

**Land South of Turnpike Lane,
Ickleford**

Air Quality Assessment



Land South of Turnpike Lane, Ickleford

Air Quality Assessment

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1 INTRODUCTION

1.1 Entran Limited has been commissioned to undertake an assessment of air quality impacts associated with a proposed residential development (the 'Proposed Development') at the Land South of Turnpike Lane, Ickleford (the 'Site').

1.2 The proposals are for the "*outline planning application for residential development including 50% affordable housing, with means of access from Turnpike Lane for consideration (all other matters reserved for subsequent approval), drainage, landscaping, car parking and all other ancillary and enabling works*". A Site layout plan is shown in Figure 1.1.

1.3 North Herts Council (NHC) has declared two Air Quality Management Areas (AQMAs) due to elevated concentrations of NO₂. The Site is not located within or near either of these AQMAs, both of which are located in Hitchin.

1.4 This report presents the findings of a detailed air quality assessment of the potential impacts of the Proposed Development on local air quality during the operational phase. The source and significance of potential impacts are identified and the measures that should be employed to minimise these impacts are described. Consideration is also given to the suitability of the Site for its proposed end-use with regards to air quality.

1.5 A glossary of common air quality terminology is provided in **Appendix A**.

2 LEGISLATION AND POLICY

Air Quality Strategy for England, Scotland, Wales & Northern Ireland

2.1 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland published in July 2007¹, pursuant to the requirements of Part IV of the Environment Act 2021. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

2.2 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene (C₆H₆), 1,3-butadiene (C₄H₆), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), particulate matter (PM₁₀, PM_{2.5}), sulphur dioxide (SO₂), ozone (O₃) and polycyclic aromatic hydrocarbons (PAHs).

2.3 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

2.4 The air quality objectives are medium-term policy-based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

2.5 For some pollutants, there is both a long-term (annual mean) standard and a short-term standard. In the case of nitrogen dioxide (NO₂), the short-term standard is for a 1-hour averaging period, whereas for fine particulates (PM₁₀) it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

2.6 The AQS objective levels relevant to this assessment are presented in **Appendix B**.

Air Quality (England) Regulations

2.7 Many of the objectives in the AQS were made statutory in England with the *Air Quality (England) Regulations 2000*² and the *Air Quality (England) (Amendment) Regulations 2002* (the Regulations)³ for the purpose of Local Air Quality Management (LAQM).

2.8 The Air Quality Standards (Amendment) Regulations 2016⁴ amend the Air Quality Standards Regulations 2010 to implement the changes made by Directive (EU) 2015/1480 and came into force on the 31st December 2016. These regulations prescribe the ‘relevant period’ (referred to in Part 12V of the Environment Act 2021) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the ‘relevant period’. The Air Quality Standards Regulations were further amended by the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020⁵ in January 2020 with regards to PM_{2.5}.

2.9 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023⁶ came into force on the 31st January 2023 and adopted into UK law a Target Value for PM_{2.5}.

Local Air Quality Management (LAQM)

2.10 Part IV of the Environment Act 2021 also requires local authorities to periodically review and assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

2.11 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

2.12 For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

¹ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – July 2007.

² The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

³ The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

⁴ The Air Quality Standards Regulations 2016 – Statutory Instrument 2016 No. 1184

⁵ The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 – Statutory Instrument 2020 No 1313

⁶ The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 – Statutory Instrument 2023 No 96



2.13 The Department of Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their Review and Assessment work⁷. This guidance, referred to in this chapter as LAQM.TG(22), has been used where appropriate in the assessment.

National Planning Policy Framework

2.14 The National Planning Policy Framework (NPPF)⁸ sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the NPPF with the objective of contributing to the achievement of sustainable development.

2.15 The NPPF states that the planning system has three overarching objectives in achieving sustainable development including a requirement to *'to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'*

2.16 Under Section 15: Conserving and Enhancing the Natural Environment, the NPPF (paragraph 187) requires that *'planning policies and decisions should contribute to and enhance the natural and local environment by ...preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible help to improve local environmental conditions such as air and water quality.'*

2.17 In dealing specifically with air quality the 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*

⁷ Department for Environment, Food and Rural Affairs (DEFRA), (2022): Part IV The Environment Act 2021 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(22).

⁸ Ministry of Housing, Communities and Local Government: *National Planning Policy Framework* (December 2024).

Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan’.

2.18 Paragraph 201 states that *‘the focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively.’*

Planning Practice Guidance

2.19 Planning Practice Guidance (PPG)⁹ was updated in November 2019 and supports the NPPF. Paragraph 001, Reference 32-001-20191101 of the PPG, provides a summary as to why air quality is a consideration for planning:

‘... Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit... The local air quality management (LAQM) regime requires every district and unitary authority to regularly review and assess air quality in their area. These reviews identify whether national objectives have been, or will be, achieved at relevant locations, by an applicable date... If national objectives are not met, or at risk of not being met, the local authority concerned must declare an air quality management area and prepare an air quality action plan... Air quality can also affect biodiversity and may therefore impact on our international obligations under the Habitats Directive... Odour and dust can also be a planning concern, for example, because of the effect on local amenity.’

2.20 Paragraph 002, Reference 32-002-20191101 of the PPG, concerns the role of Local Plans with regard to air quality;

‘Drawing on the review of air quality carried out for the local air quality management regime, plans may need to consider:

- *what are the observed trends shown by recent air quality monitoring data and what would happen to these trends in light of proposed development and / or allocations;*
- *the impact of point sources of air pollution (pollution that originates from one place);*

⁹ Ministry of Housing, Communities & Local Government. (2019). Planning Practice Guidance: Air Quality.

- *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments, including their implications for vehicle emissions;*
- *ways in which new development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example, entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable; and*
- *opportunities to improve air quality or mitigate impacts, such as through traffic and travel management and green infrastructure provision and enhancement.'*

2.21 Paragraph 006, Reference 32-005-20191101 of the PPG, identifies when air quality could be relevant for a planning decision;

'Considerations that may be relevant to determining a planning application include whether the development would:

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*
- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value.*

2.22 Paragraph 007, Reference 32-007-20191101 of the PPG, provides guidance on how detailed an assessment needs to be;

'Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific.'

2.23 Paragraph 008, Reference 32-007-20191101 of the PPG, provides guidance on how an impact on air quality can be mitigated;

'Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact... Examples of mitigation include:

- maintaining adequate separation distances between sources of air pollution and receptors;*
- using green infrastructure, in particular trees, where this can create a barrier or maintain separation between sources of pollution and receptors;*
- appropriate means of filtration and ventilation;*
- including infrastructure to promote modes of transport with a low impact on air quality (such as electric vehicle charging points);*
- controlling dust and emissions from construction, operation and demolition; and*
- contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development.'*

North Herts Local Plan 2011-2031

2.24 The North Herts Local Plan 2011-2031¹⁰ was adopted in November 2022 and is the key planning policy document for the area. The following policy is relevant to air quality and the Proposed Development in this document:

Policy D4: Air Quality, which states

'Planning permission will be granted provided that development proposals:

¹⁰ North Herts Council. (2022). North Herts Local Plan 2011-2031.



- a) Give consideration to the potential or actual impact on local air quality, both during the demolition/ construction phase and as a result of its final occupation and use;*
- b) Propose appropriate levels of mitigation to minimise emissions to the atmosphere and their potential effects upon health and the local environment; and*
- c) Carry out air pollution impact assessments, where required, to determine the impact on local air quality of the development.*

Where an air quality impact assessment demonstrates that a development is unacceptable from a local air quality perspective the development will be refused.

Where air pollution impact assessments are not required there will still be a requirement on developers to provide appropriate levels of mitigation to address emissions of pollutants to the atmosphere.'

Control of Dust and Particulates associated with Construction

2.25 Section 79 of the *Environmental Protection Act (1990)* provides the following definitions of statutory nuisance relevant to dust and particles:

- 'Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance', and
- 'any accumulation or deposit which is prejudicial to health or a nuisance'.

2.26 Following this, Section 80 states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

2.27 In the context of the Proposed Development, the main potential for nuisance of this nature will arise during the construction phase – potential sources being the clearance, earthworks, construction and landscaping processes.

2.28 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist – 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates.

EPUK & IAQM Land Use Planning and Development Control

2.29 Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) published the Land Use Planning and Development Control Air Quality guidance in January 2017¹¹ to provide guidance on the assessment of air quality in relation to planning proposals and ensure that air quality is adequately considered within the planning control process.

2.30 The main focus of the guidance is to ensure all developments apply good practice principles to ensure emissions and exposure are kept to a minimum. It also sets out criteria for identifying when a more detailed assessment of operational impacts is required, guidance on undertaking detailed assessments and criteria for assigning the significance of any identified impacts.

2.31 This guidance has been used within this assessment.

Assessment of Dust from Demolition and Construction

2.32 The IAQM published guidance on the assessment of emissions from demolition and construction activities¹². The guidance sets out an approach to identifying the risk of impacts occurring at nearby sensitive receptors from dust generated during the construction process and sets out recommended mitigation measures based on the identified risk.

2.33 This guidance has been used within this assessment.

¹¹ EPUK & IAQM. Land-use Planning and Development Control: Planning for Air Quality, January 2017

¹² Guidance on the assessment of dust from demolition and construction (version 2.2), IAQM, January 2024.

3 METHODOLOGY

Scope of Assessment

3.1 The scope of the assessment has been determined in the following way:

- Review of air quality data for the area surrounding the Proposed Development and background pollutant maps;
- Review of the proposals; and
- Review of the traffic flow data.

3.2 During construction of the development there is the potential for impacts to occur as a result of dust and PM₁₀ emissions. Guidance provided by the IAQM recommends that an assessment is undertaken where there are human receptors within 250m of the Site boundary or within 50m of the routes used by construction vehicles up to 250m from the site entrance; and where there are dust sensitive ecological receptors within 50m of the Site boundary or within 50m of the routes used by construction vehicles up to 250m from the site entrance. Human receptors are located within 250m of the Site, but there are no dust sensitive ecological habitats in the vicinity of the Site. An assessment of the impacts of the construction of the Proposed Development on human receptors has therefore been included in the assessment. An assessment of the impacts on ecological receptors has not been considered further.

3.3 Guidance provided by the EPUK & IAQM provides threshold criteria for establishing when significant impacts on local air quality may occur and when a detailed assessment of potential impacts is required. At locations outside an AQMA, a change in light duty vehicles (LDV) of more than 500 per day and / or a change in heavy duty vehicles (HDV) of more than 100 per day is considered to result in potentially significant impacts on air quality. At locations within or adjacent to an AQMA, a change in LDVs of more than 100 per day and / or a change in HDVs of more than 25 per day is considered potentially significant.

3.4 Data provided by the transport consultants indicates that the operation of the Proposed Development will result in an increase exceeding one of the above thresholds on local roads in the vicinity of the Site. An assessment of the impact of road vehicles generated by the operation of the Proposed Development has therefore been included in the assessment. Consideration has also been given to the suitability of the Site for its proposed use.

3.5 Based on the criteria set out in the NHC Air Quality Planning Guidance Document¹³, the proposals are classed as 'major' development (i.e. >50 residential units). Following a review of the proposals against Tables 1 and 2 set out within the Guidance it is concluded that an air quality assessment and pollutant emissions cost calculation are required.

3.6 Details of the assessment methodology and the specific issues considered are provided below.

Construction Phase Methodology

Introduction

3.7 To assess the potential impacts associated with dust and PM₁₀ releases during the demolition and construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the IAQM has been undertaken.

3.8 This approach divides construction activities into the following four categories:

- demolition;
- earthworks;
- construction; and
- trackout (the transport of dust and dirt from the construction site onto the public road network).

3.9 The assessment methodology then considers three separate dust effects:

- annoyance due to dust soiling;
- harm to ecological receptors; and
- the risk of health effects due to a significant increase in exposure to PM₁₀.

3.10 The assessment of the risk of dust effects is determined by:

- the scale and nature of the works, which determine the risk of dust arising; and
- the proximity of sensitive receptors.

¹³ North Hertfordshire Council. (2018). Air Quality Planning Guidance Document.



3.11 Risks are described in terms of there being a low, medium or high risk of dust effects for each of the four separate potential activities. This assessment is based on both IAQM criteria and professional judgement.

3.12 Mitigation measures are identified where necessary and significance of dust effects determined following such mitigation. The significance of the dust effects is based on professional judgement, taking into account the sensitivity of the surrounding area and the existing air quality.

Dust Emission Magnitude

3.13 The magnitude of the dust impacts for each source is classified as Small, Medium or Large depending on the scale of the proposed works. Table 3.1 summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

Table 3.1: Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	- Total building volume >75,000m³ - Potentially dusty material (e.g. concrete) - Onsite crushing and screening - Demolition activities >12m above ground level.	- Total building volume 12,000 - 75,000m³ - Potentially dusty material - Demolition activities 6 - 12m above ground level.	- Total building volume <12,000m³ - Construction material with low potential for dust release - Demolition activities <6m above ground level - Demolition during wetter months
Earthworks	- Total site area >110,000m² - Potentially dusty soil type (e.g. clay) >10 heavy earth moving vehicles active at any one time - Formation of bunds >6m in height	- Total site area 18,000 - 110,000m² - Moderately dusty soil type (e.g. silt) 5 - 10 heavy earth moving vehicles active at any one time - Formation of bunds 3 - 6m in height	- Total site area <18,000m² - Soil type with large grain size (e.g. sand) <5 heavy earth moving vehicles active at any one time - Formation of bunds <3m in height
Construction	- Total building volume >75,000m³ - On site concrete batching - Sandblasting	- Total building volume 12,000 - 75,000m³ - Potentially dusty construction material (e.g. concrete) - On site concrete batching	- Total building volume <12,000m³ - Material with low potential for dust release (e.g. metal cladding or timber)
Trackout	>50 HGV movements in any one day (a) - Potentially dusty surface material (e.g. high clay content) - Unpaved road length >100m	20 - 50 HGV movements in any one day (a) - Moderately dusty surface material (e.g. silt) - Unpaved road length 50 - 100m	<20 HGV movements in any one day (a) - Surface material with low potential for dust release - Unpaved road length <50m
(a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes.			

Receptor Sensitivity

3.14 Factors defining the sensitivity of a receptor are presented in Table 3.2.

Table 3.2: Factors Defining the Sensitivity of a Receptor

Sensitivity	Human (health)	Human (dust soiling)	Ecological
High	- Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM₁₀ (a) - Examples include residential dwellings, hospitals, schools and residential care homes.	- Regular exposure - High level of amenity expected. - Appearance, aesthetics or value of the property would be affected by dust soiling. - Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.	- Nationally or Internationally designated site with dust sensitive features (b) - Locations with vascular species (c)
Medium	- Locations where workers are exposed over a time period relevant to the air quality objectives for PM₁₀ (a) - Examples include office and shop workers (d)	- Short-term exposure - Moderate level of amenity expected - Possible diminished appearance or aesthetics of property due to dust soiling - Examples include parks and places of work	- Nationally designated site with dust sensitive features (b) - Nationally designated site with a particularly important plant species where dust sensitivity is unknown
Low	- Transient human exposure - Examples include public footpaths, playing fields, parks and shopping streets	- Transient exposure - Enjoyment of amenity not expected. - Appearance and aesthetics of property unaffected - Examples include playing fields, farmland (e), footpaths, short-term car parks and roads	Locally designated site with dust sensitive features (b)
(a) 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. (b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete). (c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee. (d) Does not include workers exposure to PM₁₀ as protection is covered by Health and Safety at Work legislation. (e) Except commercially sensitive horticulture.			



3.15 The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

Area Sensitivity

3.16 The sensitivity of the *area* to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing PM₁₀ concentrations in the area. Tables 3.3 and 3.4 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively.

Table 3.3: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the source (a)			
		<20m	<50m	<100m	<250m
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

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.



Table 3.4: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ (µg/m ³)	Number of Receptors	Distance from the source (a)			
			<20m	<50m	<100m	<250m
High	> 32	> 100	High	High	High	Medium
		10 - 100	High	High	Medium	Low
		1 - 10	High	Medium	Low	Low
	28 - 32	> 100	High	High	Medium	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low
	24 - 28	> 100	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	< 24	> 100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	>32	> 10	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	28-32	> 10	Medium	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	<28	-	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low
(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.						



3.17 For each dust emission source (demolition, construction, earthworks and trackout), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

Risk of Dust Impacts

3.18 The risk of dust impacts prior to mitigation for each emission source is presented in Tables 3.5 and 3.6.

Table 3.5: Risk of Dust Impacts – Demolition

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

Table 3.6: Risk of Dust Impacts – Earthworks, Construction and Trackout

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

Mitigation and Significance

3.19 The IAQM guidance provides a range of mitigation measures which are dependent on the level of dust risk attributed to the site. Site specific mitigation measures are also included where appropriate.

3.20 The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity following the application of appropriate mitigation measures. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effects will normally be negligible.

Construction Traffic

3.21 Construction traffic will contribute to existing traffic levels on the surrounding road network. The greatest potential for impacts on air quality from traffic associated with this phase of the Proposed Development will be in the areas immediately adjacent to the principal means of access for construction traffic.

3.22 Information is not currently available regarding the numbers of vehicles associated with construction; however the flows are not predicted to be significant in terms of total emissions or construction duration. Impacts from construction traffic on local air quality have not been considered any further within this assessment.

Operational Phase Methodology

3.23 Air quality at the Proposed Development has been predicted using the ADMS Roads dispersion model (Version 5.0.1.3). This is a commercially available dispersion model and has been widely validated for this type of assessment and used extensively in the Air Quality Review and Assessment process.

3.24 The model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user. Meteorological data from Luton Airport for the year 2023 has been used for the assessment.

3.25 The model has been used to predict road specific concentrations of oxides of nitrogen (NO_x) and Particulate Matter (PM_{10} and $\text{PM}_{2.5}$) at selected receptors. The predicted concentrations of NO_x have been converted to NO_2 using the NO_x to NO_2 calculator (August 2024) available on the Defra air quality website¹⁴.

3.26 A summary of the traffic data used in the assessment can be found in **Appendix C**. The data includes details of annual average daily traffic flows (AADT), vehicle speeds and percentage Heavy Duty Vehicles (HDV) for the assessment years considered. Low traffic speeds have been assigned to appropriate road links to account for congestion and queuing vehicles.

3.27 The following scenarios have been included in the assessment:

¹⁴ <http://uk-air.defra.gov.uk>

- 2023 – baseline traffic (for verification purposes);
- 2029 – baseline traffic (hereafter referred to as ‘without development’ scenario); and
- 2029 – baseline and development traffic (hereafter referred to as ‘with development’ scenario).

3.28 The emission factors released by Defra in March 2025, provided in the emissions factor toolkit EFT2025 v13.1 have been used to predict traffic related emissions in 2023 (for verification purposes) and 2029.

3.29 To predict local air quality, traffic emissions predicted by the model must be added to local background concentrations. Background concentrations of NO₂, PM₁₀ and PM_{2.5} have been taken from the 2021 Defra background maps. The maps provide an estimate of background concentrations between 2021 and 2040. The data used for the modelling assessment are set out in Table 4.5.

3.30 Background concentrations for 2023 have been used to predict concentrations in 2029 assuming no change in future years. This is considered to represent a worst-case prediction of future concentrations.

3.31 To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process aims to minimise modelling uncertainty and systematic error by correcting the modelled results by an adjustment factor to gain greater confidence in the final results. This process was undertaken using the methodology outlined in Chapter 7, Section 4 of LAQM.TG(22).

3.32 A verification factor of 2.70 was determined which indicates that the model is under-predicting in this area. This factor was applied to the modelled road-NO_x concentrations prior to conversion to annual mean NO₂ concentrations using the NO_x to NO₂ calculator. Further details of the determination of the verification factor are provided in **Appendix D**.

3.33 Local roadside monitoring data was not available for concentrations of PM₁₀ and PM_{2.5}, the modelled pollutant road-contributions for PM₁₀ and PM_{2.5} were therefore adjusted using the verification factor obtained for NO_x as recommended in the guidance provided in LAQM.TG(22).

3.34 A quantitative assessment of air quality in the vicinity of the Proposed Development has been completed against the Air Quality Strategy objectives set out in **Appendix B** for NO₂, PM₁₀ and PM_{2.5}.

Sensitive Receptors

3.35 LAQM.TG(22) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations ‘where members of the public are regularly present’ should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

3.36 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. For private dwellings, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

3.37 Details of the receptor locations for the roads modelling assessment are presented in Table 3.7 and illustrated in Figures 3.1 and 3.2.

Table 3.7: Location of Sensitive Receptors

ID	Receptor	Type	Easting	Northing
R1	27 Turnpike Lane	Residential	518037.2	231414.9
R2	18 Turnpike Lane	Residential	517954.4	231356.9
R3	Dwelling at Ickleford Manor	Residential	517895.1	231276.9
R4	2 Nun’s Close	Residential	518151.0	229161.1
R5	Chancery Place	Residential	518144.9	229108.6
R6	1 Coopers Yard	Residential	518209.1	229094.3
R7	41 Park Way	Residential	518132.9	229040.3
R8	The Chapmans	Residential	518142.4	228997.6
R9	43 Upper Tilehouse Street	Residential	518094.1	229054.9
R10	66 Upper Tilehouse Street	Residential	518067.1	229059.0
R11	58 Upper Tilehouse Street	Residential	518012.2	229037.3
P1	Façade of the Proposed Development	Proposed	517946.3	231284.1
P2	Façade of the Proposed Development	Proposed	518022.4	231337.4
P3	Façade of the Proposed Development	Proposed	518154.1	231393.1

Figure 3.1: Location of Receptors Considered within ADMS Model (Turnpike Lane)

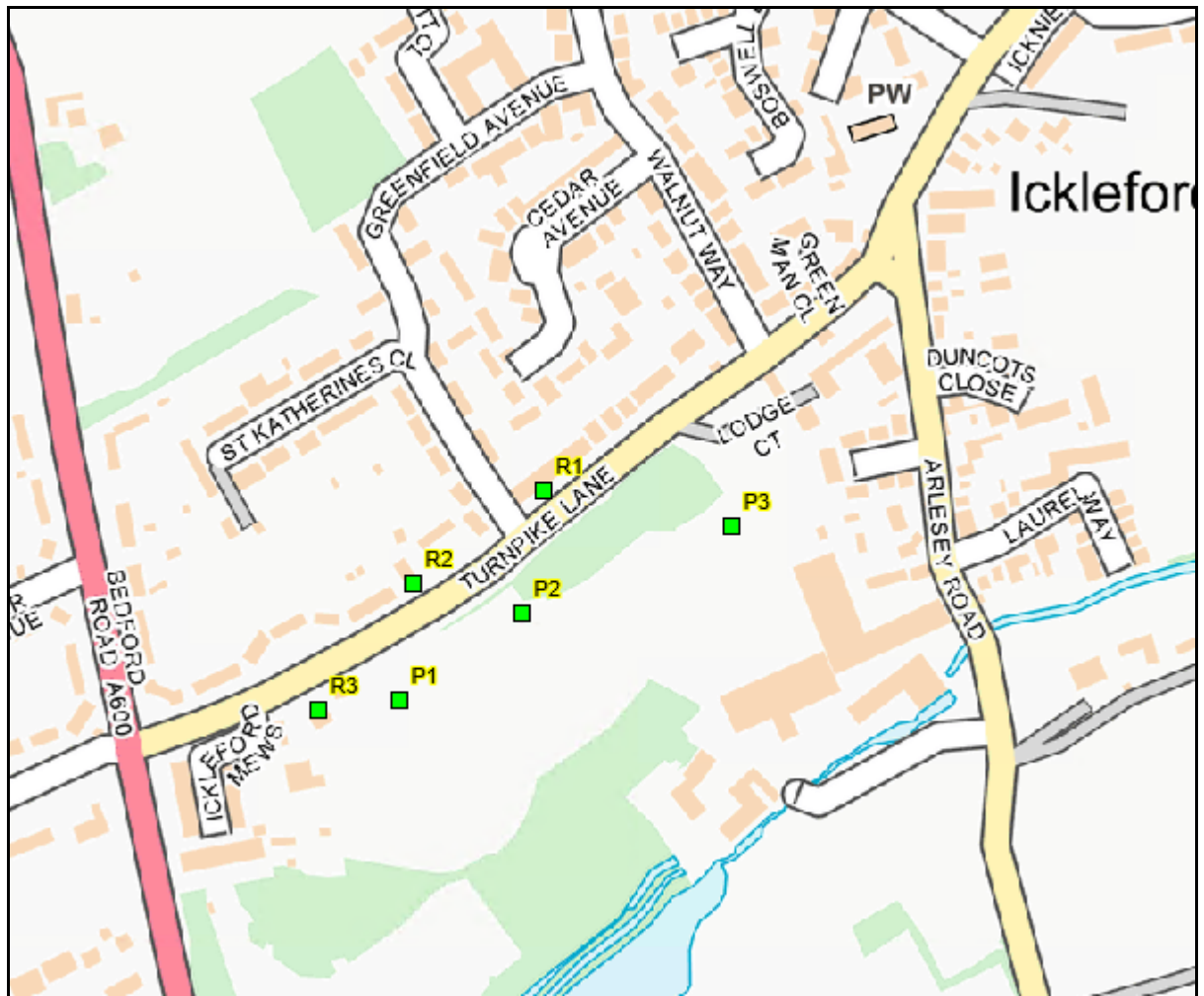
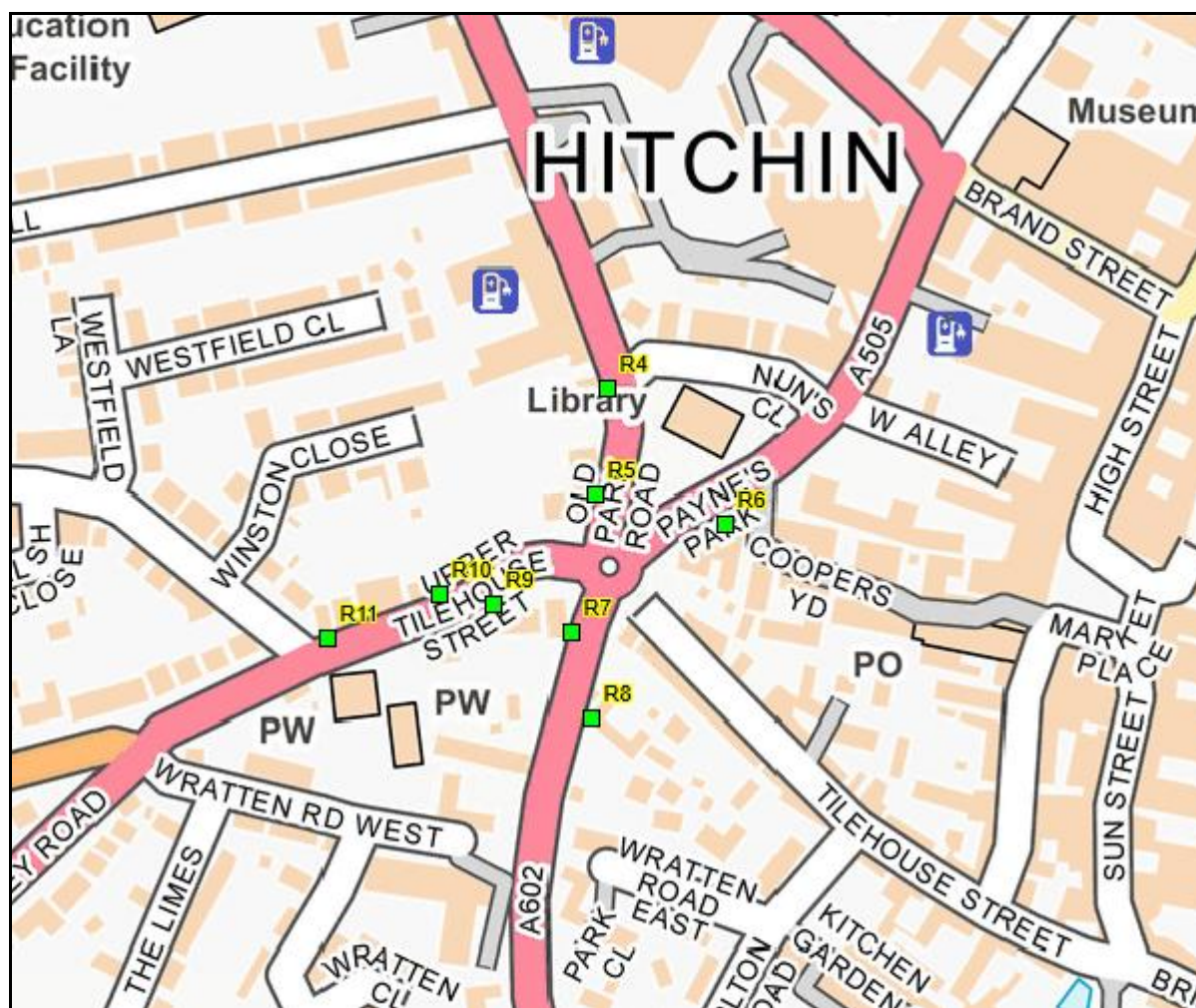


Figure 3.2: Location of Receptors Considered within ADMS Model (Paynes Park Roundabout AQMA)



Significance Criteria

3.38 The EPUK & IAQM planning guidance provides criteria for determining the significance of a development. The EPUK & IAQM guidance recommends that the impact at individual receptors is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion as summarised in Table 3.8.

Table 3.8: Impact Descriptors for Individual Receptors.

Long Term Average Concentration at Receptor in Assessment Year	% Change in concentration relative to AQAL (a)			
	1	2-5	5-10	>10
75% or less of AQAL	Negligible	Negligible	Slight adverse	Moderate adverse
76-94% of AQAL	Negligible	Slight adverse	Moderate adverse	Moderate adverse
95-102% of AQAL	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
103-109% of AQAL	Moderate adverse	Moderate adverse	Substantial adverse	Substantial adverse
110% or more of AQAL	Moderate adverse	Substantial adverse	Substantial adverse	Substantial adverse
(a) A change in concentration of less than 0.5% of the AQAL is considered insignificant, however changes between 0.5% and 1% are rounded up to 1%.				

3.39 The EPUK & IAQM guidance notes that the criteria in Table 3.8 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK & IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the Proposed Development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.



4 BASELINE CONDITIONS

North Herts Council Review and Assessment of Air Quality

4.1 NHC have carried out detailed assessments of air quality and as a result have declared two AQMAs due to elevated concentrations of NO₂:

- Stevenage Road, Hitchin: properties on the south side of Stevenage Road, Hitchin, fronting on to the road, between the Hitchin Hill Three Moorhens PH roundabout and 94-98 Stevenage Road.
- Payne's Park roundabout, Hitchin: one residential property located adjacent to the Payne's Park Roundabout.

4.2 The Site is not located within or near either of these AQMAs. The review and assessment has not identified any exceedances of the air quality objectives in Ickleford or in the vicinity of the Site.

Automatic Local Monitoring Data

4.3 NHC undertook automatic monitoring at two co-located sites at Stevenage Road, Hitchin, which are roadside sites located approximately 2.8km to the southeast of the Site. Bias adjusted data obtained from this monitoring station is presented in Tables 4.1, 4.2 and 4.3.

Table 4.1: NO₂ Concentrations recorded at the Continuous Automatic Monitor

Monitoring Site	Statistic	2019	2020	2021	2022	2023
NH1 Stevenage Road	Annual Mean (µg/m ³)	45	37	31	31	26.5
	Number of 1-hour means > 200 µg/m ³	0	0	0	0	0
Data obtained from NHC Air Quality Annual Status Report 2024						

4.4 An exceedance of the AQS objective for annual mean NO₂ concentrations has been experienced at the roadside monitor throughout the years of monitoring presented. However, this monitor is located on a busy A-road within the Stevenage Road AQMA, so it is not considered to be representative of conditions at the Site.

4.5 No exceedances of the hourly objective has been recorded during the five years of the monitoring presented, therefore the objective was met in all five monitoring years.



Table 4.2: PM₁₀ Concentrations recorded at the Continuous Automatic Monitor

Monitoring Site	Statistic	2019	2020	2021	2022	2023
NH2 Stevenage Road	Annual Mean (µg/m ³)	20.4	19.7	17	18.5	17.7
	Number of 24-hour means > 50 µg/m ³	5	1	0	4	1
Data obtained from WC Air Quality Annual Status Report 2024						

4.6 Annual mean PM₁₀ concentrations recorded have been consistently below the 40 µg/m³ objective between 2019 and 2023 at Stevenage Road.

4.7 Exceedances of the 24-hour objective have been recorded at the monitoring station during the five years of the monitoring presented, however the objective allows for 35 exceedances of the 50 µg/m³ limit in any given year therefore the objective was met in all five monitoring years.

Table 4.3: PM_{2.5} Concentrations recorded at the Continuous Automatic Monitor

Monitoring Site	Statistic	2019	2020	2021	2022	2023
NH2 Stevenage Road	Annual Mean (µg/m ³)	8.4	8.4	8	8.1	-
Data obtained from NHC Air Quality Annual Status Report 2024						

4.8 Annual mean PM_{2.5} concentrations recorded have been consistently below the 20 µg/m³ objective between 2019 and 2022 at Stevenage Road.

Non-Automatic Monitoring

4.9 NHC monitors NO₂ concentrations at 37 sites across North Herts using diffusion tubes. Details of the closest diffusion tubes to the Site are set out in Table 4.4, along with recent recorded concentrations.

Table 4.4: Annual Mean NO₂ Concentrations Measured by Diffusion Tube (µg/m³)

Site Name	Site Type	Annual Mean Concentrations (µg/m ³)				
		2019	2020	2021	2022	2023
S12/NH131 Turnpike Lane	Roadside	-	38.0	28.9	29.1	15.4
S7/NH67 Cadwell Court, Hitchin	Roadside	23.5	20.0	19.3	20.8	16.4
S8/NH127 64 Grove Road, Hitchin	Roadside	21.0	-	17.7	20.6	15.6
S25/NH99 Nightingale Road, Hitchin	Roadside	28.0	18.1	21.4	22.9	18.3



4.10 The AQS objective for annual mean NO₂ concentrations has been met at all of the diffusion tubes in the vicinity of the Site.

4.11 Diffusion tubes cannot monitor short-term NO₂ concentrations, however, research has concluded¹⁵ that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations do not exceed 60 µg/m³. Annual mean NO₂ concentrations were below 60 µg/m³ at the monitoring sites, therefore it is expected that the 1-hour objective is being met at these locations and at the Site.

4.12 Based on the data recorded at these sites, NO₂ concentrations are expected to meet the annual mean and 1-hour mean objectives at the Site.

Defra Background Maps

4.13 Additional information on background concentrations in the vicinity of the Site has been obtained from the Defra background pollutant maps. The 2021 Defra background maps provide estimated concentrations for the years 2021 to 2040. For the purposes of this assessment 2023 background concentrations have been obtained.

4.14 The pollutant concentrations from each of the grid squares representing the assessment area have been extracted from the maps which include the Site, modelled receptors and road links included in the modelling assessment. The background concentration for each pollutant used in the assessment is presented in Table 4.5 below.

Table 4.5: Estimated Annual Mean Background Concentrations from Defra Maps (µg/m³)

Grid Square	Relevant Receptor	NO ₂	PM ₁₀	PM _{2.5}
518500, 231500	R1, P2, P3, S12/NH131	8.6	13.0	7.4
517500, 231500	R2, R3, P1	7.7	13.5	7.2
518500, 229500	R4-R11, S36/NH14, S6/NH63, S13/NH82, S20/NH93, S11/NH77	10.1	12.8	7.8

4.15 The data presented in Table 4.5 shows background concentrations of all three pollutants to be well below the relevant annual mean objectives.

¹⁵ D. Laxen and B Marner (2003) Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.



5 ASSESSMENT OF IMPACT

Construction Phase

Area Sensitivity

5.1 The Site is currently occupied by open fields, therefore there are no buildings requiring demolition at the Site. An assessment of dust effects associated with demolition have therefore not been included within this assessment.

5.2 The assessment of dust impacts of earthworks, construction works and trackout is dependent on the proximity of the most sensitive receptors to the Site boundary. A summary of the receptor and area sensitivity to health and dust soiling impacts is presented in Table 5.1.

Table 5.1: Sensitivity of Receptors and the Local Area to Dust and PM₁₀ Impacts

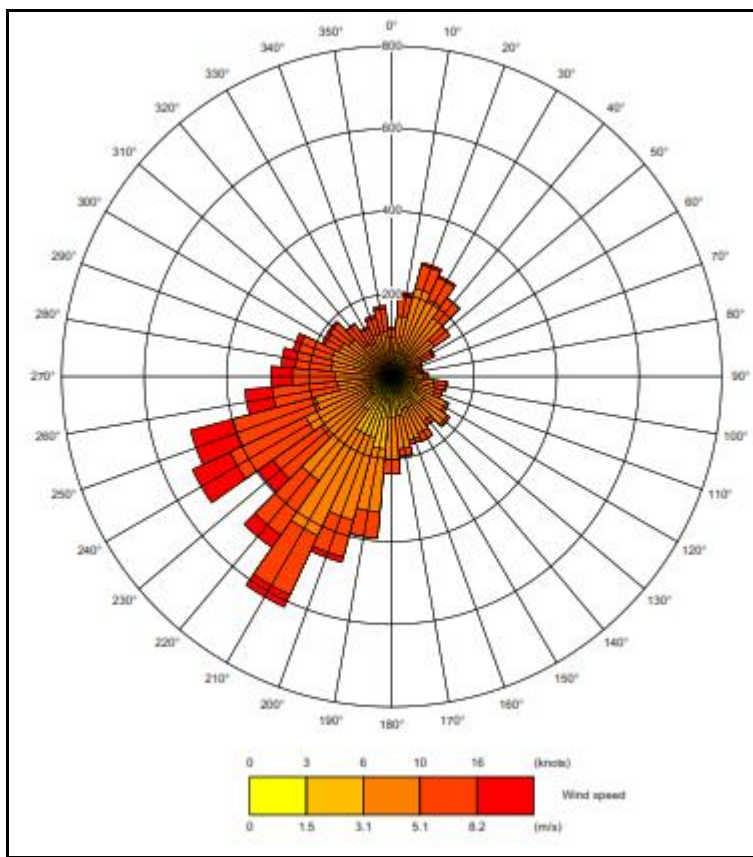
Receptor	Distance from Site Boundary (m)	Approx. Number of Receptors	Sensitivity to Health Impacts (a)		Sensitivity to Dust Soiling Impacts	
			Receptor	Area	Receptor	Area
Residential Properties	<20 m	1-10	High	Low	High	Medium
	<50 m	10-100	High	Low	High	Medium
Overall Sensitivity of the Area			Low		Medium	
(a) Estimated background PM ₁₀ concentration is 13.5 µg/m ³ .						

5.3 Construction traffic will access the Site via Turnpike Lane, where there are residential properties within 20m of the roadside. The sensitivity of the area to effects from track out are therefore high for nuisance dust and low for human health.

5.4 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

5.5 A wind rose from Luton Airport is provided in Figure 5.1, which shows that the prevailing wind is from the southwest, therefore receptors to the northeast of the Proposed Development are the most likely to experience dust impacts from the Proposed Development. Residential dwellings are located to the northeast of the Proposed Development.

Figure 5.1: Wind Rose for Luton Airport Meteorological Station (2023)



Dust Emission Magnitude

5.6 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping. The total area of the Site is approximately 16.23ha. The IAQM guidance defines an area as 'large' in terms of emissions of dust and particulates during the earthworks phase if the area is in excess of 110,000m². It is also likely that >10 heavy earth moving vehicles will be active at any one time, therefore the dust emission magnitude for the Proposed Development is considered to be '*large*'.

5.7 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build. The volume of the proposed buildings is not known, but due to the size of the Site and to ensure a worst-case assessment, the dust emission magnitude is considered to be '*large*'.

5.8 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. Based on the size of the Site and to ensure a worst case assessment, the dust emission magnitude due to trackout is considered to be '*large*'.



Dust Risk Effects

5.9 A summary of the potential risk of dust impacts, based on the low overall sensitivity of the area to human health impacts and medium overall sensitivity to dust soiling, is presented in Table 5.2.

Table 5.2: Risk of Dust Impacts Prior to Mitigation

Source	Impact Magnitude	Human Health Risk	Dust Soiling Risk
Earthworks	Large	Low	Medium
Construction	Large	Low	Medium
Trackout	Large	Low	High

Operational Phase

NO₂ Concentrations

5.10 Annual mean NO₂ concentrations predicted at the selected receptor locations are set out in Table 5.3. The concentrations include the estimated background NO₂ concentrations indicated in Table 4.5.

Table 5.3: Predicted Annual Mean Nitrogen Dioxide Concentrations at Selected Receptors (µg/m³)

Receptor Number	2029 Without Development	2029 With Development	Change as a result of Development (as % of the AQAL)	Impact Descriptor
R1	10.0	10.1	0.2	Negligible
R2	9.0	9.1	0.2	Negligible
R3	8.4	8.4	0.1	Negligible
R4	15.0	15.0	0.1	Negligible
R5	17.5	17.5	0.1	Negligible
R6	13.8	13.8	0.0	Negligible
R7	18.5	18.5	0.1	Negligible
R8	16.4	16.4	0.0	Negligible
R9	16.4	16.4	0.0	Negligible
R10	16.7	16.7	0.0	Negligible
R11	16.6	16.6	0.0	Negligible
P1	-	8.1	-	-
P2	-	9.2	-	-
P3	-	8.9	-	-



5.11 The predicted annual mean NO₂ concentrations are well below (less than 75% of) the 40µg/m³ objective level at all selected receptor locations under both scenarios.

5.12 In accordance with the EPUK & IAQM significance criteria, the impact on annual mean NO₂ concentrations at all receptors as a result of traffic emissions from the Proposed Development is predicted to be *negligible*.

5.13 As the predicted annual mean NO₂ concentrations are all below 60 µg/m³, it is considered unlikely that the 1-hour objective will be exceeded at any of the selected receptors. The impact of the Proposed Development on hourly mean NO₂ concentrations is therefore also considered to be *negligible*.

5.14 The predicted concentrations within the Site are well below (less than 75% of) the relevant AQS objective level, therefore the impact of the Proposed Development with regards new exposure to air quality is also considered to be *negligible*.

PM₁₀ Concentrations

5.15 Predicted annual mean PM₁₀ concentrations at the selected receptor locations are presented in Table 5.4. The concentrations include the estimated background PM₁₀ concentrations indicated in Table 4.5.

Table 5.4: Predicted Annual Mean PM₁₀ Concentrations at Selected Receptors (µg/m³)

Receptor Number	2029 Without Development	2029 With Development	Change as a result of Development (as % of the AQAL)	Impact Descriptor
R1	13.8	13.8	0.1	Negligible
R2	14.2	14.3	0.1	Negligible
R3	13.9	13.9	0.1	Negligible
R4	15.3	15.3	0.0	Negligible
R5	16.1	16.1	0.0	Negligible
R6	14.6	14.6	0.0	Negligible
R7	17.0	17.0	0.0	Negligible
R8	16.2	16.2	0.0	Negligible
R9	16.1	16.1	0.0	Negligible
R10	16.3	16.3	0.0	Negligible
R11	16.0	16.0	0.0	Negligible
P1	-	13.7	-	-
P2	-	13.3	-	-



Receptor Number	2029 Without Development	2029 With Development	Change as a result of Development (as % of the AQAL)	Impact Descriptor
P3	-	13.1	-	-

5.16 The predicted annual mean PM₁₀ concentrations are well below (less than 75% of) the 40µg/m³ objective level at all the selected receptor locations including the Proposed Development site, under both scenarios.

5.17 In accordance with the EPUK & IAQM significance criteria, the impact on annual mean PM₁₀ concentrations at all receptors as a result of traffic emissions from the Proposed Development is predicted to be *negligible*.

5.18 LAQM.TG(22) provides a relationship between predicted annual mean concentrations and the likely number of exceedances of the short-term (24-hour mean) PM₁₀ objective of 50µg/m³ (N), where:

$$N = -18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean}).$$

5.19 The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32 µg/m³.

5.20 The number of predicted exceedances at all receptors under all scenarios is less than 1 day with a change of less than one day with the operational Proposed Development. The impact of the Proposed Development on the 24-hour objective would also be *negligible*.

5.21 The predicted PM₁₀ concentrations within the Site are also well below (less than 75% of) the relevant AQS objective level, therefore the impact with regards new exposure to air quality is considered to be *negligible* in respect of this pollutant.

PM_{2.5} Concentrations

5.22 Predicted annual mean PM_{2.5} concentrations at the selected receptor locations are presented in Table 5.5. The concentrations include the estimated background PM_{2.5} concentrations indicated in Table 4.5.



Table 5.5: Predicted Annual Mean PM_{2.5} Concentrations at Selected Receptors (µg/m³)

Receptor Number	2029 Without Development	2029 With Development	Change as a result of Development (as % of the AQAL)	Impact Descriptor
R1	7.8	7.8	0.1	Negligible
R2	7.6	7.6	0.1	Negligible
R3	7.4	7.5	0.1	Negligible
R4	9.1	9.1	0.0	Negligible
R5	9.5	9.5	0.0	Negligible
R6	8.7	8.7	0.0	Negligible
R7	10.0	10.0	0.0	Negligible
R8	9.6	9.6	0.0	Negligible
R9	9.5	9.5	0.0	Negligible
R10	9.6	9.6	0.0	Negligible
R11	9.5	9.5	0.0	Negligible
P1	-	7.4	-	-
P2	-	7.5	-	-
P3	-	7.4	-	-

5.23 The predicted annual mean PM_{2.5} concentrations are well below (less than 75% of) the 20 µg/m³ objective level at all the selected receptor locations under both scenarios.

5.24 In accordance with the EPUK & IAQM significance criteria, the significance of the impact of the operation of the Proposed Development on annual mean PM_{2.5} concentrations is *negligible*.

5.25 The predicted concentrations at the Site are well below (less than 75% of) the relevant AQS objective level, therefore the impact of the Proposed Development with regards new exposure to air quality is considered to be *negligible* in respect of this pollutant.

5.26 New legislation in 2023 has introduced an additional target for PM_{2.5} of 10µg/m³ to be achieved by the year 2040 and an interim target of 12µg/m³ to be achieved by 2028. Due to the uncertainty of future background concentrations and to ensure a worst-case assessment, background concentrations from the year 2023 have been used to predict the overall concentrations in the opening year of 2029 assuming no change in background concentrations. It is however, expected that the background concentration of PM_{2.5} will reduce in future years. The highest predicted concentration at a residential receptor is 10.0 µg/m³, which indicates the interim target level will be reached at the Proposed Development in the year 2029. It is considered that as



the background concentration of PM_{2.5} will likely reduce in future years that the Proposed Development will not hinder the achievement of the future targets for PM_{2.5}.

POLLUTANT EMISSION COSTS CALCULATION

5.27 The impact of the traffic associated with the operation of the Proposed Development is considered to be negligible. Nonetheless, in accordance with the advice provided in the NHC Air Quality Planning Guidance Document, mitigation measures will be implemented to reduce operational emissions.

5.28 In order to assist in determining the value of emissions mitigation required, a pollutant emissions cost calculation was completed in accordance with the advice provided in the NHC Air Quality Planning Guidance Document and Defra's Damage Costs Appraisal Toolkit. The inputs used for the Defra EFT, which is used to estimate the mass of pollutants emitted, and the subsequent calculation are provided in Table 5.6.

Table 5.6: Pollutant Emission Costs Calculation

	NO _x	PM _{2.5}
Proposed Development Trips (as AADT) ⁽¹⁾	502 (1.0% HGV)	
Average Trip Length (km) ⁽²⁾	10	
Emissions (kg/yr) ⁽³⁾	208.93	32.29
Emissions (tonnes/yr)	0.21	0.03
Damage Cost (per tonne) ⁽⁴⁾	£7,545.00	£52,114.00
Cost of 5 Year Exposure	£7,881.80	£8,413.00
Total	£16,294.80	
(1) Provided by Transport Consultants		
(2) Obtained from National Travel Survey (UK Average)		
(3) Value obtained from EFT spreadsheet for 2029 (assuming average speed of 48kph)		
(4) IGC B Air Quality Damage Costs per tonne (2023 prices) (Central Estimate for Transport Urban Small)		

5.29 The pollutant emission costs calculation presented above suggests a damage cost of £16,294.80. A range of costs is provided, the above damage cost is based on the Central Estimate.



6 MITIGATION

Construction Phase

6.2 The control of dust emissions from construction site activities relies upon management provision and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, construction operations have been successfully undertaken without impacts to nearby properties.

6.3 Overall the Site is considered to be a high risk of dust impacts, and a low risk to human health from particulate matter concentrations at nearby receptors during the construction phase. Appropriate mitigation measures for the Site have been identified following the IAQM guidance and based on the risk effects presented in Table 5.2. It is recommended that the 'highly recommended' measures set out in **Appendix E** are adhered to during the construction phase.

6.4 Following implementation of the 'highly recommended' measures outlined in the IAQM guidance and reproduced in **Appendix E**, the impact of emissions during construction of the Proposed Development would be negligible.

Operational Phase

6.5 The detailed dispersion modelling indicates that the impact of the operation of the Proposed Development on local pollutant concentrations is negligible and that the concentrations of relevant pollutants (NO₂, PM₁₀ and PM_{2.5}) at nearby sensitive receptors and at the Site will meet the relevant air quality objectives.

6.6 In line with the NHC Air Quality Planning Guidance Document, the following mitigation measures will be included within the Proposed Development:

- 1 Electric Vehicle charging point per dwelling with dedicated parking or 1 charging point per 10 spaces (unallocated parking);
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing);
- Improved pedestrian links to public transport stops;
- Provision of residential travel vouchers;
- Site layout to include improved pedestrian pathways to encourage walking; and
- Support secure and safe cycle parking facilities at the Site.



6.7 The cost of implementing the above mitigation measures will exceed the emission costs figure calculated in Table 5.6 by a significant margin. The implementation of the above mitigation measures should further reduce the impact of emissions during operation of the Proposed Development.



7 CONCLUSIONS

7.1 An air quality impact assessment has been carried out to assess operational impacts of the Proposed Development.

7.2 An assessment of the potential impacts during the construction phase has been carried out in accordance with the latest Institute of Air Quality Management Guidance and including consideration of the proximity of the nearest sensitive receptors. This has shown that for the Proposed Development, limited releases of dust and particulate matter are likely to be generated from on-site activities. However, through good site practice and the implementation of suitable mitigation measures, the impact of dust and particulate matter releases may be effectively mitigated and the resultant impacts are considered to be negligible.

7.3 ADMS Roads dispersion modelling has been carried out to assess the impact of the operation of the Proposed Development on local pollutant concentrations. The results indicate that predicted concentrations of relevant pollutants (NO_2 , PM_{10} and $\text{PM}_{2.5}$) concentrations are well below the relevant objectives at nearby sensitive receptors and at the Site.

7.4 In accordance with the EPUK & IAQM significance criteria, the overall impact of the operation of the Proposed Development on NO_2 , PM_{10} and $\text{PM}_{2.5}$ concentrations is considered to be negligible. The impact of the Proposed Development with regards to new exposure to air quality is considered to be negligible.

7.5 A pollutant emission costs calculation has been carried out in accordance with the NHC Air Quality Planning Guidance Document. A damage cost of £16,294.80 was determined and mitigation has been identified.

7.6 It is concluded that air quality does not pose a constraint to the Proposed Development, either during construction or once operational.



APPENDIX A - AIR QUALITY TERMINOLOGY

Term	Definition
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
DEFRA	Department for Environment, Food and Rural Affairs.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO₂	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O₃	Ozone.
Percentile	The percentage of results below a given value.
PM₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
ppb parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10 ⁹) units of air, there is one unit of pollutant present.
ppm parts per million	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every billion (10 ⁶) units of air, there is one unit of pollutant present.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
µg/m³ micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1 µg/m ³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.



APPENDIX B - AIR QUALITY STRATEGY OBJECTIVES

Table B1: Air Quality Strategy Objectives

Pollutant	Objective Level (µg/m ³)	Averaging Period	No. of Permitted Exceedances	Notes
NO ₂	200 (a)	1-Hour	18 per annum (99.8 th percentile)	
	40 (a)	Annual	-	
PM ₁₀	50 (a)	24-Hour	35 per annum (90.4 th percentile)	
	40 (a)	Annual	-	
PM _{2.5}	20 (b)	Annual		
	12 (b)	Annual		Interim Target to be achieved by end Jan 2028
	10 (c)	Annual		Target Level to be achieved by end Dec 2040
(a) Air Quality Standards Regulations (2016) and amendments				
(b) Environmental Improvement Plan 2023				
(c) The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023				



APPENDIX C - SUMMARY OF TRAFFIC DATA

Table C1: Traffic data utilised for the air quality assessment (AADT)

Road Link	Speed (kph)		2023 Verification		2029 Without Development		2029 With Development	
	Freeflow	Congestion/ Junction	AADT	% HGV	AADT	% HGV	AADT	% HGV
Turnpike Lane	39	15	7613	7.5	7898	7.5	8400	7.5
A505 Old Park Road	30	15	13411	3.4	14088	3.4	14165	3.4
A505 Paynes Park	30	15	12275	3.3	12895	3.3	12972	3.3
A602 Park Way	30	15	27627	3.0	29022	3.0	29106	3.0
A505 Upper Tilehouse Street	30	15	21177	3.5	22246	3.5	22315	3.5



APPENDIX D – VERIFICATION AND ADJUSTMENT OF MODELLED CONCENTRATIONS

Nitrogen Dioxide (NO₂)

Most nitrogen dioxide (NO₂) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS model has followed the methodology presented in LAQM.TG(22).

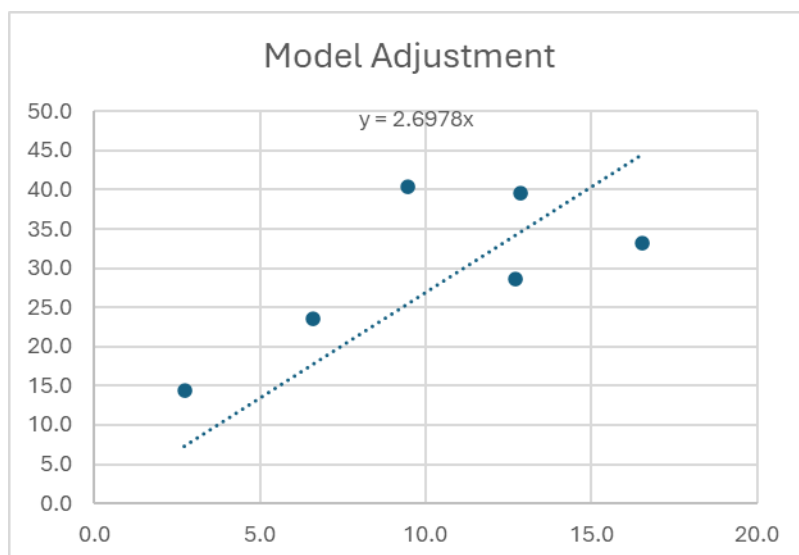
The model has been run to predict annual mean road-NO_x concentrations at six nearby monitoring sites.

The model output of road-NO_x (i.e. the component of total NO_x coming from road traffic) has been compared to the 'measured' road-NO_x (Table D1). The 'measured' road NO_x has been calculated from the measured NO₂ concentrations by using the Defra NO_x to NO₂ calculator available on the UK-AIR website.

Table D1: Comparison of Modelled and Monitored NO_x concentrations

Monitoring Location	Total Monitored NO ₂	Background NO ₂	Monitored Road NO _x	Modelled Road NO _x	Ratio
S12/NH131	15.4	8.6	14.5	2.7	5.30
S36/NH14	20.7	10.1	23.6	6.6	3.59
S6/NH63	24.5	10.1	33.2	16.5	2.01
S13/NH82	22.7	10.1	28.6	12.7	2.25
S20/NH93	26.9	10.1	39.6	12.9	3.08
S11/NH77	27.2	10.1	40.4	9.5	4.27

Figure D1: Comparison of Modelled and Monitored NO_x concentrations



The results in Table D1 and Figure D1 indicate that the ADMS model under-predicted road NO_x concentrations at the selected monitoring sites. An adjustment factor was therefore determined as the ratio between the measured road-NO_x contribution and the modelled road-NO_x contribution (2.70). This factor has then been applied to the modelled road-NO_x concentration for each location to provide an adjusted modelled road-NO_x concentration.

The annual mean road-NO₂ concentration was determined using the Defra NO_x:NO₂ spread sheet calculation tool and added to the background NO₂ concentration to produce a total adjusted NO₂ concentration.

Particulate Matter (PM₁₀ and PM_{2.5})

There was insufficient roadside monitoring data available against which the modelling could be verified. Consequently, the verification factor determined above for adjusting the road-NO_x contribution has been applied to the predicted road-PM₁₀ and road-PM_{2.5} contributions, consistent with guidance provided in LAQM.TG(22).

Model Uncertainty

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG(22) identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. These include root mean square error (RMSE); fractional bias (FB) and correlation coefficient (CC). These parameters estimate how the model results agree or diverge from the observations. The simplest parameter to calculate and to interpret is the RMSE, which has therefore been used in this assessment to understand the model uncertainty.



The RMSE value calculated after verification was 3.5. Guidance provided in LAQM.TG(22) indicates that for RMSE values higher than 25% of the objective level, that the model should be revisited. Ideally an RMSE value should be within 10% of the air quality objective level. For annual mean NO₂, which has an objective level of 40µg/m³, this equates to 4µg/m³. The RMSE value calculated for this assessment is therefore considered to fall within the acceptable limits, therefore the final predictions can be considered to be robust.



APPENDIX E - CONSTRUCTION MITIGATION MEASURES

The following measures are detailed in the IAQM guidance as being 'highly recommended' for sites of the level of risk identified for the Site. It is therefore recommended that these measures are adhered to during the construction works.

- develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- display the name and contact details of the person accountable for air quality and dust issues on the site boundary (i.e. the environment manager/engineer or site manager);
- display the head or regional office contact information;
- develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the local authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, realtime PM₁₀ continuous monitoring and/or visual inspections.
- record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off- site and the action taken to resolve the situation in the log book;
- hold regular liaison meetings with other high risk construction sites within 250 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;
- 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 100m of the site boundary, with cleaning to be provided if necessary;
- carry out regular site inspections to monitor compliance with the DMP, record inspection results and make inspection log available to the local authority when asked;
- increase frequency of site inspection 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 periods of dry or windy conditions;
- agree dust deposition, dust flux, or real-time PM₁₀ 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. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles;
- fully enclose site or specific operations where there is a high potential for dust production and the activities are being undertaken for an extensive period;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods;
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If being re-used on site, cover as detailed below;
- cover, seed or fence stockpiles to prevent wind whipping;
- ensure all vehicles switch off engines when stationary - no idling vehicles;
- avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- impose and signpost a maximum speed limit of 15mph on surfaces and 10mph on un-surfaces 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);
- produce a construction logistic plan to manage the sustainable delivery of goods and materials;
- implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing);
- 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;
- ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- 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;
- avoid bonfires and burning of waste materials;
- re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable;



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- only remove the cover in small areas during work and not all at once;
 - avoid scabbing (roughening of concrete surfaces) if possible;
 - 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;
 - 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;
 - for smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust;
 - use water-assisted dust sweepers on the access and local roads, to remove, as necessary, any material tracked out of the site;
 - avoid dry sweeping of large areas;
 - ensure vehicles entering and leaving the site are covered to prevent the escape of materials during transport;
 - inspect on-site haul routes for integrity and instigate necessary repairs to the surfaces as soon as reasonably practicable;
 - record all inspections of haul routes and any subsequent action in a site log book;
 - install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
 - implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud);
 - ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit; and
 - access gates to be located at least 10 m from receptors where possible.