
Crest Nicolson Ltd

# LAND NORTHEAST OF HARPENDEN

## Air Quality Assessment

Revision F

Independent, multidisciplinary engineering and environmental consultants

# LAND NORTHEAST OF HARPENDEN

## Air Quality Assessment

**Document Reference: TR/VL/P24-3257/01 Rev F**


**Client:** Crest Nicolson Ltd

**Engineer:** Create Consulting Engineers (Create) Limited
2 The Chestnuts
Mill Farm Courtyard
Milton Keynes
MK19 6DS

**Tel:** 01908 015 400
**Email:** enquiries@createce.co.uk
**Website:** www.createce.co.uk


**Date:** July 2025

# DOCUMENT AND QUALITY CONTROL

| Revision/Date | Prepared By | Reviewed By | Approved By | Nature of Revision |
|---|---|---|---|---|
| Draft Issue February 2025 | Tara Rasoul, PhD, FMIEnvSc, FMIAQM | Paul Zanna, BSc (Hons) | Paul Zanna, BSc (Hons) | |
| Final Issue 04/07/2025 | Tara Rasoul, PhD, FMIEnvSc, FMIAQM | Paul Zanna, BSc (Hons) | Paul Zanna, BSc (Hons) | |
| Revision A 05/08/2025 | Tara Rasoul, PhD, FMIEnvSc, FMIAQM | Paul Zanna, BSc (Hons) | Paul Zanna, BSc (Hons) | Updated in line with the client's comments |
| Revision B 17/10/2024 | Tara Rasoul, PhD, FMIEnvSc, FMIAQM | Paul Zanna, BSc (Hons) | Paul Zanna, BSc (Hons) | Updated to client's comments |
| Revision C 24/10/2025 | Tara Rasoul, PhD, FMIEnvSc, FMIAQM | Paul Zanna, BSc (Hons) | Paul Zanna, BSc (Hons) | Updated the description of the development. |
| Revision D 18/11/2025 | Tara Rasoul, PhD, FMIEnvSc, FMIAQM | Tara Rasoul, PhD, FMIEnvSc, FMIAQM | Tara Rasoul, PhD, FMIEnvSc, FMIAQM | Updated the description of the development. |
| Revision E 11/12/2025 | Saba Manzoor, CEnv, MIEnvSC, MIAQM | Saba Manzoor, CEnv, MIEnvSC, MIAQM | Saba Manzoor, CEnv, MIEnvSC, MIAQM | Updated the development description. |
| Revision F 20/02/2026 | Saba Manzoor, CEnv, MIEnvSC, MIAQM | Saba Manzoor, CEnv, MIEnvSC, MIAQM | Saba Manzoor, CEnv, MIEnvSC, MIAQM | Updated the redline boundary and figures. |
| | | | | |
| | | | | |

# CONTENTS

# 1.0 INTRODUCTION

1.1 Create Consulting Engineers Limited (CCE) have been appointed by Crest Nicolson Ltd to undertake an Air Quality Assessment (AQA) in support of the planning application for the development at Land Northeast of Harpenden.

1.2 The proposals include: *"Outline Application for demolition of existing buildings and structures and construction of a mixed-use development comprising residential dwellings (including affordable housing), children's home, elderly extra care facility, local centre (flexible retail/health/community use), sports pitches and associated building, green infrastructure and landscaping works (to include public open space and community growing space); primary school with early years provision, vehicular and active travel infrastructure (including pedestrian and cycle access) and diversion of Bower Heath Lane; drainage works; and related infrastructure. All matters reserved save for access from Lower Luton Road."*

1.3 The completion year of the development is expected to be 2036.

## Site Description

1.4 The proposed development lies within the jurisdiction of St Albans City and District Council (SACDC). The site covers an area of 32.84 ha and is located just northeast of Harpenden. The site mainly comprises pasture fields with further fields, hedgerows, and woodlands to the north, east, and west. To the north, it is bordered by Bower Heath Road (B652), to the east by Lower Luton Road (B653), and to the south by residential properties and gardens along Nokeshot, Saxon Close, Dane Close, and Turners Close. Common Lane marks the western boundary. The red line boundary is shown in Figure 1.1.

## Assessment Scope

1.5 This report considers potential air quality impacts associated with both the construction and operation of the development. Likely changes to air quality in the area, as a result of the proposed development have been considered in relation to the UK Air Quality Objectives (AQOs). Also, where required, the AQA considers mitigation measures to reduce the effect of the proposed development upon local air quality.

1.6 In terms of the construction impacts, the development proposal will have the potential to generate dust, particulate matter ($PM_{10}$) during the construction phases. This has been assessed to provide an adequate level of dust mitigation and practices during the construction phases.

1.7 Vehicle movements generated during the operation of the development will give rise to $NO_2$, $PM_{10}$ and $PM_{2.5}$ emissions which will have potential impacts to worsen air quality within the area.


Figure 1.1: Location of the development site

# 2.0 LEGISLATION AND POLICY CONTEXT

## Environment Act 1995

2.1 The Environment Act 1995 placed a responsibility on the UK Government to prepare an Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland. The most recent version of the strategy (2023) sets out the current UK framework for air quality management and includes a number of AQOs for specific pollutants.

## Clean Air Strategy 2019

2.2 The primary focus of air quality management has primarily been related to $NO_2$ and its principal source in the UK, road traffic. The Clean Air Strategy aims to broaden the focus to other areas, including actions on clean growth, emissions from domestic wood burning stoves, industry and agriculture.

## Environment Act 2021

2.3 The Environment Act 1995 is being updated to include several changes that aim to improve air quality in England. These changes include a requirement for the Secretary of State to review the National Air Quality Strategy every five years, as well as a requirement for annual reports to be made to Parliament on the progress made towards achieving air quality objectives. Additionally, changes are being made to the way Air Quality Management Areas (AQMAs) are designated and managed.

2.4 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 set a new target for $PM_{2.5}$ in ambient air to reduce air pollution's environmental and health impacts. These Regulations come into force on the day after the day on which they are made:

> *The annual mean concentration target is that by the end of 31st December 2040 the annual mean level of $PM_{2.5}$ in ambient air must be equal to or less than 10 µg/m³ ("the target level").*

2.5 The Environmental Improvement Plan 2023 for England set interim targets by January 2028:

> *An annual average of 12 µg/m³ for $PM_{2.5}$ is not exceeded at any monitoring station.*

2.6 Table 2.1 details the current AQOs in relation to the proposed development and this assessment.

| Pollutant | Air Quality Objectives | | |
|---|---|---|---|
| | Concentration | | Measured as |
| Nitrogen Dioxide ($NO_2$) | 200 µg/m$^3$ | | 1-hour mean not to be exceeded more than 18 times per year |
| | 40 µg/m$^3$ | | Annual mean |
| Particulate Matter ($PM_{10}$) | 50 µg/m$^3$ | | 24-hour mean not to be exceeded more than 35 times per year |
| Particulate Matter ($PM_{2.5}$) | AQO | 20 µg/m$^3$ | Annual mean |
| | Interim target by 2028 | 12 µg/m$^3$ | |
| | Legally binding target by 2040 | 10 µg/m$^3$ | |

**Table 2.1: Air Quality Objectives (England)**

## National Planning Policy Framework 2024

2.7 The National Planning Policy Framework (NPPF), paragraph 199, states that:

*"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."*

2.8 *The NPPF, paragraph 200, states*:

*"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."*

## Environmental Protection Act 1990

2.9 The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations 2016 and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act 1990. The Act defines nuisance as:

> *"any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance."*

2.10 Enforcement of the Act, regarding nuisance, is currently under the administration of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no dust beyond the boundary of the works. The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practice measures.

## Local Planning Policy

### Harpenden Neighbourhood Plan

2.11 The Neighbourhood Plan has been created to ensure that new developments benefit Harpenden and its surrounding areas over the next 15 years.

**ESD1 – Design Strategy**

All developments must be visually attractive, designed to a high quality; maintain or enhance the character of the area and support Harpenden as a low carbon place to live and work.

For major developments in the Neighbourhood Plan Area, a Design Brief must be prepared and submitted in support of the planning application. The Design Brief should demonstrate consideration of the following (where applicable) in addition to the requirements of the other policies of this Neighbourhood Plan:

xi. How best practice measures have been used to avoid pollution to air, water and soil.

**ESD20 – Pollution**

Appropriate best practice measures should be incorporated into developments to avoid pollution to air, water and soil both during construction and in the operation of the completed development.

Developments should not increase air pollution levels in the area and actions should be taken to mitigate this such as planting, appropriate siting of air outlets, and designing to ensure any air pollution can dissipate.

Developments should be designed to minimise light pollution for example by appropriate siting of lights, appropriate light fittings, and management of external lighting.
Key Guidance Documents.

## Key Guidance Documents

### Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

2.12 This guidance provides advise, methodology and criteria to assess the dust impacts that arise from construction activities. This assessment evaluates the impact of dust soils and human health impacts during the demolition, earthworks, construction and trackout activities. The methodology is replicated in Appendix A of this report.

## Land Use Planning and Development Control: Planning for Air Quality (EPUK-IAQM, 2017)

2.13 This guidance includes a method for screening the requirement for an air quality impact assessment and whether a detailed assessment is required. The methodology is reproduced in Appendix B of this report.

## A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM 2020)

2.14 This document is designed to provide assistance into the assessment of the air quality impacts of development on designated nature conservation sites. The document focuses on air quality assessments in support of Habitats Regulations Assessments, however, is useful when assessing the air quality impact on national or local designated nature conservation sites. The methodology is reproduced in Appendix C of this report.

## Local Air Quality Management Technical Guidance (LAQM.TG22)

2.15 This technical guidance is used by local authorities in their review and assessment work. LAQM is a statutory process through which local authorities are required to monitor, assess, and take actions to improve local air quality.

2.16 Within this guidance, Box 1.1 contains examples where air quality objectives should apply. Annual mean objectives for $NO_2$ and $PM_{10}$ should apply at locations where members of the public might be regularly exposed, including building façades of residential properties, school, hospitals and care homes.

2.17 The following impacts should be assessed with the consideration of cumulative effects from other planned or proposed developments within the area:

- Impact of the proposed development upon the local air quality; and
- The impact of local air quality on the receptors using the development.

2.18 The methodology is reproduced in Appendix B of this report.

## $PM_{2.5}$ Targets: Interim Planning Guidance

2.19 The interim guidance, published on 4 October 2024 by DEFRA, applies to future developments and those in pre-application stages at the time of publication. The guidance shifts the focus from solely assessing the risk of exceeding legal air quality limits to ensuring that mitigation measures are incorporated during the design phase. This approach aims to streamline the planning process while minimising pollution emissions and exposure. Until the release of the final guidance, applicants are advised to demonstrate in their planning applications that they have identified key sources of air pollution within their schemes and have taken appropriate measures to minimise emissions of $PM_{2.5}$ and its precursors as far as practicable.

2.20 The following questions are designed to support the interim process; however, applicants are encouraged to consider additional measures beyond those listed below:

1. **How has exposure to $PM_{2.5}$ been considered when selecting the development site?**

*Applicants are advised to consider the following in their application*:

- *Site proximity to people (particularly large populations and/or vulnerable groups, e.g. schools, hospitals, care homes, areas of deprivation) and the impact of the development on these,*
- *Site proximity to pollution sources and the impact of these on users of the development,*
- *Exposure and emissions during both construction and in-use.*

2. **What actions and/or mitigations have been considered to reduce $PM_{2.5}$ exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of $PM_{2.5}$ and its precursors?**

*Applicants are advised to explain (with evidence where possible) why each measure was implemented. Or, if no mitigation measures have been implemented, why this was not proposed. Actions can refer to, but are not limited to, the following*:

- *Site layout,*
- *The development's design,*
- *Technology used in the construction or installed for use in the development,*
- *Construction and future use of the development.*

# 3.0 BASELINE CONDITIONS

3.1 Baseline data was gathered from the following sources:

- SACDC's 2024 Air Quality Annual Status Report;
- DEFRA's UK AIR website; and
- DEFRA's national air quality background maps 2018.

## Local Air Quality Management

### Air Quality Management Areas

3.2 As required by the Environment Act (1995), SACDC has undertaken a review and assessment of air quality within their administrative area. There is one designated AQMA for elevated annual mean $NO_2$ and 24-hour mean $PM_{10}$ concentrations above their respective AQOs.

3.3 This AQMA is not located within close proximity of the proposed development. There are no other neighbouring AQMA's within close proximity of the proposed development. Therefore, AQMAs have not been assessed any further within this report.

## Air Quality Monitoring Data

3.4 Data was taken from SACDC's 2024 Air Quality Annual Status. Concentrations measured in 2020 and 2021 should be perceived with caution due to the COVID-19 pandemic where lockdown would have disrupted usual traffic patterns in the UK. These concentrations are likely to be lower than expected in an ordinary year.

### Automatic Monitoring Locations

3.5 There is no automatic monitoring undertaken by St Albans City & District Council in 2022.

### Non-Automatic Monitoring Locations

3.6 SACDC operated 50 passive monitoring stations (diffusion tubes) within the area in 2023. Table 3.1 shows diffusion tube monitoring results within 2 km of the site. The closest monitoring site, SA110, is approximately 1,410 km south of the site, while SA109 is approximately 1,850 km southwest.

| Site ID | Site Name | NGR | | Site Type | Annual Mean $NO_2$ Concentrations ($\mu g/m^3$) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | | 2019 | 2020 | 2021 | 2022 | 2023 |
| SA110 | Crabtree JMI | 514438 | 214353 | Kerbside | 21.2 | 12.3 | 12.9 | 13.0 | 11.5 |
| SA109 | Crabtree Lane Harpenden | 513427 | 214308 | Kerbside | 26.9 | 15.9 | 18.0 | 19.3 | 17.9 |
| SA112 | High Street Harpenden | 517727 | 214041 | Kerbside | 26.1 | 19.6 | 20.6 | 19.7 | 17.9 |
| SA159 | High Street Wheathampstead | 517727 | 213901 | Roadside | 28.8 | 19.4 | 21.1 | 20.2 | 18.8 |

**Table 3.1: Diffusion Tube Monitoring Results**

3.7 Table 3.1 shows there have been no exceedances of the annual mean $NO_2$ AQO at any monitoring station in recent years.

## Mapped Background Pollution

3.8 Predictions of background pollutant concentrations on a 1km-by-1km grid basis have been produced by DEFRA for the entire of UK to assist Local Authorities (LAs) in their Review and Assessment of air quality.

3.9 The proposed development site is located in grid squares NGR: 514500, 216500. Predicted background concentrations for the baseline year (2022), the present year (2025), and 2030 are shown in Table 3.2.

3.10 There is no background data for 2036 when the development is expected to be fully completed and therefore 2030 has been used to provide the furthest predicted data available.

| Pollutant | Predicted Background Concentration (µg/m³) | | |
|---|---|---|---|
| | 2022 | 2025 | 2030 |
| $NO_X$ | 12.93 | 12.10 | 10.45 |
| $NO_2$ | 9.86 | 9.20 | 8.07 |
| $PM_{10}$ | 14.30 | 13.95 | 13.76 |
| $PM_{2.5}$ | 9.15 | 8.88 | 8.73 |

**Table 3.2: DEFRA Predicted Background Concentrations**

3.11 As shown in Table 3.2, background concentrations do not exceed the relevant AQOs and are predicted to decline further by the year of completion.

# 4.0 DISPERSION MODEL ASSESSMENT INPUTS

4.1 The built and occupied development has the potential to expose future site users to elevated pollutant concentrations. To assess $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations across the site, detailed dispersion modelling was undertaken in accordance with the following methodology.

## Dispersion Model

4.2 Dispersion modelling was undertaken using the ADMS-Roads Extra dispersion model (version 5.0.1.3). ADMS-Roads Extra is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

## Input Data

4.3 The model requires input data that details the following parameters:

- Emission Factors;
- Traffic Flow Data;
- Diurnal Profiling;
- Energy Inputs;
- Meteorological data;
- Roughness length;
- Monin-Obukhov length;
- Background Concentrations;
- Verification Factor; and
- Sensitive Receptor Locations.

## Emission Factors

4.4 Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (Version 12.0) released in December 2023.

## Traffic Flow Data

4.5 Three scenarios have been modelled as follows:

- S1 – baseline scenario (2022)
- S2 – Opening year without the development scenario (2036)
- S3 – Opening year with the development scenario (2036)

4.6 Traffic data for this scheme for S1 was obtained from The Department for Transport's (DfT's) Traffic Count Website.

4.7 The DfT Matrix web tool enables the user to view and download traffic flows on every link of the A-road and motorway network in Great Britain for the years 1999 to 2023. It should be noted that the DfT matrix is referenced in DEFRA guidance LAQM.TG22 as being a suitable source of data for air quality

assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.

4.8 The baseline model was verified against the monitoring station SA109. The verification monitoring station and the road links used in the S1 scenario are shown in Figure 4.1. A summary of the traffic data used in S1 scenario is provided in Table 4.1.

4.9 Traffic data for the S2 and S3 scenarios was supplied by the project's transport consultants, SLR Consulting. A summary of the traffic data for these scenarios is presented in Table 4.2, with the relevant road links shown in Figure 2.

4.10 Vehicle speeds were estimated based on the free flow 'potential' of each link and local speed limits. Road widths were estimated from aerial photography and UK highway design standards.

4.11 In accordance with the modelling methodology, different speeds for road links have been used for the base plus development traffic approaching at busy junctions and delays during peak/off peak. The road width stayed the same for all modelling scenarios. The mean vehicular speeds stayed the same for all modelling scenarios.

| Link ID | Road Link | Average Road Width (m) | Mean Vehicle Speed (km/h) | S1 | |
|---|---|---|---|---|---|
| | | | | 24-hour AADT Flow | HDV % |
| L1 | High Street, A1081 | 10 | 32 | 16871 | 1 |

**Table 4.1: Traffic Data Input for S1 Modelling Scenario**

| Link ID | Road Link | Average Road Width (m) | Mean Vehicle Speed (km/h) | S2 | | S3 | |
|---|---|---|---|---|---|---|---|
| | | | | 24-hour AADT Flow | HDV % | 24-hour AADT Flow | HDV % |
| L1 | Lower Luton Road (West of Bower Heath Lane) | 7 | 64 | 11902 | 2 | 12857 | 2 |
| L2 | Bower Heath Lane | 7 | 64 | 1851 | 2 | 1946 | 2 |
| L3 | Lower Luton Road (East of Westfield Road) | 6 | 48 | 11457 | 3 | 13605 | 3 |
| L4 | Common Lane | 3 | 48 | 2163 | 2 | 2163 | 2 |
| L5 | Station Road (South of Lower Luton Road) | 6 | 48 | 10925 | 2 | 12063 | 2 |
| L6 | Lower Luton Road (East of Station Road) | 6 | 32 | 14973 | 3 | 15764 | 3 |

**Table 4.2: Traffic Data Input for S2 and S3 Modelling Scenarios**

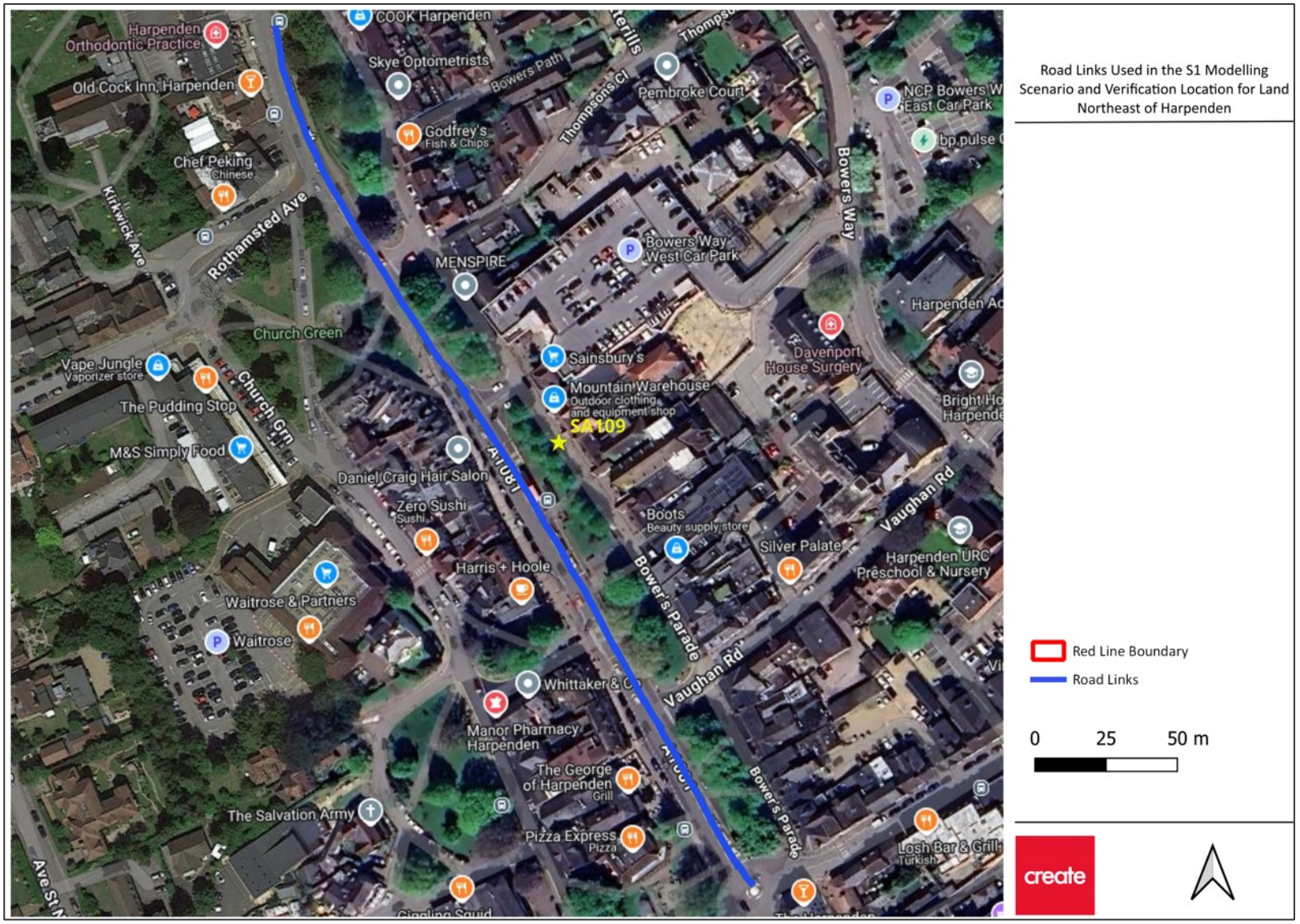


**Figure 4.1: Road Links Used in the S1 Modelling Scenario and Verification Monitoring Location**


Figure 4.2: Road Links Used in the S2 and S3 Modelling Scenarios

## Diurnal Profiling

4.12 A 2022 national diurnal profile was added to all scenarios to evaluate the distribution of traffic across the week within the model. A representation of the profile is shown in Figure 4.3.

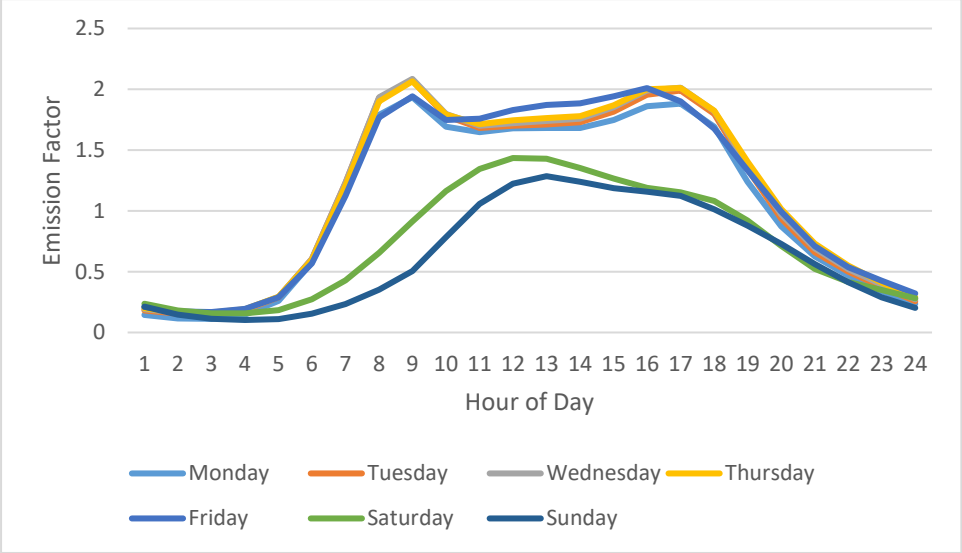


**Figure 4.3: 2022 National Diurnal Profile**

## Energy Inputs

4.13 The development will use Air Source Heat Pumps to provide heating arrangements to the housing units. As a result, the development will not produce any $NO_x$ emissions and further energy inputs have been screened out of the modelling assessment.

## Meteorological Data

4.14 Meteorological data used in this assessment was taken from Luton Airport meteorological station over the period 1st January 2022 to 31st December 2022 (inclusive) as shown in Figure 4.4 This meteorological station is located approximately 5.1 km northwest of the proposed development site.

4.15 All meteorological records used in the assessment were provided by Air Pollution Services Ltd, which is an established distributor of data within the UK.

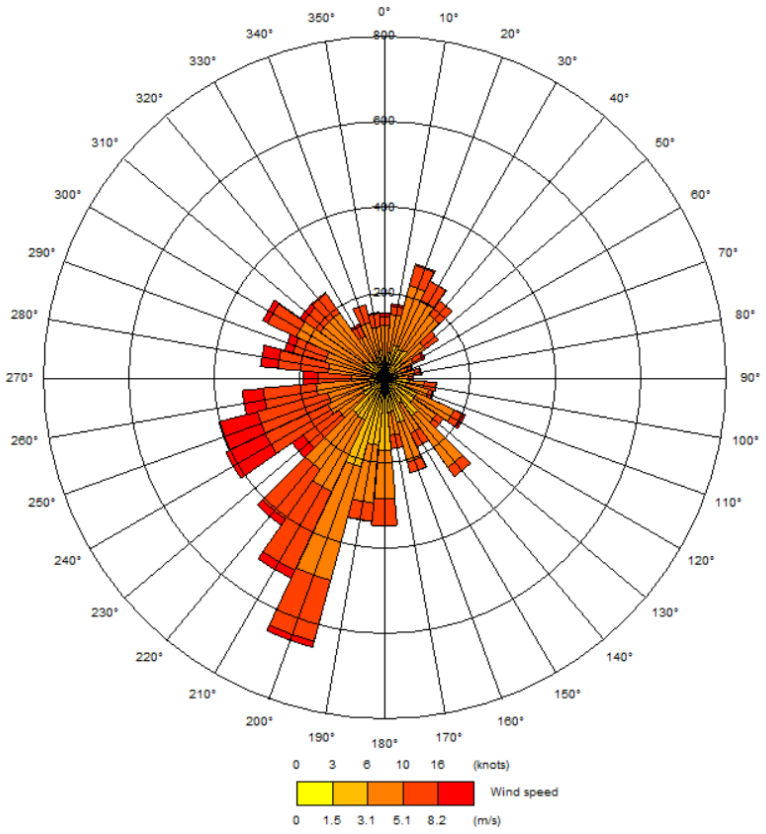


**Figure 4.4: 2022 Wind Rose for Church Lawford Meteorological Station**

## Roughness Length

4.16 A roughness length (z0) of 0.5 m was used for the dispersion site. This value is considered appropriate for the morphology of the assessment area, which is suggested within ADMS-Roads Extra as being suitable for 'Parkland, open suburbia'.

4.17 A roughness length (z0) of 0.02m was used for the dispersion site and meteorological site. This value is considered appropriate for the morphology of the meteorological area, which is suggested within ADMS-Roads Extra as being suitable for 'Open grassland.

## Monin-Obukhov Length

4.18 A minimum Monin-Obukhov length of 10 m was used in the assessment area for both the dispersion and meteorological sites. This value is considered appropriate for the nature of the assessment area and is suggested within ADMS-Roads Extra as being suitable for 'small towns<50,000'.

## Background Concentrations

4.19 There are no background monitoring stations for $NO_2$, $PM_{10}$ and $PM_{2.5}$ within close proximity of the proposed development. Therefore, DEFRA's background maps were used to provide background concentrations in the model.

4.20 Concentrations used within the model are as follows:

- $NO_2$ annual concentration of 9.86 µg/m$^3$;

- $PM_{10}$ annual concentration of 14.30 µg/m$^3$; and
- $PM_{2.5}$ annual concentration of 9.15 µg/m$^3$.

4.21 Background concentrations for 2022 were utilised in preference to the development's completion year, 2036. This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operational phase of the proposals.

## Verification Factor

4.22 The comparison of modelled concentrations with local monitored concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations.

4.23 The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including:

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and
- Uncertainties associated with monitoring data, including locations

4.24 For this assessment the model verification was undertaken for 2022, using traffic data, meteorological data and background concentrations from this year. Monitoring Station SA109 was used within the modelled road network to verify the model.

### Verification Factor for $NO_2$

4.25 The monitored and modelled road contribution concentrations for $NO_2$ were graphed and the equation of the trendline based on the linear progression through zero was calculated. The results for predicted versus monitored $NO_2$ concentrations are shown in Figure 4.5 and Table 4.3.

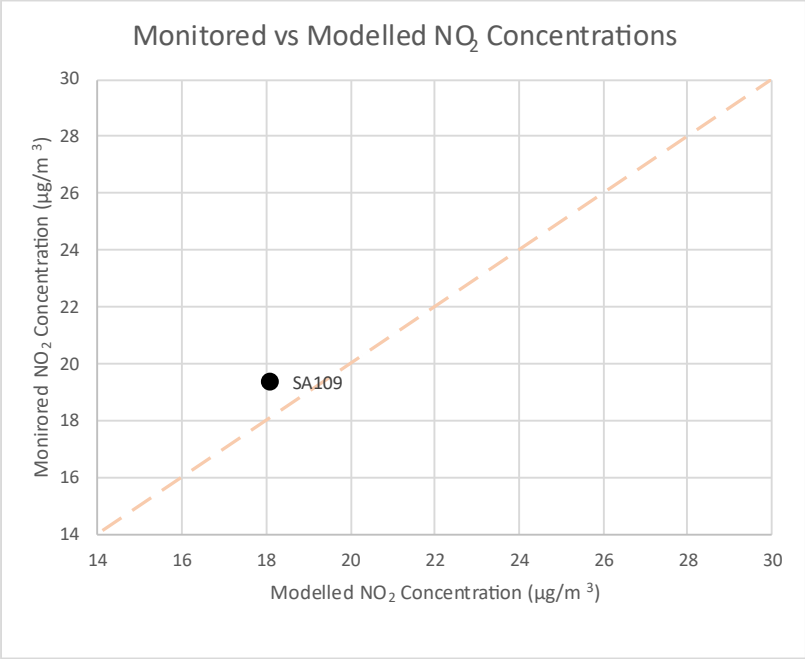


**Figure 4.5: Monitored vs Modelled $NO_2$ Concentrations**

| Site ID | Monitored Road $NO_2$ Concentration ($\mu g/m^3$) | Modelled Road $NO_2$ Concentration ($\mu g/m^3$) | Difference (%) |
|---|---|---|---|
| SA109 | 19.30 | 18.14 | -6.04 |

**Table 4.3: Monitored vs Modelled $NO_2$ Concentrations**

4.26 The results in Figure 4.5 and Table 4.3 show that the modelled annual $NO_2$ concentrations do not align with the monitored annual concentrations. The overall difference between the modelled and measured $NO_2$ concentrations is -6.04%. As such, a verification factor of 1.06423 has been added to the modelling $NO_2$ results.

4.27 Table 4.4 presents the adjusted modelled $NO_2$ concentration using the verification factor.

| Site ID | Monitored $NO_2$ Concentration ($\mu g/m^3$) | Adjusted Modelled Total $NO_2$ Concentration ($\mu g/m^3$) | Difference (%) |
|---|---|---|---|
| SA109 | 19.30 | 19.30 | 0.00 |

**Table 4.4: Monitored vs Adjusted Modelled $NO_2$ Concentrations**

4.28 Table 4.4 shows that the addition of the verification factor creates a 0.00% difference between the monitored and modelled data at B4. Therefore, the modelled dispersion area is aligned with the actual area.

## Verification Factor for $PM_{10}$ and $PM_{2.5}$

4.29 There are no monitoring stations that monitor $PM_{10}$ and $PM_{2.5}$ concentrations within the vicinity of the proposed development and therefore these pollutants were not modelled in the baseline modelling scenario.

4.30 As a result, a factor of 1.06423 was derived from the $NO_2$ verification factor and utilised to adjust model predictions for $PM_{10}$ and $PM_{2.5}$, in accordance with the guidance provided within LAQM.TG22.

## Sensitive Receptor Locations

4.31 Existing and future human receptors were modelled at locations across the proposed development, as detailed in Table 4.5 and Figure 4.6. Human receptors were modelled at a height of 1.5 m to represent ground-level exposure. The ecological receptor locations were modelled at a height of 0 m to represent vegetation level.

| Receptor ID | Location | NGR (m) | |
|---|---|---|---|
| | | X- Axis | Y-Axis |
| R1 | Sauncey Wood Primary School | 514710 | 215632 |
| R2 | Katherine Warington School | 514997 | 215095 |
| R3 | 39 Common Ln | 514968 | 215287 |
| R4 | 1 Sauncey Wood | 514970 | 215956 |
| R5 | Bower Heath Lane | 514295 | 216641 |
| R6 | Bower Heath Lane | 514276 | 216471 |
| R7 | River Lea | 514096 | 215872 |
| R8 | Noah's Ark Pre-School | 514143 | 215786 |
| R9 | 12 Riverbanks Cl | 514188 | 215714 |

| Receptor ID | Location | NGR (m) | |
|---|---|---|---|
| | | X- Axis | Y-Axis |
| R10 | 8 Millstone Wy | 514206 | 215646 |
| R11 | 162 Lower Luton Rd | 514242 | 215621 |
| R12 | 28 Millstone Wy | 514248 | 215539 |
| R13 | Kelverion UK Ltd | 514326 | 215429 |
| E1 | Batford Springs LNR | 514582 | 215220 |
| E2 | Batford Springs LNR | 514630 | 215190 |

**Table 4.5: Sensitive Receptor Locations**


**Figure 4.6: Sensitive Receptor Locations**

# 5.0 CONSTRUCTION PHASE ASSESSMENT

5.1 There is the potential for air quality impacts because of the change of use of the site. The methodology for this assessment is detailed in Appendix A.

## Sensitive Receptors

5.2 A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for construction dust impacts in the following Sections.

5.3 The proposed development is surrounded by residential receptors to the east and south of the site boundary. Additionally, to south lies Arborfield Studios. There are a few industrial developments located within close proximity to the site.

5.4 Based on the criteria shown in Table A2, Appendix A, the sensitivity of the receiving environment to potential dust impacts is considered to be high for residential receptors and medium for industrial and commercial receptors. This is because users would expect to enjoy a high and reasonable level of amenity, respectively.

## Ecological Receptors

5.5 Ecological receptors were analysed using Magic Maps website which provides authoritative geographic information about the natural environment from across the government. This application is managed by Natural England. The application showed that the site boundary and trackout route are not within 50 m of an ecological receptor.

5.6 There are no ecological designations in close proximity to, the site including Sites of Special Scientific Interest, Special Areas of Conservation, or Special Protection Areas. Batford Springs local Nature Reserve (LNR) is 450m to the southwest of the site and Marshalls Heath LNR is 1km to the southeast.

5.7 The Batford Springs LNR was considered in this assessment as receptors E1 and E2, where pollutant concentrations were predicted.

## Construction and Trackout Sensitive Receptors

5.8 Receptors sensitive to potential dust impacts during all construction activities were identified from a desk-top study of the area up to 250 m from the development boundary. These are summarised in Table 5.1.

| Distance from Site Boundary (m) | Approximate Number of High Sensitivity Receptors |
|---|---|
| Less than 20 | 10 - 100 |
| Less than 50 | 10 - 100 |
| Less than 100 | More than 100 |
| Less than 350 | More than 100 |

**Table 5.1: Construction Activities Dust Sensitive Receptors**

5.9 Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 250 m of the site and within 50 m of the road. These are summarised in Table 5.2.

5.10 The exact construction vehicle access routes are not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. It is expected that vehicles will use Lower Luton Road and Common Lane to access the development.

| Distance from Site Access Route (m) | Approximate Number of Medium Sensitivity Receptors | Approximate Number of High Sensitivity Receptors |
|---|---|---|
| Less than 20 | More than 100 | 10-100 |
| Less than 50 | More than 100 | More than 100 |

**Table 5.2: Trackout Activities Dust Sensitive Receptors**

## Additional Factors

5.11 The wind direction is predominantly from southwesterly, as shown in Figure 4.4. As such, receptors to the northeast are mostly affected by dust emissions.

5.12 A review of SACDC planning portal shows that there are no approvals for large scale developments in close proximity to the proposed development site boundary.

5.13 The development will be constructed over several phases, where the localised impact to nearby receptors will keep changing. It is not expected that one set of receptors will be subjected to construction activities and dust for more than two years. Therefore, the long-term dust impact on receptors will be low.

## Sensitivity of the Surrounding Area

5.14 Sensitive receptors have been assessed based on distance from the source and annual mean $PM_{10}$ concentrations within the area. This has been used to determine the sensitivity of the surrounding area to demolition, earthworks, construction and trackout activities.

5.15 Table 5.3 shows the sensitivity of the surrounding area in relation to dust soiling, human health impacts and ecological impacts for each of the construction activities.

| Potential Impact | Sensitivity of the Surrounding Area | | | |
|---|---|---|---|---|
| | Demolition | Earthworks | Construction | Trackout |
| **Dust Soiling** | High | High | High | High |
| **Human Health** | Low | Low | Low | Low |

**Table 5.3: Sensitivity of the Surrounding Area**

## Construction Phase Assessment

5.16 The undertaking of activities such as excavation, ground works, cutting, construction and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from haul road and highway surfaces.

5.17 The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

5.18 The development is likely to take place on a phased approach, however for the basis of this assessment, the development has been assessed as a whole package. There is currently no data available on the construction-based activities. Therefore, professional judgment has been used to assess each activity.

## Demolition

5.19 It is proposed to demolish the existing Green Acres Equestrian Centre. The total building volume to be demolished is less than 12,000 $m^3$ and includes potentially dusty materials such as concrete. Demolition activities, including on-site crushing, will occur at heights between 6 m and 12 m above ground level.

5.20 In accordance with the criteria outlined in Table A1, the magnitude of potential dust emissions from earthworks is therefore medium.

## Earthworks

5.21 Earthworks will primarily involve excavating material, haulage, as well as site levelling and landscaping. The British Geological Survey website informs that the soil types lie beneath the site is Lewes Nodular Chalk Formation and Seaford Chalk Formation, alongside Holywell Nodular Chalk Formation and New Pit Chalk Formation. The total site area is more than 110,000 $m^2$. Due to the size of the site area, there may be more than 10 HGVs active at any one time. Height of bunds expected to be up to 6 m.

5.22 In accordance with the criteria outlined in Table A1, the magnitude of potential dust emissions from earthworks is therefore large.

## Construction

5.23 The construction activities will involve the erection of up to 500 residential units, a primary school, care home and associated infrastructure with associated infrastructure. The total construction volume will be over 75,000 $m^3$. Various materials will be used for the construction of dwellings including concrete, timber, metals and/or cladding. It is unknown if on-site concrete batching and/or sandblasting will take place and therefore has been included in this assessment.

5.24 In accordance with the criteria outlined in Table A1, the magnitude of potential dust emissions from construction works is therefore large.

## Trackout

5.25 Trackout activities will include vehicles accessing and leaving the site with new construction materials and site waste. Unpaved road is expected to be more than 100, m with trackout materials comprising from chalk. The number of HGV movements per day is expected to be more than 50 movements.

5.26 In accordance with the criteria outlined in Table A1, the magnitude of potential dust emissions from trackout activities is therefore large.

## Risk of Impacts

5.27 The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. Table 5.4 provides a summary of the risk of impacts for the proposed development. The highest risk category identified for each construction activity has been used to determine the level of mitigation required.

| Potential Impact | Unmitigated Dust Risks | | | |
|---|---|---|---|---|
| | Demolition | Earthworks | Construction | Trackout |
| **Dust Soiling** | Medium | High | High | High |
| **Human Health** | Low | Low | Low | Low |

**Table 5.4: Summary of Potential Unmitigated Dust Risks**

5.28 As indicated in Table 5.4, the highest risk from demolition is classified as medium, while the risk from earthworks, construction, and trackout activities is high. The overall dust risk level is classified as high for all non-specified activities.

5.29 It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phases.

## Mitigation and Residual Effects

5.30 The IAQM guidance provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the development site as summarised in Table 5.5.

5.31 The mitigation measures can be reviewed prior to the commencement of construction works incorporated into the existing the strategies as applicable.

5.32 Assuming the relevant mitigation measures outlined in Table 5.5 are implemented, the residual effect from all dust generating activities is predicted to be not significant, in accordance with the IAQM guidance.

| Guidance | Comment |
|---|---|
| Communications | • Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.<br>• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.<br>• Display the head or regional office contact information.<br>• Develop and implement a Dust Management Plan. |
| Site Management | • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.<br>• Make the complaints log available to the local authority when asked.<br>• Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.<br>• Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes. |
| Monitoring | • Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.<br>• Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.<br>• Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.<br>• Agree dust deposition, dust flux, or real-time $PM_{10}$ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. |
| Preparing and Maintaining the Site | • Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.<br>• Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.<br>• Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.<br>• Avoid site runoff of water or mud.<br>• Keep site fencing, barriers and scaffolding clean using wet methods. |

| Guidance | Comment |
|---|---|
| | • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.<br>• Cover, seed or fence stockpiles to prevent wind whipping. |
| Operating Vehicle/ Machinery and Sustainable Travel | • Ensure all vehicles switch off engines when stationary - no idling vehicles.<br>• Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.<br>• Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).<br>• Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.<br>• Implement a Travel Plan that supports and encourages sustainable travel. |
| Operations | • Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.<br>• Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.<br>• Use enclosed chutes and conveyors and covered skips.<br>• Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.<br>• Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. |
| Waste Management | • Avoid bonfires and burning of waste materials. |
| Demolition | • Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).<br>• Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.<br>• Avoid explosive blasting, using appropriate manual or mechanical alternatives.<br>• Bag and remove any biological debris or damp down such material before demolition. |
| Earthworks | • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. |

| Guidance | Comment |
|---|---|
| | • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.<br>• Only remove the cover in small areas during work and not all at once. |
| Construction | • Avoid scabbling (roughening of concrete surfaces) if possible.<br>• Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.<br>• Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.<br>• For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust. |
| Trackout | • Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site, This may require the sweeper being continuously in use.<br>• Avoid dry sweeping of large areas.<br>• Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.<br>• Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.<br>• Record all inspections of haul routes and any subsequent action in a site logbook.<br>• Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.<br>• Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).<br>• Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.<br>• Access gates to be located at least 10 m from receptors where possible. |

**Table 5.5: Fugitive Dust Mitigation Measures**

# 6.0 DISPERSION MODELLING ASSESSMENT

6.1 A dispersion modelling assessment has been undertaken to determine annual concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ at the proposed operational development for the expected operational year of 2036. These have been depicted as follows:

- S2 – without the development
- S3 – with the development

## Human Receptors

6.2 Human receptors (R1-R13) were modelled at a height of 1.5 m to represent ground floor height. The development's predicted pollutant concentrations for the proposed opening year scenario (S3) are shown in Figures 6.1 to 6.3.

6.3 The Batford Springs LNR, represented by receptors E1 and E2, was modelled at a height of 0 m to reflect vegetation level.

### Nitrogen Dioxide ($NO_2$) Impacts

6.4 In accordance with the assessment criteria the annual mean $NO_2$ concentrations were predicted for S2 and S3 scenarios and are summarised in Table 6.1.

| Sensitive Receptor | Predicted Annual Mean $NO_2$ Concentration (µg/m³) | | |
|---|---|---|---|
| | S2 | S3 | Change |
| R1 | 10.51 | 10.51 | 0.0010 |
| R2 | 10.51 | 10.51 | 0.0008 |
| R3 | 10.52 | 10.52 | 0.0007 |
| R4 | 10.51 | 10.51 | 0.0004 |
| R5 | 10.52 | 10.52 | 0.0013 |
| R6 | 10.51 | 10.51 | 0.0012 |
| R7 | 10.55 | 10.56 | 0.0092 |
| R8 | 10.58 | 10.59 | 0.0128 |
| R9 | 10.61 | 10.63 | 0.0176 |
| R10 | 10.61 | 10.62 | 0.0170 |
| R11 | 10.63 | 10.65 | 0.0210 |
| R12 | 10.59 | 10.60 | 0.0142 |
| R13 | 10.62 | 10.63 | 0.0148 |
| E1 | 10.78 | 10.79 | 0.0135 |
| E2 | 10.74 | 10.76 | 0.0118 |

**Table 6.1: Predicted Annual Mean $NO_2$ Concentrations for S2 and S3**

6.5 As indicated in Table 6.1, predicted annual mean $NO_2$ concentrations are below the AQO at all modelled sensitive receptor locations. There are small changes in concentrations with the development in place.

6.6 Impacts on the Air Quality Assessment Level (AQAL) for the predicted annual mean $NO_2$ concentrations at the human sensitive receptor locations are summarised in Table 6.2.

| Sensitive Receptor | % Change in Concentration Relative to AQAL | Long Term Average Concentration | Impact |
|---|---|---|---|
| R1 | 0.0097 | 26.27 | Negligible |
| R2 | 0.0077 | 26.28 | Negligible |
| R3 | 0.0067 | 26.31 | Negligible |
| R4 | 0.0039 | 26.27 | Negligible |
| R5 | 0.0124 | 26.29 | Negligible |
| R6 | 0.0114 | 26.28 | Negligible |
| R7 | 0.0870 | 26.41 | Negligible |
| R8 | 0.1209 | 26.47 | Negligible |
| R9 | 0.1659 | 26.56 | Negligible |
| R10 | 0.1602 | 26.56 | Negligible |
| R11 | 0.1973 | 26.63 | Negligible |
| R12 | 0.1335 | 26.51 | Negligible |
| R13 | 0.1390 | 26.58 | Negligible |
| E1 | 0.1253 | 26.97 | Negligible |
| E2 | 0.1098 | 26.89 | Negligible |

**Table 6.2: Predicted $NO_2$ Impacts as a Result of the Development**

6.7 Overall, as indicated in Table 6.2, the significance of impacts of annual mean $NO_2$ concentrations as a result of the development was predicted to be negligible at all receptor locations, in accordance with EPUK-IAQM guidance.

6.8 Predictions of 1-hour $NO_2$ concentrations were not produced as part of the dispersion modelling assessment. However, as stated in LAQM.TG22 if annual mean $NO_2$ concentrations are below 60 µg/$m^3$ then it is unlikely that the 1-hour AQO will be exceeded. As such, it is not predicted that concentrations will exceed the 1-hour mean AQO for $NO_2$ across the modelled site for the development's proposed operational year, 2030.

6.9 It should also be noted that background $NO_2$ levels are likely to be lower at elevated heights due to increased distance from emission sources, such as the local road network. Therefore, predicted concentrations at heights above ground floor level are considered to be acceptable in regard to pollutant exposure across all receptor locations and have not been assessed further.

6.10 The assessment shows a negligible impact with the development in place and predicted annual $NO_2$ concentrations below the AQO. Therefore, the site is considered to be suitable for the proposed use without the implementation of mitigation techniques to protect existing receptors and future site users from elevated $NO_2$ concentrations.

## Particulate Matter ($PM_{10}$) Impacts

6.11 In accordance with the assessment criteria the annual mean $PM_{10}$ concentrations were predicted for S2 and S3 scenarios and are summarised in Table 6.3.

| Sensitive Receptor | Predicted Annual Mean $PM_{10}$ Concentration ($\mu g/m^3$) | | |
|---|---|---|---|
| | S2 | S3 | Change |
| R1 | 15.28 | 15.29 | 0.0051 |
| R2 | 15.30 | 15.30 | 0.0040 |
| R3 | 15.36 | 15.36 | 0.0035 |
| R4 | 15.29 | 15.29 | 0.0020 |
| R5 | 15.32 | 15.32 | 0.0062 |
| R6 | 15.30 | 15.30 | 0.0055 |
| R7 | 15.51 | 15.56 | 0.0468 |
| R8 | 15.62 | 15.69 | 0.0653 |
| R9 | 15.77 | 15.86 | 0.0898 |
| R10 | 15.76 | 15.84 | 0.0866 |
| R11 | 15.88 | 15.99 | 0.1070 |
| R12 | 15.68 | 15.75 | 0.0719 |
| R13 | 15.72 | 15.80 | 0.0730 |
| R14 | 16.58 | 16.65 | 0.0685 |
| R15 | 16.42 | 16.48 | 0.0602 |

**Table 6.3: Predicted Annual Mean $PM_{10}$ Concentrations for S2 and S3**

6.12 As indicated in Table 6.3, predicted annual mean $PM_{10}$ concentrations are below the AQO at all the modelled sensitive receptor locations. There are small changes in concentrations with the development in place.

6.13 Impacts on the AQAL for the predicted annual mean $PM_{10}$ concentrations at sensitive receptor locations are summarised in Table 6.4.

| Sensitive Receptor | % Change in Concentration Relative to AQAL | Long Term Average Concentration | Impact |
|---|---|---|---|
| R1 | 0.0334 | 76.43 | Negligible |
| R2 | 0.0264 | 76.52 | Negligible |
| R3 | 0.0229 | 76.80 | Negligible |
| R4 | 0.0132 | 76.47 | Negligible |
| R5 | 0.0403 | 76.62 | Negligible |
| R6 | 0.0362 | 76.51 | Negligible |
| R7 | 0.3009 | 77.80 | Negligible |
| R8 | 0.4165 | 78.44 | Negligible |
| R9 | 0.5663 | 79.31 | Negligible |
| R10 | 0.5468 | 79.21 | Negligible |
| R11 | 0.6689 | 79.95 | Negligible |
| R12 | 0.4569 | 78.73 | Negligible |
| R13 | 0.4622 | 78.98 | Negligible |
| R14 | 0.4117 | 83.24 | Negligible |
| R15 | 0.3654 | 82.42 | Negligible |

**Table 6.4: Predicted $PM_{10}$ Impacts as a Result of the Development**

6.14 As indicated in Table 6.4, impacts on annual mean $PM_{10}$ concentrations as a result of the development were predicted to be negligible at all receptor locations, in accordance with EPUK-IAQM guidance.

6.15 Similar to $NO_2$ concentrations, it should also be noted that background $PM_{10}$ levels are likely to be lower at elevated heights due to increased distance from emission sources, such as the local road network. Therefore, predicted concentrations at heights above ground floor level are considered to be acceptable in regard to pollutant exposure across all receptor locations and have not been assessed further.

6.16 The assessment shows a negligible impact with the development in place and predicted annual $PM_{10}$ concentrations below the AQO. Therefore, the site is considered to be suitable for the proposed use without the implementation of mitigation techniques to protect existing receptors and future site users from elevated $PM_{10}$ concentrations.

## Particulate Matter ($PM_{2.5}$) Impacts

6.17 The annual $PM_{2.5}$ AQO has been revised by the government. There is an interim target and legally binding target for this pollutant as follows:

- Interim Target by 2028: 12 µg/m$^3$
- Legally binging target by 2040: 10 µg/m$^3$

6.18 These two targets have been assessed for the impact of $PM_{2.5}$ as a result of the development.

6.19 In accordance with the assessment criteria the annual mean $PM_{2.5}$ concentrations were predicted for S2 and S3 scenarios and are summarised in Table 6.5.

| Sensitive Receptor | Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m$^3$) | | |
|---|---|---|---|
| | S2 | S3 | Change |
| R1 | 9.77 | 9.77 | 0.0026 |
| R2 | 9.78 | 9.78 | 0.0021 |
| R3 | 9.81 | 9.81 | 0.0019 |
| R4 | 9.78 | 9.78 | 0.0011 |
| R5 | 9.79 | 9.79 | 0.0032 |
| R6 | 9.78 | 9.78 | 0.0030 |
| R7 | 9.89 | 9.92 | 0.0245 |
| R8 | 9.95 | 9.98 | 0.0342 |
| R9 | 10.03 | 10.08 | 0.0471 |
| R10 | 10.02 | 10.07 | 0.0455 |
| R11 | 10.09 | 10.14 | 0.0561 |
| R12 | 9.98 | 10.01 | 0.0377 |
| R13 | 10.00 | 10.04 | 0.0382 |
| E1 | 10.45 | 10.49 | 0.0359 |
| E2 | 10.37 | 10.40 | 0.0316 |

**Table 6.5: Predicted Annual Mean $PM_{2.5}$ Concentrations for S2 and S3**

6.20 As indicated in Table 6.5, predicted annual mean $PM_{2.5}$ concentrations are below the interim target of 12 µg/m$^3$at all existing sensitive receptor locations. However, they slightly exceed the legally binding AQO of 10 µg/m$^3$ at receptor locations R9 to R11 and ecological receptors E1 and E2. There are small changes in concentrations with the development in place which are considered to be insignificant.

6.21 Impacts on the AQAL for the predicted annual mean $PM_{2.5}$ concentrations at sensitive receptor locations are summarised in Tables 6.6 and 6.7.

| Sensitive Receptor | % Change in Concentration Relative to AQAL | Long Term Average Concentration | Impact |
|---|---|---|---|
| R1 | 0.0270 | 81.45 | Negligible |
| R2 | 0.0214 | 81.52 | Negligible |
| R3 | 0.0191 | 81.77 | Negligible |
| R4 | 0.0112 | 81.48 | Negligible |
| R5 | 0.0329 | 81.62 | Negligible |
| R6 | 0.0305 | 81.52 | Negligible |
| R7 | 0.2470 | 82.64 | Negligible |
| R8 | 0.3427 | 83.20 | Negligible |
| R9 | 0.4673 | 83.96 | Negligible |
| R10 | 0.4518 | 83.88 | Negligible |
| R11 | 0.5536 | 84.52 | Negligible |
| R12 | 0.3765 | 83.46 | Negligible |
| R13 | 0.3810 | 83.67 | Negligible |
| R14 | 0.3426 | 87.40 | Negligible |
| R15 | 0.3037 | 86.68 | Negligible |

**Table 6.6: Predicted $PM_{2.5}$ Impacts as a Result of the Development for the 2028 Interim Target (12 µg/m³)**

| Sensitive Receptor | % Change in Concentration Relative to AQAL | Long Term Average Concentration | Impact |
|---|---|---|---|
| R1 | 0.0270 | 97.73 | Negligible |
| R2 | 0.0214 | 97.82 | Negligible |
| R3 | 0.0191 | 98.12 | Negligible |
| R4 | 0.0112 | 97.77 | Negligible |
| R5 | 0.0329 | 97.94 | Negligible |
| R6 | 0.0305 | 97.82 | Negligible |
| R7 | 0.2470 | 99.17 | Negligible |
| R8 | 0.3427 | 99.84 | Negligible |
| R9 | 0.4673 | 100.75 | Negligible |
| R10 | 0.4518 | 100.65 | Negligible |
| R11 | 0.5536 | 101.43 | Negligible |
| R12 | 0.3765 | 100.15 | Negligible |
| R13 | 0.3810 | 100.40 | Negligible |
| R14 | 0.3426 | 104.88 | Negligible |
| R15 | 0.3037 | 104.02 | Negligible |

**Table 6.7: Predicted $PM_{2.5}$ Impacts as a Result of the Development for the 2040 Target (10 µg/m³)**

6.22 As shown in Tables 6.6 and 6.7, the impacts on annual mean $PM_{2.5}$ concentrations resulting from the development are predicted to be negligible at all receptor locations for both the interim 2028 target and the legally binding 2040 target, in accordance with EPUK-IAQM guidance.

6.23 Similar to $NO_2$ and $PM_{10}$ concentrations, it should also be noted that background $PM_{2.5}$ levels are likely to be lower at elevated heights due to increased distance from emission sources, such as the local road network. Therefore, predicted concentrations at heights above ground floor level are considered to be lower than those modelled within the assessment.

6.24 Although predicted annual $PM_{2.5}$ concentrations slightly exceed the legally binding AQO in both the S2 and S3 scenarios at a few receptors, pollutant levels have been decreasing year on year. This decline can be attributed to changes in traffic patterns following the COVID pandemic and improvements in vehicle technologies.

6.25 Additionally, the responses to the two questions provided by DEFRA to support the interim process are summarised in Table 6.8:

| Question | Response |
|---|---|
| How has exposure to $PM_{2.5}$ been considered when selecting the development site? Applicants are advised to consider the following in their application: | |
| • Site proximity to people (particularly large populations and/or vulnerable groups, e.g. schools, hospitals, care homes, areas of deprivation) and the impact of the development on these. | • Sauncey Wood Primary School is located near the site and has been considered in the assessment as R1. The modelling results show that annual mean $NO_2$, $PM_{10}$, and $PM_{2.5}$ concentrations at R1 are below the relevant AQOs, and the development will have a negligible impact on it |
| • Exposure and emissions during both construction and in-use | • By implementing the mitigation measures outlined in Table 5.5 during the construction phase, fugitive dust emissions will be minimised to an insignificant level, reducing potential exposure at off-site locations. |
| • Site proximity to pollution sources and the impact of these on users of the development. | • The site is not located near a major A road or motorway. It is adjacent to the B653; however, the proposed units will be more than 70 m from the road. The plans include preserving the existing vegetation, planting additional trees around the site, and creating a pond near the road. These will act as a natural screen to protect future site users from emissions from the B653. |
| What actions and/or mitigations have been considered to reduce $PM_{2.5}$ exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of $PM_{2.5}$ and its precursors?<br><br>Actions can refer to, but are not limited to, the following: | The proposed development will include the following:<br>• **Trees and green spaces around the perimeter.** These will serve as a natural barrier, filtering pollutants and improving air quality by trapping particulate matter and absorbing $NO_2$.<br>• |

| Question | Response |
| --- | --- |
| • Site layout<br>• The development's design<br>• Technology used in the construction or installed for use in the development<br>• Construction and future use of the development. | • Best practice measures to further reduce air quality impacts: Recommendations for additional measures are outlined in Section 7.<br><br>• Mitigation measures listed in Table 5.5: These measures will be implemented to minimise dust generation from associated activities. |

**Table 6.8: Interim Planning Guidance Questions and Responses**

# 7.0 BEST PRACTICE MEASURES

## Construction Phase

7.1 The IAQM guidance provides a number of potential mitigation measures to reduce impacts from the construction phases. A high risk of dust impacts from earthworks, construction, and trackout activities were identified. As a result, mitigation measures are required. These have been adapted for the development site as summarised in Table 5.5.

7.2 These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by SACDC.

## Operational Phase

7.3 The modelled results show that predicted annual mean $NO_2$, $PM_{10}$, and $PM_{2.5}$ concentrations across the proposed development boundary and at all human receptor locations are below the relevant AQOs for the proposed operational year, 2036. Additionally, the development will have a negligible impact at all receptor locations, in line with EPUK-IAQM guidance.

7.4 Therefore, the development is considered suitable for the proposed use without the implementation of mitigation techniques for air quality.

7.5 The development will have an insignificant impact on ecological receptor locations at the ecological receptor locations.

7.6 Potential best practice mitigation options to further reduce operational effects are listed below, suggested by IAQM. It is acknowledged that this is not an exhaustive list but sets out a range of mitigation measures which could be explored at the reserved matters stage of the development:

- At least 1 Electric Vehicle "fast charge" point per 10 dwellings – This shall be based on the best technology available at the time of planning approval;
- Travel Plan (where required) including mechanisms for discouraging high emission vehicle use and encouraging the uptake of low emission fuels and technologies;
- A Welcome Pack available to all residents online and as a booklet, containing information and incentives to encourage the use of sustainable transport modes; and
- Car club provision within the Development or support given to local car club/Electric vehicle car clubs.

7.7 If the above measures are implemented, this will further reduce the potential impacts associated with the development.

# 8.0 CONCLUSIONS

8.1 Create Consulting Engineers Limited (CCE) have been appointed by Crest Nicolson Ltd to undertake an Air Quality Assessment in support of the planning application for the development at at Land Northeast of Harpenden..

8.2 During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by earthworks, construction, and trackout activities was predicted to be negligible.

8.3 The modelled results show that predicted annual mean $NO_2$, $PM_{10}$, and $PM_{2.5}$ concentrations across the development's site boundary and at all human receptor locations are below the relevant AQOs for the proposed operational year, 2036. Additionally, the development will have a negligible impact on all human receptor locations, in line with EPUK-IAQM guidance.

8.4 Additional mitigation measures are detailed in Section 7 to reduce pollutant concentrations further. If these are implemented, air quality should not be considered a constraint to planning consent for the proposed development scenarios.

# 9.0 DISCLAIMER

9.1 Create Consulting Engineers Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report.

9.2 The copyright of this report is vested in Create Consulting Engineers Limited and Crest Nicolson Ltd. The Client, or his appointed representatives, may copy the report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Limited or Crest Nicolson Ltd.

9.3 Create Consulting Engineers Limited accepts no responsibility whatsoever to other parties to whom this report, or any part thereof, is made known. Any such other parties rely upon the report at their own risk.

# 10.0 REFERENCES


10.1 *Air emissions risk assessment for your environmental permit.* Environment Agency & Department for Environment, Food and Rural Affairs (2023)

10.2 *A Guide To The Assessment Of Air Quality Impacts On Designated Nature Conservation Sites*. IAQM, Holman et al (2020)

10.3 *2024 Air Quality Annual Status Report (ASR)*. St Albans City and District Council (June 2024)

10.4 *Clean Air Strategy* 2019. Department for Environment, Food and Rural Affairs (2019)

10.5 *Environment Act 1995*. Environment Agency, Scottish Environment Protection Agency (1995)

10.6 *Environment Act 2021.* Secretary of State, The Welsh Ministers (2021).

10.7 *Guidance on the assessment of dust from demolition and construction (version 2.2).* IAQM, Stoaling. et al (2024)

10.8 *Harpenden Neighbourhood Plan 2018 – 2033.* St. Albans City and Borough Council (2018)

10.9 *Land-Use Planning and Development Control: Planning for Air Quality*. EPUK & IAQM, Moorcroft, Barrowcliffe. et al (2017)

10.10 *Local Air Quality Management Technical Guidance* (LAQM.TG22). Department for Environment, Food and Rural Affairs (2022)

10.11 *National Planning Policy Framework*. Ministry of Housing, Communities and Local Government (2024)

10.12 *$PM_{2.5}$ Targets: Interim Planning Guidance.* Department for Environment Food & Rural Affairs (DEFRA). [Online] Available at <uk-air.defra.gov.uk/pm25targets/planning> [Accessed 24/01/2025]

10.13 *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1).* Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland (2007)

10.14 *The Environmental Target (Fine Particulate Matter) (England) Regulations 2023).* Secretary of State, Department for Environment, Food and Rural Affairs (2023)

# APPENDIX A

Construction Phase Assessment Methodology

There is the potential for fugitive dust emissions to occur as a result of construction activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management's *"Guidance on the Assessment of Dust from Demolition and Construction (Version 2.2)"*, 2024.

## Construction Phase Assessment

Activities on the construction site have been divided into four types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling;
- The risk of health effects due to an increase in exposure to $PM_{10}$; and
- Harm to ecological receptors with account being taken of the sensitivity of the area that may experience these effects.

The assessment steps are detailed below.

### STEP 1

STEP 1 screens the requirement for a more detailed assessment. An assessment will normally be required where there is:

- a 'human receptor' within:
  - 250 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s).

- an 'ecological receptor' within:
  - 50 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s).

### STEP 2

STEP 2 assesses the risk of potential dust impacts separately for demolition, earthworks, construction and trackout activities. Each activity is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (STEP 2A); and
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (STEP 2B).

The two factors are combined in STEP 2C to determine the risk of dust impacts without mitigation applied.

STEP 2A defines the potential magnitude of dust emission through the demolition phase. The relevant criteria are summarised in Table A1.

| Magnitude | Activity | Criteria |
|---|---|---|
| Large | Demolition | • Total building volume >75,000 $m^3$,<br>• Potentially dusty construction material (e.g. Concrete),<br>• On-site crushing and screening,<br>• Demolition activities >12 m above ground level |
| | Earthworks | • Total site area >110,000 $m^2$,<br>• Potentially dusty soil type (e.g. Clay, which will be prone to suspension when dry due to small particle size),<br>• >10 heavy earth moving vehicles active at any one time,<br>• Formation of bunds >6 m in height |
| | Construction | • Total building volume >75,000$m^3$,<br>• On site concrete batching,<br>• Sandblasting. |
| | Trackout | • > 50 (>3.5t) outward movements in any one day,<br>• Potentially dusty surface material (e.g. High clay content),<br>• Unpaved road length >100 m. |
| Medium | Demolition | • Total building volume 12,000 $m^3$ – 75,000 $m^3$,<br>• Potentially dusty construction material,<br>• Demolition activities 6-12 m above ground level |
| | Earthworks | • Total site area 18,000 $m^2$ – 110,000 $m^2$,<br>• Moderately dusty soil type (e.g. Silt),<br>• 5-10 heavy earth moving vehicles active at any one time,<br>• Formation of bunds 3 m – 6 m in height |
| | Construction | • Total building volume 12,000 $m^3$ – 75,000 $m^3$,<br>• Potentially dusty construction material (e.g. Concrete),<br>• On-site concrete batching. |
| | Trackout | • 20 – 50 (>3.5t) outward movements in any one day,<br>• Moderately dusty surface material (e.g. High clay content)<br>• Unpaved road length 50 m – 100 m. |
| Small | Demolition | • Total volume of building to be demolished <12,000 $m^3$,<br>• Construction material with low potential for dust release (e.g metal, cladding, or timber),<br>• Demolition activities <6 m above ground,<br>• Demolition during wetter months. |
| | Earthworks | • Total site area < 18,000$m^2$,<br>• Soil type with large grain size (e.g. Sand),<br>• <5 heavy earth moving vehicles active at any one time,<br>• Formation of bunds <3 m in height. |

| Magnitude | Activity | Criteria |
|---|---|---|
| | Construction | • Total building volume <12,000 $m^3$,<br>• Construction material with low potential for dust release (e.g. Metal cladding or timber). |
| | Trackout | • < 20 HDV (>3.5t) outward movements in any one day,<br>• Surface material with low potential for dust release,<br>• Unpaved road length <50 m. |

**Table A1: Potential Dust Emission Magnitude**

Step 2B defines the sensitivity of the area. The sensitivity of the area takes account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of $PM_{10}$, the local background concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

| Sensitivity | Examples | | |
|---|---|---|---|
| | **Dust Soiling Effects** | **Health Effects of $PM_{10}$** | **Ecological Effects** |
| High | • Users can reasonably expect enjoyment of a high level of amenity; or<br>• The appearance, aesthetics or value of their property would be diminished by soiling; and<br>• The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.<br>• Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms. | • Locations where members of the public are exposed over a time period relevant to the air quality objective for $PM_{10}$ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).[c]<br>• Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of | • Locations with an international or national designation and the designated features may be affected by dust soiling; or<br>• Locations where there is a community of a particularly dust sensitive species, such as vascular species included in the red data list for Great Britain.<br>• Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings. |
| Medium | • Users would expect[a] to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or<br>• The appearance, aesthetics or value of their property could be diminished by soiling; or<br>• The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.<br>• Indicative examples include parks and places of work. | • Locations where the people exposed are workers[d], and exposure is over a time period relevant to the air quality objective for $PM_{10}$ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).<br>• Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to pm10, as protection is covered by health and safety at work legislation. | • Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or<br>• Locations with a national designation where the features may be affected by dust deposition.<br>• Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features. |

| Sensitivity | Examples | | |
|---|---|---|---|
| | **Dust Soiling Effects** | **Health Effects of $PM_{10}$** | **Ecological Effects** |
| Low | • The enjoyment of amenity would not reasonably be expected[a]; or<br>• Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or<br>• There is transient exposure, where the people or property would reasonably be expected[a] to be present only for limited periods of time as part of the normal pattern of use of the land.<br>• Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks[b] and roads. | • Locations where human exposure is transient.[e]<br>• Indicative examples include public footpaths, playing fields, parks and shopping streets. | • Locations with a local designation where the features may be affected by dust deposition.<br>• Indicative example is a local nature reserve with dust sensitive features. |

NOTES:

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

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

*c.* This follows Defra guidance as set out in LAQM.TG(22).

*d.* The air quality objectives and limit values do not apply to people in the workplace, although, such people can be affected by exposure of $PM_{10}$. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers.

*e.* There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.

*Ecological Receptors*: The advice of an ecologist should be sought to determine the need for an assessment of dust impacts on sensitive habitats and plants. A Habitat Regulation Assessment of the site may be required as part of the planning process, if the site lies close to an internationally designated site i.e. Special Conservation Areas (SACs), Special Protection Areas (SPAs) designated under the Habitats Directive (92/43/EEC) and RAMSAR sites.

**Table A2: Sensitivity of Different Types of Receptors**

The guidance also provides the following additional factors to consider when determining the sensitivity of an area:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and the receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant
- The season during which the works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and
- Any known specific receptor sensitivities which go beyond the classifications given in this document.

The sensitivity of the area to dust soiling effects on people and property is shown in Table A3.

| Receptor Sensitivity | Number of Receptors | Distance from the Source (m) | | | |
|---|---|---|---|---|---|
| | | > 20 | > 50 | > 100 | > 250 |
| High | > 100 | High | High | Medium | Low |
| | 10 - 100 | High | Medium | Low | Low |
| | 1 - 10 | Medium | Low | Low | Low |
| Medium | >1 | Medium | Low | Low | Low |
| Low | >1 | Low | Low | Low | Low |

**Table A3: Sensitivity of the Area to Dust Soiling Effects on People and Property**

Table A4 outlines the sensitivity of the area to human health impacts.

| Receptor Sensitivity | Annual Mean $PM_{10}$ Concentration | Number of Receptors | Distance from the Source (m) | | | |
|---|---|---|---|---|---|---|
| | | | > 20 | > 50 | > 100 | > 250 |
| High | >32 µg/m³ (>18 µg/m³ in Scotland) | >100 | High | High | High | Medium |
| | | 10 - 100 | High | High | Medium | Low |
| | | 1 - 10 | High | Medium | Low | Low |
| | 28 – 32 µg/m³ (16 – 18 µg/m³ in Scotland) | >100 | High | High | Medium | Low |
| | | 10 - 100 | High | Medium | Low | Low |
| | | 1 - 10 | High | Medium | Low | Low |
| High | 24 – 28 µg/m³ (14 – 16 µg/m³ in Scotland) | >100 | High | Medium | Low | Low |
| | | 10 - 100 | High | Medium | Low | Low |
| | | 1 - 10 | Medium | Low | Low | Low |
| | <24 µg/m³ | >100 | Medium | Low | Low | Low |

| Receptor Sensitivity | Annual Mean $PM_{10}$ Concentration | Number of Receptors | Distance from the Source (m) | | | |
|---|---|---|---|---|---|---|
| | | | > 20 | > 50 | > 100 | > 250 |
| Medium | (>18 µg/m³ in Scotland) | 10 - 100 | Low | Low | Low | Low |
| | | 1 - 10 | Low | Low | Low | Low |
| | >32 µg/m³ (>18 µg/m³ in Scotland) | >10 | High | Medium | Low | Low |
| | | 1 - 10 | Medium | Low | Low | Low |
| | 28 – 32 µg/m³ (16 – 18 µg/m³ in Scotland) | >10 | Medium | Low | Low | Low |
| | | 1 - 10 | Low | Low | Low | Low |
| | 24 – 28 µg/m³ (14 – 16 µg/m³ in Scotland) | >10 | Low | Low | Low | Low |
| | | 1 - 10 | Low | Low | Low | Low |
| | <24 µg/m³ (>18 µg/m³ in Scotland) | >10 | Low | Low | Low | Low |
| | | 1 - 10 | Low | Low | Low | Low |
| Low | - | >1 | Low | Low | Low | Low |

**Table A4: Sensitivity of the Area to Human Health Impacts**

Table A5 outlines the sensitivity of the area to ecological impacts.

| Receptor Sensitivity | Distance from the Source (m) | |
|---|---|---|
| | > 20 | > 50 |
| High | High | Medium |
| Medium | Medium | Low |
| Low | Low | Low |

**Table A5: Sensitivity of the Area to Ecological Impacts**

STEP 2C combines the dust emission magnitude (STEP 2A) with the sensitivity of the area (STEP 2B) to determine the risk of unmitigated impacts. Tables A6 to A9 provide a method of assigning the level of risk for each activity. This is used to determine the level of mitigation that must be applied. Where the risk category is 'negligible', no mitigation measures beyond those required by legislation will be required.

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High | Medium | Medium |
| Medium | High | Medium | Low |
| Low | Medium | Low | Negligible |

**Table A6: Risk of Dust Impacts from Demolition**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High | Medium | Low |
| Medium | Medium | Medium | Low |
| Low | Low | Low | Negligible |

**Table A7: Risk of Dust Impacts from Earthworks**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High | Medium | Low |
| Medium | Medium | Medium | Low |
| Low | Low | Low | Negligible |

**Table A8: Risk of Dust Impacts from Construction**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High | Medium | Low |
| Medium | Medium | Medium | Low |
| Low | Low | Low | Negligible |

**Table A9: Risk of Dust Impacts from Trackout**

## STEP 3

The dust risk categories for each of the four activities determined in STEP 2C should be used to define the appropriate, site-specific, mitigation measures to be adopted. For those mitigation measures that are general, the highest risk category should be applied.

For those cases where the risk is assigned as 'negligible', no mitigation measures beyond those required by legislation are required, however, additional mitigation measures may be applied as part of good practice. Where a local authority has issued guidance on measures to be adopted at demolition/ construction sites, these should also be taken into account.

## STEP 4

Once the appropriate dust mitigation measures have been identified in STEP 3, the final step is to determine whether there are significant effects arising from the construction phase of a proposed development.

For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

There may be cases where, for example, there is inadequate access to water for dust suppression to be effective, and even with other mitigation measures in place there may be a significant effect. Therefore, it is important to consider the specific characteristics of the site and the surrounding area to ensure that the conclusion of no significant effect is robust.

# APPENDIX B

Operational Phase Assessment Methodology

This section details the methodology and criteria used to assess the operational phase assessment in conjunction with EPUK-IAQM and LAQM.TG22 guidance.

## Operational Phase Assessment

The potential impacts of the proposed development on local air quality are to be assessed through detailed dispersion modelling, which is to be undertaken to quantify $NO_2$, $PM_{10}$, and $PM_{2.5}$ concentrations across the site and evaluate its suitability for the proposed use, using the following scenarios:

- Baseline Year, 2022 (S1);
- Completion Year Without the Development, 2036 (S2); and
- Completion Year With the Development, 2036 (S3).

The S1 scenario is representative of anticipated traffic data for a baseline year of 2022 based on data collected from Department for Transport's Traffic Count Website.

The S2 scenario is representative of anticipated traffic data with predicted variations in traffic flow patterns without the development, in 2036.

The S3 (i.e. with development) scenario is representative of anticipated traffic data with the addition of predicted variations in traffic flow patterns as a result of the proposals and committed flows from the community, for the completed development, 2036.

It should be noted that air quality is predicted to improve in the future. However, in order to provide a robust assessment, background concentrations for 2022 were utilised within the dispersion model. The use of 2036 traffic data with 2022 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Receptors potentially sensitive to changes in $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations were identified within 500 m of the affected highway network in accordance with the guidance provided within the IAQM guidance on the likely limits of pollutant dispersion from road sources. LAQM.TG22 provides the following examples of where annual mean AQOs should apply:

- Residential properties;
- Schools;
- Hospitals; and
- Care homes.

The sensitivity impact significance of each receptor was defined in accordance with the criteria are shown in Tables A3 to A5 in Appendix A.

A desk-top study was undertaken to identify any existing and future sensitive receptor locations in the vicinity of the site that require specific consideration during the assessment.

The sensitive receptors are identified in Section 4 and represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposed development that have not been individually identified above.

The following factors may provide some assistance in determining the overall significance of a development:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective will be relevant;
- The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors;
- Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease; and
- The extent to which an objective is exceeded e.g. an annual mean $NO_2$ concentration of 41 µg/$m^3$ should attract less significance than an annual mean of 51 µg/$m^3$.

These factors were considered, and an overall significance determined for the impact of operational phase road traffic emissions.

It should be noted that the determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

The criteria shown in Table B1, is adapted from the EPUK-IAQM guidance 'Land-Use Planning and Development Control: Planning for Air Quality with sensitivity descriptors included to allow comparisons of various air quality impacts.

| Long Term Average Concentration | % Change in Concentration Relative to AQO | | | |
|---|---|---|---|---|
| | 1 | 2-5 | 6-10 | >10 |
| 75% or less of AQO | Negligible | Negligible | Slight | Moderate |
| 76 - 94% of AQO | Negligible | Slight | Moderate | Moderate |
| 95 - 102% of AQO | Slight | Moderate | Moderate | Substantial |
| 103 - 109% of AQO | Moderate | Moderate | Substantial | Substantial |
| 110% or more of AQO | Moderate | Substantial | Substantial | Substantial |

**Table B1: Operational Traffic Exhaust Emissions – Assessment of Impacts**

It should be noted that changes of up to 0.5% will be described as negligible in accordance with the EPUK-IAQM guidance.

Following the prediction of impacts at discrete receptor locations utilising the criteria in Table B1, the EPUK-IAQM document states that this framework is to be used as a starting point to make a judgement on significance of effect, but other influences might need to be accounted for.

Whilst impacts might be determined as 'slight', 'moderate' or 'substantial' at individual receptors, overall effect might not necessarily be deemed as significant in some circumstances.

The descriptors of impact significance for the annual mean concentration for both $NO_2$ and $PM_{10}$ that take account of the magnitude of changes for the proposed development based on guidance from EPUK-IAQM are shown in Table B2 below.

| Total Concentration Related to Objective/Limit Value | Change in Concentration | | |
|---|---|---|---|
| | Small | Medium | Large |
| **Increase with Scheme** | | | |
| Above Objective/Limit Value with Scheme (>40 µg $m^{-3}$) | Minor Adverse | Moderate Adverse | Major Adverse |
| Just Below Objective/Limit Value with Scheme (36-40 µg $m^{-3}$) | Minor Adverse | Moderate Adverse | Moderate Adverse |
| Below Objective/Limit Value with Scheme (30-36 µg $m^{-3}$) | Negligible | Minor Adverse | Minor Adverse |
| Well Below Objective/Limit Value with Scheme (<30 µg $m^{-3}$) | Negligible | Negligible | Minor Adverse |
| **Decrease with Scheme** | | | |
| Above Objective/Limit Value with Scheme (>40 µg $m^{-3}$) | Minor Beneficial | Moderate Beneficial | Major Beneficial |
| Just Below Objective/Limit Value with Scheme (36-40 µg $m^{-3}$) | Minor Beneficial | Moderate Beneficial | Moderate Beneficial |
| Below Objective/Limit Value with Scheme (30-36 µg $m^{-3}$) | Negligible | Minor Beneficial | Minor Beneficial |
| Well Below Objective/Limit Value with Scheme (<30 µg $m^{-3}$) | Negligible | Negligible | Minor Beneficial |

**Table B2: Impact Descriptors for Changes to Annual Mean Concentration of $NO_2$ and $PM_{10}$**

Once the magnitude of the change has been established, the impact at each relevant receptor needs to be described. The impact magnitude at each receptor location can be described using the changes stated above as Negligible, Minor, Moderate or Major, as either Adverse or Beneficial, and either Temporary or Permanent.

The overall significance should be described separately for both the impact of emissions related to the proposed development on existing receptors, and for the impacts of emissions from existing source(s) on new exposure being introduced from the proposed development.

Crest Nicolson Ltd

# LAND NORTHEAST OF HARPENDEN

## Air Quality Assessment




Independent, multidisciplinary engineering and environmental consultants

Norwich | London | Chelmsford | Glasgow | Milton Keynes

visit us at **createce.co.uk** or call us on **01603 877010**