significant.

9.94 Cumulative dust-led impacts from other quarries have the potential to arise where processes overlap at a receptor location. For human health (ambient PM concentrations), a 1km distance threshold is prescribed by IAQM guidance, consistent with national planning policy. Whereas for dust deposition effects (human and ecological), dust impacts from sand and gravel sites are uncommon beyond 250m from the nearest dust generating activities. As established above, no statutory ecological receptor exists within 250m of the site, therefore no cumulative impacts can arise.

9.95 It is acknowledged that a planning application for an extension of a sand and gravel quarry at Hatfield Quarry off Oaklands Lane (land adjoining Coopers Green Lane) is under consideration – located north east of the application site. A review of the health impact assessment submitted for that application was undertaken.

9.96 Dispersion modelling of proposed fugitive dust sources was undertaken in support the assessment, limited to three extraction sites (located approximately 2km north east from the application site) and supporting (new) infrastructure (e.g. conveyors). The full extent of new sources considered are located 1.3km from the application site. As such, cumulative effects associated with dust disamenity arising from the proposed extraction sites and supporting infrastructure can therefore be scoped out given the separation distances between proposed sources (>500m i.e. 250m + 250m process contribution overlap from sand and gravel sites) and limited likelihood of effects arising.

9.97 The Hatfield Quarry off Oaklands Lane sand and gravel quarry will be served by existing infrastructure (CEMEX Hatfield processing plant and supporting conveyor lines) located north and west of the application site. These sources were not considered as part of the Hatfield Quarry off Oaklands Lane dispersion modelling assessment on the assumption that throughput is to remain unchanged and are sufficiently distant from any new source for cumulative effects to arise. The processing plant is located approximately 200m from the application site. However, despite this all receptors considered are not found to be located within 250m from both sources. As such, cumulative effects associated with existing and proposed operations relative to the CEMEX Hatfield processing plant and supporting conveyor lines can be scoped out.

9.98 As discussed above, the maximum modelled PM_{10} and $PM_{2.5}$ concentrations reported within the accompanying health impact assessment (relating to proposed operations) for all receptors and phases considered has been added to the future year modelled concentrations to address potential cumulative impacts (i.e. 2023 DM and DS). This approach is believed to be conservative on reflection, as assumes the maximum modelled concentration at all receptors for those sources considered is constant across the modelled area, not accounting for dispersion and dilution with distance - contrary to established guidance (IAQM). Furthermore, this approach is considered to be suitably conservative in the absence of PM_{10} and $PM_{2.5}$ modelled contributions from existing sources (CEMEX Hatfield processing plant). Despite this, existing sources (such as the processing plant) are believed to be suitably covered through inclusion within the relevant background concentrations given that throughput is not expected to change.

9.99 In relation to road traffic emissions, traffic flows used for the air quality assessment includes vehicle movements associated with committed developments in the assessment area.

9.100 The air quality assessment, and the results presented are therefore inherently cumulative, where relevant.

9.101 Furthermore, all modelled concentrations/deposition rates are considered to be well-below the respective environmental benchmarks despite the conservative assessment methodology adopted (i.e. use of dust emission factors derived from arid conditions, 2019 road traffic emission factors and background concentrations). Therefore, the likelihood of a cumulative effect or exceedence arising outside of the operational envelope assessed is low.

MITIGATION

9.102 In relation to ambient AQALs at human receptor locations, the overall effect of the development on NO_2, PM_{10} and $PM_{2.5}$ concentrations at all assessed receptor locations is considered to be 'not significant', with concentrations considered to be 'well-below' the respective AQALs, despite the worst case assessment approach undertaken.

9.103 Furthermore, dust deposition rates modelled at all sensitive receptor locations are below the applied nuisance threshold.

9.104 As such, no further mitigation measures in relation to the operational phase of the development outside of those already proposed and encountered for within this assessment are not considered to be necessary. Those measures already proposed to be employed at the quarry, and evidenced to be effective in reducing on-site fugitive dust emissions are detailed in Table 9-11.

Table 9-11
Summary of Dust Control Measures

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

Site Operation	Dust Control Measures
Transport: Internal Movements	Controlled use of haul routes
	Haul routes to be regularly maintained by grading to minimise dust generation
	Speed controls of 10mph to be implemented on all haul routes
	Water bowsers to be used as required
	Mobile plant exhausts will discharge above the horizontal
Transport – access road	Controlled use of fixed haul routes
	All vehicles exiting the site carrying material are sheeted or totally enclosed as soon as possible after loading and before leaving site
	Speed controls to be implemented and enforced on all haul routes
	Operation of a wheel washing facility

CONCLUSIONS

9.105 An air quality assessment has been undertaken focusing on the air quality impacts arising from operation of a new sand and gravel quarry at Hatfield, in accordance with relevant guidance.

9.106 Detailed dispersion modelling of both road traffic and fugitive dust emissions generated by site activities has been undertaken in consideration of potential effects onto both sensitive human and ecological receptors. This has involved the consideration of potential effects on human health associated with increases in ambient pollutant concentrations, as well as the loss of amenity and deterioration of sensitive ecological environments arising from dust deposition.

9.107 In conclusion, all impacts assessed associated with the operational phase of the quarry were found to be not significant.